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Does Measuring Quality of Delivery for a Parent Led Intervention to Treat ADHD in Children Explain Individual Variation in Outcome?

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Abstract

Introduction: Parent led interventions (PLI) to treat ADHD in children were not found to be effective for ADHD symptoms from non-blinded reports compared with controls. In addition apart from baseline child symptom severity, no factors consistently explained for whom these interventions are effective and why. One reason for individual variation in outcome could be quality of delivery measured in real time. This study developed and applied a bespoke measure of “quality of delivery” to explore this. It was applied to all subjects of the New Forest Parenting Programme arm of the Comparison of Preschool Parenting Interventions (COPPI) trial (n=133).

Structure: Initially this thesis explored the current evidence base behind ADHD associative factors and causality (Chapter One). The role of parenting behaviours and other environmental factors are presented in the context of being protective or further exacerbating baseline ADHD genetic risk. Chapter Two systematically explores the role of attendance measures in explaining individual variation in the effectiveness of parent led interventions to treat ADHD. How the theory from Chapter One is incorporated into the change content and methods behind the intervention applied in the COPPI trial is the focus of Chapter Three with Chapter Four being the methodology behind the current thesis.

Method: The experiential aim of this thesis was whether measuring quality of delivery of a parent led intervention explained individual variation in child behavioural outcomes in this sample. This was a longitudinal, observational study focussing only on trial cases with quantity of delivery (7 sessions or more). The quality measure included 10 targets-for-change with 3 “mentioning” and 4 “exploring” levels. Baseline exploratory-data-analysis identified variables to include in both the quantity (n=133) and quality (n=47) analyses.

Outcomes were change scores for ADHD/ODD behaviours for immediate (12-weeks) and extended (6-months) follow-up. Main analysis was full regression including significant baseline variables, quantity and quality of delivery for change scores. Ethics approval was obtained.

Results: (Chapter 5) Exploratory data analysis of the NFPP COPPI arm (n=133) and included thesis individuals (n=47) identified the following baseline factors for inclusion; parent education levels, baseline child ADHD/ODD severity, parental age and weekly disposable and parental ADHD. In the regression for baseline variables vs outcomes only, baseline child symptom and quantity independently predicted outcome (n=133). Once quality was added (n=47), only child baseline severity remained significant. Total quality of delivery did not independently predict any outcome (although for two sub-scales there were some promising findings).

Conclusion: From the ADHD theory-base, empirical findings and surface validity of the New Forest Parenting Programme, one would think a quality of delivery measure applied to delivery videos may have shown significant results. However this study did not add additional understanding around for whom PLI interventions are likely to be effective for child ADHD/ODD and why. It did show some factors associated with attendance and quality of delivery. Also quantity/attendance predicted outcome in this study. This highlights the importance of continuing to measure and present these factors in future trials of this type. Better contemporaneous documentation of quality of delivery should be aimed for in future studies of this type along with focusing on prioritization and delivery optimization of programme components (see discussion; Chapter Six).

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Abbreviations

ADHD	Attention Deficit [/] Hyperactivity Disorder
Adj.	Adjusted (from original)
Agg	Aggression
AIS	average item score
ASD	Autistic Spectrum Disorder
B	Beta (β) test statistic
BIT	Behavioural Intervention Technologies
CC	Correlation Coefficient
CD	Conduct Disorder
CDA	Complete Data Available/Analysis
CI	Confidence Interval
COPPI	Comparison of Preschool Parenting Interventions
CSS	[Barkley's] Current Symptom Scale
CT	Child Training
df	Degrees of Freedom
DSM	Diagnostic and Statistical Manual
DVD	Digital Versatile Disc
EB	Externalising Behaviour
EB NOS	Externalising Behaviour Not Otherwise Specified
ECBI	Eyberg Child Behavior Inventory
EF	Executive Functioning
ES	Effect Size
F	Fishers Exact test statistic
GHQ	General Health Questionnaire
HNC	Helping the Non-compliant Child – a PLI
Hyp	Hyperactive
I^2	I-Squared Statistic related to heterogeneity analysis
ICD	International Classification of Disease
Imp	Impulsive
Ina	Inattentive
ITT	Intention To Treat

IY	Incredible Years – a PLI
MA	Meta-analysis
MP[rox]	Most-Proximal
NFPP	New Forest Parenting Programme
ns	Not Significant
ODD	Oppositional/Defiant Disorder
OR	Odds Ratio
PACS	Parental Accounts of Children’s Symptoms
PB[lind]	Probably Blinded
PLI	Parent Led Intervention
PMTO	Parent Management Training - Oregon model
PPP	Per Protocol Population
PR	Parent reported
PSI	Parenting Stress Index
PT	Parent Training
PTAP	Preschool-Type Attention Problems
QofD	Quality of Delivery
RR	Relative Risk
Rx	Treatment
SD	Standard Deviation
SDQ	Strength and Difficulties questionnaire
SMD	Standardised Mean Difference
T1 to T2	Time 1 (pre-intervention) to Time 2 (immediately post intervention)
T1 to T3	Time 1 to Time 3 (6-months post-intervention end)
TAU	Treatment As Usual
TforC	Target for Change
TT	Teacher Training
WLC	Wait[ing] List Control
WWW	Werry-Weiss-Peters
♀	Female sign
♂	Male sign
95%CI	95% Confidence Interval
p values	Probability: Δ p<.10, * p<.01, **p<.05, ***p<.001

Chapter 1: What is ADHD?

1.1 Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a common neurodevelopmental disorder with an estimated worldwide prevalence of 5.3% (95%CI=5.01–5.56, Polanczyk et al., 2014).

ADHD typically presents in young children and is characterised by the symptom triad of hyperactivity, impulsivity and inattention (Lange et al., 2010). It is more common in boys versus girls with a ratio of about 3:1 (Gaub & Carlson, 1997) In order to reach clinical significance, ADHD behaviours must be seen as being socially inappropriate given the child's age and stage of development (Frick & Nigg, 2012). For ADHD to be diagnosed in those less than 18 years of age under the Diagnostic and Statistical Manual criteria revision (Alemany et al., 2018) an individual needs to show 6 out of 9 symptoms in either the hyperactive/impulsive symptom list (ADHD-HI diagnosis), or the inattentive list (ADHD-IN type) or at least 6 symptoms from both (ADHD-combined or ADHD-C-See Table 1)

Table 1: A table showing the symptom definitions for Attention Deficit/Hyperactivity Disorder separated by sub-type/the ADHD symptom triad.

Inattention	Hyperactivity
a. Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or during other activities (e.g., overlooks or misses details, work is inaccurate).	a. Often fidgets with or taps hands or feet or squirms in seat.
b. Often has difficulty sustaining attention in tasks or play activities (e.g., has difficulty remaining focused during lectures, conversations, or lengthy reading).	b. Often leaves seat in situations when remaining seated is expected (e.g., leaves his or her place in the classroom, in the office or other workplace, or in other situations that require remaining in place).
c. Often does not seem to listen when spoken to directly (e.g., mind seems elsewhere, even in the absence of any obvious distraction).	c. Often runs about or climbs in situations where it is inappropriate. (Note: In adolescents or adults, may be limited to feeling restless).
d. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., starts tasks but quickly loses focus and is easily sidetracked).	d. Often unable to play or take part in leisure activities quietly.
e. Often has difficulty organizing tasks and activities (e.g., difficulty managing sequential tasks; difficulty keeping materials and belongings in order; messy, disorganized work; has poor time management; fails to meet deadlines).	e. Is often “on the go” acting as if “driven by a motor” (e.g., is unable to be or uncomfortable being still for extended time, as in restaurants, meetings; may be experienced by others as being restless or difficult to keep up with).
f. Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (e.g., schoolwork or homework; for older adolescents and adults, preparing reports, completing forms, reviewing lengthy pa	f. Often talks excessively.
	Impulsivity
g. Often loses things necessary for tasks or activities (e.g., school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).	g. Often blurts out an answer before a question has been completed (e.g., completes people’s sentences; cannot wait for turn in conversation).
h. Is often easily distracted by extraneous stimuli (for older adolescents and adults, may include unrelated thoughts).	h. Often has trouble waiting his/her turn (e.g., while waiting in line).
i. Is often forgetful in daily activities (e.g., doing chores, running errands; for older adolescents and adults, returning calls, paying bills, keeping appointments).	i. Often interrupts or intrudes on others (e.g., butts into conversations, games, or activities; may start using other people’s things without asking or receiving permission; for adolescents and adults, may intrude into or take over what others are doing).

Adapted from: National Library of Medicine (2016). "DSM-5 Changes: Implications for Child Serious Emotional Disturbance: Table 7, DSM-IV to DSM-5 Attention-Deficit/Hyperactivity Disorder." from <https://www.ncbi.nlm.nih.gov/books/NBK519712/table/ch3.t3/>.

For a symptom to be “endorsed” as significant it must be present “often” or “very often” if using rating scales (as opposed to “sometimes” or “never”). These symptoms must have been present for at least 6 months at this level and these must negatively impact on both social and academic/work functioning. In addition, “several symptoms” need to be seen in two different settings (for example home plus nursery, school or work) and again “several symptoms” should be present before the age of 12. The other often used diagnostic system for mental health conditions in children and adults is the International Classification of Diseases, currently on its 11th revision (ICD-11, World Health World Health Organization, 2019).

1.1.1 Diagnostic Criteria

The two important practical differences between ICD and DSM classification systems are, first the need for threshold of inattention symptoms to be reached in ICD-10 for all individuals with no separate criteria for a predominately inattentive type as available in DSM-IV (American Psychiatric Association, 1994). Second that, under ICD-10 (World Health Organization, 1992), the symptom threshold criteria for each of the ADHD symptom triad (hyperactivity, impulsivity and inattention) needs to be met by reports from different sources in two different locations. It is implied that these should ideally be reports from home and school however observed behaviour in a clinic scenario is suggested as an alternative. In DSM-IV it is only impairment that needs to be demonstrated across two settings not symptom threshold. In addition, how this impairment needs to be demonstrated is not clearly laid out with “clear evidence of clinically significant impairment” only being demanded for a single setting (Gordon et al., 2006).

The main result of these differences is that the prevalence rates if using ICD-10 for diagnosis has been likely to be much lower compared with those from DSM-IV. The higher threshold for ICD-10 has obvious implications for access to care and can also impact on public perception around whether ADHD exists and therefore whether the allocation of resources occurs in a fair and efficacious way (Hinshaw et al., 2011). For this reason, and due to the increasing evidence that the inattentive subtype of ADHD is a separate phenotype from hyper-active-impulsive or combined, ICD-11 and DSM-V have come together on this point. ADHD with “predominantly inattentive presentation” can now be diagnosed under the ICD-11 criteria (World Health Organization, 2019). Both now use the label of Attention Deficit/Hyperactivity disorder for the disorder as a whole and this comes under the category of neurodevelopmental disorders in both classification systems. Additional clarification of how the DSM criteria embody the current understanding of the ADHD construct has been published through a “Text Revision” of the Diagnostic and Statistical Manual of Mental Disorders Fifth edition; DSM-V-TR (Koutsoklenis & Honkasilta, 2023)

1.2 The ADHD Phenotype

There are additional elements of the ADHD phenotype over and above behaviours and impairment that contribute to the ongoing cycle of [re-] conceptualisation and validation of ADHD. A pattern of specific neurocognitive deficits on psychological testing are found in some individuals expressing significant ADHD behaviours (but not all, see Doyle et al., 2005; Pievsky & McGrath, 2018). These differences in cognitive functioning have, with various levels of significance and consistency, been associated with genetic (Chang et al., 2020) and behavioural (Pauli-Pott & Becker, 2011) findings in individuals with ADHD. In addition postulated theories around the mechanisms linking these to ADHD expressed behaviours

have surface validity: causal models based on these theories are supported by empirical findings when tested, for example in delay aversion (Sonuga-Barke et al., 2010). Another ADHD feature is the presence of certain co-morbidities at a significantly higher level than in those without ADHD (with co-occurrence percentages from a recent European registry review in parentheses, n=1919); for example sleep disorders (23%), oppositional defiant disorder (20%), and anxiety disorders (12%). Other common co-occurring disorders include learning disorders (56%) and Autistic Spectrum Disorders (Reale et al., 2017). Finally certain factors within the child, parent, family and wider systems are found to be significantly associated with either; (a) increased likelihood of a diagnosis of ADHD over a person's lifetime (Deater-Deckard et al., 1998), (b) having ADHD of higher severity (Greven et al., 2016), or (c) a higher rate of adverse outcomes (Di Lorenzo et al., 2021). There are two important things to consider when exploring the diagnosis, severity, prognosis and treatment needs for an individual family; First the number and diversity of factors that influence this for all individuals (the multifactorial nature of ADHD; Hartman, 2023) and secondly that the type, severity and combination of these factors influence each individual differently over time (ADHD heterogeneity; Nigg et al., 2020).

It is the multifactorial nature and heterogeneity of ADHD across individuals that makes assessing the presence and severity of ADHD and the associated impairment hard to do. In addition, early diagnosis (under 5 years of age) is hampered by needing to distinguish early ADHD-like symptoms from normal developmental variation. Young children often "receive" a diagnosis of ADHD through parental and school/teacher reports of their ADHD symptoms. However published findings on the concordance of child reported ADHD symptom count and severity with that of parents is poor (Sandra Kooij et al., 2008), as is parental concordance with teacher reports (Overgaard et al., 2023) and with observed measures

(Kennerley et al., 2018). Summary of overall findings show that self-reported symptoms, especially in adolescents, are less severe than those reported by their parents, possibly as a protective mechanism (see; McQuade et al., 2011 around the positive illusionary bias phenomena). In addition, recent work has suggested that reported symptoms may not predict whether an individual's ADHD is likely to persist or remit in future years (Du Rietz et al., 2016, although results need to be replicated).

1.3 Impact of ADHD

It has been firmly established that having a clinical diagnosis of ADHD in childhood increases the likelihood of an individual experiencing negative outcomes as adults; especially in the areas of academic/employment success, establishing significant relationships and around criminality and substance mis-use (Erskine et al., 2016). More importantly the health-related quality of life for children with ADHD is significantly worse than those without (Peasgood et al., 2016). It has been shown that children who display clinical levels of hyperactivity, impulsivity and/or inattention at pre-school age (< 6 years) are already less adept in areas of social functioning and academic/learning techniques (DuPaul et al., 2001). Recent research suggests that functional impairments associated with living with ADHD may be a better predictor of long-term outcome than symptom severity, making this an essential part of assessment and treatment outcome for these families (McAuley et al., 2017).

The impact of living with a child with at-threshold ADHD is associated with much higher levels of total parental stress (mainly mothers in the included studies) when compared to families of typically developing children ($k=9$, $d=1.80$, $p < .001$ 95%CI: 1.24-2.37 but $Q=88.04$ sig at $p < 0.05$ level; Theule et al., 2013). The wellbeing of siblings growing up with a sibling with ADHD is an increasing area of both research and concern. Interestingly, the above

paper on health-related quality of life measurements (n>4000, with age and statistically matched controls) found utility scores to be 0.063 (0.5 SD) lower in those children with ADHD versus controls. When the quality of life of siblings of the ADHD index child was analysed, there was no effect on the sibling's health related quality of life directly attributable to having a sibling with an ADHD diagnosis. However, they did show significantly lower levels of life satisfaction and overall happiness in the family, measured using a bespoke questionnaire applying a 1-7 visual scale (Peasgood et al., 2016).

Overall, the cyclical effects of living with ADHD on the child and family creates a chain of interrelated problems. For example, the child's symptoms and neurocognitive difficulties affect both the child and parent's self-esteem, self-efficacy and mood. This can then impact on the parent-child relationship and that between parents/co-habiting partners, siblings and significant others. This then can lower the capacity and efforts of the family to spend time together and can eventually, therefore, isolate the family and/or parent from any past social support networks they may have had (Harpin, 2005).

1.3.1 Young Person's Perceptions of Their ADHD

A qualitative meta-synthesis of published papers and doctoral theses explored perceptions, difficulties and (although only one included study explored this) advantages/positives of having ADHD, directly elicited from children themselves (Ringer, 2020). Table 2Table 2 shows the themes and sub themes that emerged from the extensive methodology and collaborative thematic exploration this author and collaborators carried out (n=16). Most children in the included papers were over the age of 10, although children as young as 6 years were reported as being involved.

Table 2: Categorisation of children's experiences and understanding of their ADHD.

1. Experience related to own body and psychological characteristics	2. Ambivalence...		3. Experience related to formation of self-identity
	↗ A. ...experiences related to [their] own psychological needs	↘ B...experiences related to social [interaction/perceived abilities with] others (school family and peers)	
↳ Lack of control	↳ Need to adapt oneself	↳ Others demands and expectations are a problem	↳ Challenges forming self-identity
↳ Having difficulties	↳ Need to be accepted for who I am	↳ Experiences of stigma	↳ Building a normative personal identity
↳ Biologically determinate		↳ Lack of belonging	
		↳ Receiving help from others	

Adapted from; Ringer N. (2020). Living with ADHD: A meta-synthesis review of qualitative research on children's experiences and understanding of their ADHD. International Journal of Disability Development and Education 67(2) 208-224.

The main overall themes coming out of the paper relate to an ambivalence or a dichotomy expressed by the child between; first having experiences and internal representations of the world that were negative or that implied the person was forcing themselves, somewhat unsuccessfully, to fit into the society they found themselves in. However, second, that this was coupled with a need/want to be [accepted as] the person they are, while being aware that they will need to adapt to the world to some degree to achieve this because of the differences that ADHD brings. It appeared that these children were striving to achieve this despite implied underlying thoughts/beliefs that their efforts might be futile (Ringer, 2020).

This paper reports that “most” of the participants included were taking medication and this mirrors a lot of the research in child perception, experiences and understanding of ADHD.

This may mean that these children have already had significant impact from their ADHD

and/or have high levels of ADHD traits and so these might reflect quite deep-seated cognitions and biases. In addition, these are being sampled cross-sectionally and after diagnosis. Gaining insight into how a very young child feels about living with ADHD and how these feelings evolve is difficult. This is due to both the lack of cognitive abilities needed to express these thoughts at that age and because these children are not yet on the radar of researchers or clinical services providers (but see; Coussens et al., 2020, as a recent attempt to create methodology and motivation to do this).

1.4 Prevalence, Identification and Diagnosis of ADHD

1.4.1 Prevalence

The prevalence of ADHD varies as to whether it has been estimated from administration-based methods (e.g. from secondary care recording of diagnoses or from ADHD medication prescribing records), or via direct cross sectional community sampling of diagnostic status/symptomatology. For example, for administrative prevalence of ADHD in 6-18 year olds, extracting data from a UK country wide General Practitioner-reporting databases (n=2,873) gave rates of 0.44% in boys and 0.05% in girls (Holden et al., 2013). Using community sampling, as in the seminal study by Ford et al., (2003), applying a comprehensive multi source clinical interview (n=10,438) found prevalence rates of 3.6% in boys and 0.9% in girls. The difference between these values reflects those individuals who had not needed to seek treatment and/or did not have access to it. The administrative prevalence of ADHD in all 6- to 18-year-olds has gone up in the UK from 0.19% in 1994 to 0.51% in 2009 (with a peak in 2007 of 0.55%) potentially implying increased recognition. Though see (McKechnie et al., 2023) and Appendix ([Page 1](#)) for further increases in both prevalence and medication use after the 2007/08 plateaux and for how these differences

vary across age ranges. Especially important is the relative lack of an increase in administrative prevalence in the pre-school age group and that the relatively lower identification and medication rate in females versus males still remains. Despite the improved recognition and medical treatment, qualitative patient and clinician studies support the fact that the administrative prevalence in the UK is still likely to be a substantial underestimate of actual population levels (Kovshoff et al., 2012). See Polanczyk et al., (2014) for empirical data and discussion around the possibility or otherwise of actual increase in prevalence over this period. Process based analyses (Sayal et al., 2018) of ADHD service provision in the UK suggest the deficit between community and administrative prevalence rates may be due to a failure in provision and/or accessibility of support and treatment for children and families living with ADHD.

1.4.2 Early Identification of ADHD

The gap between the administrative prevalence of ADHD and the true prevalence in the community has implications for early identification and treatment in the UK. For example, the mean age of diagnosis of children with ADHD in the UK from the previously referenced administrative database based study (n=2,873) was 9.8 years (SD 2.8 - Holden et al., 2013). This is unlikely to be due to a true inability to accurately diagnose ADHD in very young children: There is increasing empirical evidence that the symptom, impairment, neurocognitive deficit and co-morbidity pattern in pre-school children is similar to that in older children and adults, suggesting validity of an ADHD diagnosis even at this early age (Lahey et al., 2004; Sonuga-Barke et al., 2003; Wilens et al., 2002). However, there are important issues in diagnosing ADHD in pre-school children: (i) Differing sensitivity and specificity of individual items in distinguishing ADHD from non-ADHD in younger children

and (ii) lack of consistency of endorsing the same items to the same level on parent report of a child's symptoms across early childhood (Curchack-Lichtin et al., 2014); (iii) Diagnostic threshold and ADHD sub-type fluctuating in individuals across early lifespan (Lahey et al., 2005); (iv) the difference in presentation of girls versus boys with relatively higher rates of inattentive vs hyperactive/impulsive or combined, with inattention often either presenting or being picked up at a later age (Mowlem et al., 2019). In addition (v) potential misconceptions in both the public and clinicians around ADHD and gender may contribute to the under-identification of girls with ADHD versus boys. This is reflected in the female: male ratios for ADHD children when using either clinical (diagnosis given in secondary or tertiary care) or administration prevalence data (as taken from primary care diagnosis systems or medication records) for ADHD in children versus that found in community prevalence studies using clinical interview and impairment "gold standard" criteria (Hinshaw et al., 2022). (vi) Using impairment levels independently from categorical thresholds for symptom count and severity in order not to miss those in need of support/treatment (Angold et al., 1999). (vii) Role of co-occurring; oppositional defiant disorder, conduct disorder and callous unemotional traits in the presentation, severity, treatment response and outcome (Reale et al., 2017). (viii) Early identification is often affected by issues of limited resources therefore missing opportunity for preventative intervention and/or less intervention being needed (Charach et al., 2020). Finally (ix) barriers to availability, accessing and taking up diagnosis and treatment for ADHD vary according to societal, cultural and geographical factors and these barriers can be greater in areas, families or individuals for whom the child's risk of ADHD is greater for similar reasons (Wright et al., 2015).

1.4.4 Defining and Conceptualising ADHD

The important thing to keep in mind when using pre-defined criteria to diagnose ADHD is that they are, by definition, categorical. This is functionally important mainly for consistency and efficacy in the context of assigning limited resources in clinical practice. However, the majority of protagonists in the ADHD field would agree that the ADHD symptom triad, hyperactivity, impulsivity and inattention, exist on a spectrum in all individuals (Coghill & Sonuga-Barke, 2012). Applying diagnostic criteria or symptomatic cut-off levels to population norms are also of importance in research terms in identifying sub groups that are: (i) thought to have a common trait/condition, (ii) are significantly diverse from comparison groups to achieve significant findings if present, while at the same time (iii) being [applied in a way that is] lenient enough to allow for further understanding of unclarified areas as well as to prevent falsely re-affirming findings currently seen as integral to the ADHD concept. Despite the clarity and development of ADHD research methods around standardising study populations, current research is not able to supply consistent links between: (a) ADHD genetic and environmental causal elements, (b) neurocognitive functioning and (b) relative motor activity, impulse control and attentional-system variability (Nigg et al., 2005), although several possible unifying theories are emerging (Sonuga-Barke & Castellanos, 2007).

One of the main difficulties in optimizing the ADHD concept and thus adapting diagnostic criteria, is the heterogeneity and multifactorial nature of ADHD (see earlier). In addition each of the possible contributors to ADHD life-time risk (for diagnosis, condition severity, long-term outcomes and response to treatment) only explain a small proportion of the variance in these metrics. This means that the study methodology, power and statistical

analysis needed to infer causality of ADHD is somewhat unachievable. As a result many factors explored in the drive to understand ADHD causality (and thus improve identification and individual targeted effective treatment) can only be described as associative. In addition many of the analyses using theoretical mechanisms to combine these associative factors are mostly exploratory rather than confirmatory in terms of causal pathways. However in the absence of a clear simple cause and effect condition mechanism, one can only use the current best understanding of the associative and potentially causal factors to drive the content and change methods behind PLIs to treat ADHD. These will be presented below: Some of these are obvious in the way they are applied in PLI to promote change (e.g. family environment, child personality characteristics and parent-child relationship). Others are less so (e.g. socio-economic status or early life exposures or events); however these are important in the delivery and potential effectiveness of PLI also (e.g. addressing parental attributions or understanding subtle reasons behind attendance and engagement differences).

1.5 ADHD Causality

1.5.1 Introduction

A number of plausible causal factors for ADHD have been proposed and many factors associated with increase ADHD phenotypic expression identified. Ideas around ADHD-type behaviours being a distinct entity have been around for a long while with the first description of inattention as thought of today dating back to Sir Alexander Crichton circa 1798. Observations from significant physicians have shaped understanding: examples such as Heinrich Hoffmann 1809–1894 with Fidgety Phil and the Still Lectures around the role of early brain injury in ADHD understanding (Sir George Frederic Still, 1868–1941). As things

are understood now, neurodevelopment conditions such as ADHD involve an individual; (a) being born with an increased likelihood of them having an ADHD diagnosis at some point in their lifespan, (b) this being associated in some individuals with significant identifiable differences in their underlying brain anatomy, brain physiology and/or neuropsychological functioning compared with those not meeting ADHD diagnostic criteria and (c) that from the moment of conception, this level of life-time ADHD genetic risk is either improved or worsened by a combination of parental, child, family and external/wider environmental factors (Lange et al., 2010).

1.5.2 Genetics

1.5.2.1 Heritability estimates and genetics vs. environmental influences

Concordance rates of ADHD are high, as found in large-scale birth registry study in Sweden (n=1,656,943 unique participants): 0.56 (95%CI: 0.46–0.66) for monozygotic twins, 0.16 (0.13–0.19) for dizygotic twins and 0.12 (0.11–0.12) for full siblings (Chen et al., 2017) . The strength of familial aggregation increases with degree of genetic relatedness: monozygotic twins were 70.45 (95%CI: 38.19–129.96) times more likely to have ADHD if their twin had a diagnosis compared to those who did not. This dropped to 8.44 (5.87–12.14) in dizygotic twins and there was no significant difference between the hazard ratio for these relative pairs compared to full sibling risk level 8.27 (7.86–8.70). This study also went on to look at several important methodological factors that may have affect the reliability and magnitude of the findings (e.g. diagnostic methodology and geographical population). None of these affected the magnitude of the hazard ratio significantly. What did was the birth year by cohort with the hazard ratio being significantly greater with the youngest cohort. The

authors felt this reflected the possible increase in awareness of ADHD and accessibility to services (Chen et al., 2017).

The same authors went on to use variance decomposition analysis to explore the extent of genetic influence on the likelihood of a person developing clinically significant ADHD. The authors applied joint twin-family methodology using the relative concordance rates between mono- and di-zygotic twins as well as between non-twin family members, in this case full and half-siblings and cousins: Replicating other studies of this type the best fitting model was the one that retained only the additive genetic influences and non-shared environment components (e.g. differences in parental style or attributions between siblings) and this explained 0.89 (95%CI: 0.87–0.91) of the variance of ADHD expression in this sub-sample. The authors were quick to highlight that shared environmental factors (e.g. marital discord or lower disposable income) although not high enough for the model to retain, still explained 0.06 (0.00-0.13) of the variance in ADHD phenotype full-expression in the full model (Chen et al., 2017).

The heritability statistics and research into family variance of ADHD risk shows that ADHD has a large genetic component. However, despite this there is a significant proportion of the difference of lifetime ADHD-expression that is explained by the environment in which the child is raised.

1.5.2.2 ADHD associated genes

Genetic studies have aimed to aim to link specific candidate genes to individuals with ADHD. This has produced a number of genes that, if present, have been found to be significantly associated with congruent neurophysiological or neurocognitive findings in those with ADHD compared with normal controls (Hawi et al., 2015).

Exploring the association or predictive capacity of these identified candidate genes with the ADHD phenotype has, however, not produced the hoped-for clear answers over the last two decades. A recent meta-analysis from a large collaborative (Demontis et al., 2019), brought together DNA from 12 different cohorts comprising a final sample of 19,099 individuals with ADHD and 34,194 controls. From this they found 12 loci of significance that promote increased risk of expressing ADHD phenotype: that variations of genes at these loci (304 genetic variations in total found across these locations) in those with ADHD compared with non-ADHD controls were found at a high enough level to be greater than chance on statistical testing at the [lower than normal] threshold deemed appropriate for this type of study and analysis. As per other studies of this type, the effect sizes for each individual risk-loci are small (here expressed as odds ratios). Furthermore, the gene loci found did not have significant association with the ADHD candidate genes that previous theoretical and empirical association studies have identified. The authors tentatively linked some of the genes associated with the loci with other possible genes whose functions are consistent with the postulated neurophysiological and neuropsychological mechanisms of ADHD behavioural expression (Demontis et al., 2019).

In an endeavour to move beyond candidate genes to better understand the origin of ADHD genetic risk, studies have utilised a recent finding of association, referred to as copy number variants, with other neurodevelopmental conditions. Briefly a recent paper found children with ADHD had a significantly “larger burden” of CNV (i.e. CNV were found at a higher rate and number) than those without and, consistent with above, the presence of candidate gene single nucleotide polymorphisms was not significantly greater in those with ADHD versus controls. The authors found that the CNVs (of areas of repetition of certain genes and/or deletion of genetic material) found in these ADHD subjects were associated with the

pathways of the previous SNP candidate genes that have been identified. This study found the proportion of shared genetic material coordinating with heritance of ADHD diagnosis across generations only explained 20-30% of this variation. This is in contrast to the levels of heritability found in twin studies as outlined earlier in this section (Demontis et al., 2019).

Several studies in the genetic area are using symptom scales dimensionally to try and provide additional understanding of the cumulative nature of genetic risk for ADHD by comparing polygenic risk scores [PRS] (the cumulative ADHD related risk that an individual has from analysis of their genomic variation) with the degree of phenotypic expression with some positive findings at individual study level (Groen-Blokhuis et al., 2014). This has been confirmed on recent meta-analysis with higher ADHD-PRS being associated with an increased odds of lifetime diagnosis (OR = 1.37; $p < 0.001$). Additional associations of PRS with comorbidity and negative outcomes were also found by this group (Green et al., 2022).

The role of genetics and the identification of markers of ADHD diagnosis, severity and long-term prognosis is mainly in early diagnosis and prioritising intervention in high-risk groups. However currently this is not an available avenue in everyday practice. Another source of importance however is the role of gene-environment interplay in exacerbating, protecting against or even potentially reversing the effects of genetic factors in ADHD. There is thought that the difference between the heritability estimates using genomic methodologies (Demontis et al., 2019) versus twin-study alternatives (Chen et al., 2017) may be due in part to environmental factors that are accounted for by this latter, gene-environment interplay, methodology.

1.5.3 Neuropsychology

As mentioned earlier, neurophysiological and neuropsychological differences are found in children and adults with ADHD. Despite some methodological concerns (Karalunas et al., 2020), neurocognitive tests in preschool children have been found to be associated with ADHD symptom severity and predict group membership for those with an ADHD categorical diagnosis versus those without (Pauli-Pott & Becker, 2011). There is also some evidence for an association between ADHD genetic markers and inheritance of neurocognitive deficits associated with ADHD behavioural phenotypes (Doyle et al., 2005).

A meta-analysis looked at the associative or discriminative power of ADHD associated neurocognitive deficits on ADHD behaviours/phenotype in 3–6-year-old children ($k=23$, total $n=3005$). Included studies either looked at whether test performance predicted if the individual had an ADHD categorical diagnosis or not ($k=14$ of 23 studies) or they looked at the correlation between poorer performance on the test and higher levels of ADHD symptoms in 3–6-year-old children ($k=9$). Associated areas of neurological functioning differences in those with ADHD versus not are listed below in order of effect size; (1) Delay Aversion ($d=.64$) (2) Inhibitory Control; Response Inhibition (3) Flexibility/Shift Attention (4) Inhibitory Control; Interference Control (5) Vigilance/Arousal and (6) Working Memory ($d=.32$). How different areas of neurological functioning are associated with neuroanatomical (Yadav et al., 2021) and neurofunctional changes in brain perfusion/activation on neurological imaging (Kowalczyk et al., 2022) can be reviewed in the cited papers.

Important conclusions from this paper (Pauli-Pott & Becker, 2011) were the following: (I) Neurocognitive deficits that are theoretically and empirically associated with casual

pathways in ADHD appear to differentiate those with ADHD from those without in the preschool period. This gives construct validity to ADHD for this age group. (ii) That the strength of the association of different areas of functioning with ADHD varies at this early age and that this might be due to a larger age window of normal development for some processes. An example of this in this study was deemed to be working memory (Willcutt et al., 2005) which improves steadily in the first five years versus delay aversion (Sonuga-Barke et al., 2010) and response inhibition (Barkley, 1997) which are almost fully developed by the age of 3 years (Garon et al., 2008). Another explanation for lower effect sizes may be lack of task specificity and ADHD overlap; for example with the association of error rates in continuous performance tests with ADHD symptoms/diagnostic group in the included studies. In young children with ADHD, delay aversion may cause the child to choose “speed over error” increasing variability in findings. Finally (iii) the authors concluded that meta-analytical evidence of neuropsychological deficits in such young children suggests that the role of these should be kept under consideration when designing process mechanisms behind future interventions (See; Sonuga-Barke & Halperin, 2010 also for a review).

Despite these strong findings, there is debate as to whether neurocognitive deficits are a part of the pathological process behind ADHD genetic risk to behavioural manifestation in all children with ADHD (Nigg et al., 2005). A recent study found poor associations of neurological functioning with practical impairment in daily life for preschoolers with ADHD. This study used lab-testing and teacher reports of potential deficits along with parent and teacher reported levels of impairment (Sjöwall & Thorell, 2019). Other similar literature casts doubt on the influence neurocognitive deficits have on behavioural and functional outcomes longitudinally in ADHD over and above symptom levels and impairment (van Lieshout et al., 2017).

Treating ADHD neurocognitive deficits with cognitive training methods (such as computerized games) does not decreased ADHD symptoms in children from probably blinded or observed measures (Sonuga-Barke et al., 2013). Working on the theory that combining parent-management strategies with child-directed neurocognitive training components may be a solution (Chacko et al., 2014), an intervention trial applied parenting interventions with either a child-directed working memory training component or a placebo (Chacko et al., 2018). The neurocognitive addition showed no additional effect on the child's ADHD symptoms over and above Parent Training.

1.5.4 Environment

As stated above, a large proportion of the variance associated with increased lifetime risk of ADHD can be explained by genetic inheritance. Given the lack of intervention possible at the genetic level, except the use of medication, the importance of identifying targets for change in terms of optimising the environment any child grows up is undisputed. In addition, there is empirical evidence of environmental risk factors that clearly can worsen or protect the child's genetic predisposition to ADHD along with influencing the severity/impact and long-term adverse outcomes (Caye et al., 2016).

The problem and challenge is to identify which of these are simply associated with an increased risk of ADHD diagnosis from those that may be directly causal. In addition how individual factors interact to either over-inflate associative or causal inferences or to directly affect the child's possible ADHD phenotype manifestation (Thapar & Rutter, 2009). This necessitates large study populations along with selection of the correct study type, methods and statistical testing depending on the hypothesis in question. Finally understanding the role of one or more environmental factors associated with ADHD presentation requires the

application of theory either a priori to guide analysis pathways or in discussion to translate findings appropriately into clinical practice or further research.

1.5.4.1 Pre-natal, peri-natal and early childhood exposure risk factors for ADHD

Some environmental factors have been associated with a future ADHD-like phenotype. If these have a causal influence in terms of brain development this would occur as early as in-utero or during the early post-natal period. These are: (a) Exposure to nicotine (risk of child having ADHD, prospective cohort studies only, IF parent smoked during pregnancy VS. those that did not; $k=12$, Relative Risk [RR]=1.58, 95% CI: 1.33-1.88) and alcohol (biological mothers drinking ≤ 70 g/week of alcohol vs those drinking >70 g: $k=6$, Odds Ratio [OR] 0.94, 95%CI: 0.86–1.02, $Q=10.59$, $p=.10$ (San Martin Porter et al., 2019)), (b) illicit drugs (being exposed to opioids prenatally, yes or no, resulted in higher symptom rates VS comparison group or population norms, $K=7$, $d=1.27$; 95%CI: 0.79–1.75; $p<0.0001$ (Schwartz et al., 2021), (c) toxin exposure (PCPs, Mercury and Lead: Size of the association between level of child lead burden AND hyperactive/impulsive symptom count/severity, $K=27$, $r=.16$, 95%CI: .12–.20; $Z=8.09$, $p<.001$, equivalent to $d=.32$, $Q(26)=85.31$, $p<.001$, $I^2=71.2\%$ (Goodlad et al., 2013), (d) prematurity (pooled RR calculated from the proportion of those with a ADHD diagnosis on follow up after 5 years of age in the premature group versus controls, RR 2.64; 95% CI, 1.85-3.78, $z=5.32$; $P<.001$, $\chi^2=2.60$; $p=.86$, (Bhutta et al., 2002) and (e) low birth weight (normal ≥ 2500 g, low-normal, very low ≤ 1500 g) lower birthweight was associated with “increased ADHD symptoms” BUT significant heterogeneity with multiple significant moderators, and taking these into account reduced the association to below significance, $k=85$, $r=-.14$, 95%CI: $-.16$ to $-.12$, $Q(84)=6598.0$, $p<.0001$ and $I^2=98.7$, (Momany et al., 2018).

Causality and mechanisms of action are hard to prove for these early risk factors. This is due firstly to changes in exposure patterns and populations over time (for example prevention and awareness have lowered the incidences of these exposures occurring in recent times, e.g. lead exposure and pregnancy smoking rates) and secondly due to the confounding nature of these environmental factors. An example of the latter is that maternal smoking often co-occurs with illicit drug use and both result in increased prematurity (Thapar et al., 2009). Debate still exists about how, when and to whom one should target preventative interventions for very young children who are at a high genetic or environmental risk for ADHD in later life (Halperin et al., 2012).

1.5.4.2 Psychosocial adversity

One of the most established environmental risks associated with ADHD is social or family adversity. Much initial work on this was done by Rutter and colleagues (Rutter, 1985). They looked at the association between individual ecological circumstances and psychiatric disorders ('neurotic', 'conduct' or 'mixed') and then compared these between two geographical areas: an inner London borough and the Isle of White (Berger et al., 1975). The following are known as the Rutter's indicators of Adversity (RIA): In brackets are the relative predictive power of the RIA taken from a recent population database study based in Denmark (Østergaard et al., 2016). The study population consisted of all children born between January the 1st 1993 and December the 31st 2011, with RIAs assessed at some point in the first year of life. This gave a total n of 994,407 of which 21,520 had a documented ADHD diagnosis with a male to female distribution of 15,857: 5,663. (i) Severe marital discord (both custodial parents not living at the same address vs living together; Hazard ratio [HR] large vs small proportion of marital discord in studies vs. lifetime ADHD diagnosis: ♀ HR 2.34, 95%CI: 2.20–2.49; ♂ HR 2.07, 95%CI: 1.99–2.15). (ii) Low social class

(low vs high for any of education, occupation or income; ♀ HR 2.94, 95%CI: 2.77–3.12; ♂ HR 2.61, 95%CI: 2.51–2.71). (iii) Large family size (≥ 4 children <18 years of age: ♀ HR; 1.02, 95%CI: 0.88–1.17 and ♂ HR 0.96, 95%CI: 0.89–1.05). (iv) Paternal criminality (Yes to custodial or suspended sentence vs No; ♀ HR 2.50, 95%CI: 2.35–2.66; ♂ HR 2.33, 95%CI: 2.25–2.42). (v) Maternal mental disorder (registered in data base before child's first birthday; ♀ HR 2.56, 95%CI: 2.34–2.81; ♂ HR 2.15, 95%CI: 2.03–2.28). Finally (vi) Placement in foster care ("out of home" care; ♀ HR 7.43, 95%CI: 6.08–9.07; ♂ HR 5.60, 95%CI: 4.86–6.45).

Østergaard and colleagues (2016) also found, replicating all similar studies to date, that there was a dose-response relationship with increasingly greater hazard ratios as the number of significant adversity indicators for each individual increased. For females an RIA-score of 1 (i.e. that the individual reached study significance for adversity in only 1 of the 6 RIA variables/concepts assessed at 1 year of age) led to approximately double the risk of being diagnosed with ADHD in their lifetime compared with children having none of the risk factors to this level (♀ HR 2.10, 95%CI: 1.97–2.23). A child who met the risk level for 4 of the 6 adversity factors was over 6 times as likely as those with no risk factors (HR 6.14, 95%CI: 4.90–7.69). However, this level of risk rose to 11 times the baseline comparison when a child had 5 or 6 of the RIA factors (HR 11.37, 95%CI: 7.06–18.32). Comparable sizes of hazard ratios with the large jump between 4 and 5/6 RIA-scores were seen in males also.

1.5.4.3 Parental Stress

Parental stress is defined as stress caused by a parent perceiving that the demands caused by parenting their child[ren] are above and beyond what they can deal with (Deater-Deckard & Dodge, 1997). In a recent meta-analysis (Robinson et al., 2022), the association

between preexisting parental stress and anxiety (both mothers and fathers) and subsequent child ADHD dichotomous diagnosis was high and significant ($k=19$, $N=1,101,696$, Odds Ratio [OR] 1.80, 95%CI: 1.49-2.18. No significant heterogeneity). Exclusion of studies not applying diagnostic categories and/or reliable and valid measures to assess the level of risk factor (stress and/or anxiety) present, resulted in a greater association size than just cited ($k=14$, $N=1,085,921$, OR 1.95, 95%CI: 1.55-2.46). There was a small but significant correlation between the number of stress/anxiety symptoms in the parent and the severity of symptoms seen in the child at the point of later diagnosis ($k=8$, $N=12,538$, Correlation Coefficient [CC] 0.08, 95%CI: 0.04 - 0.12, $p<0.05$. $Q(7)=27.82$, $p < 0.0001$). Again this association was small and in addition it was the only sub-analysis in the stress/anxiety part of this paper with significant heterogeneity. The association between paternal stress and dichotomous ADHD diagnosis was not significant ($k=4$, $N=57,376$, OR 1.28, 95%CI: 0.90 - 1.83, not significant). Although this pooled odds ratio was from a small number of studies, the overall number of participants was large and there was no significant heterogeneity within the included studies for this sub-analysis. Higher maternal stress and anxiety was associated with significantly higher likelihood of later ADHD [dichotomous] diagnosis in the child ($k=19$, $N=1,101,696$, OR 1.82, 95%CI: 1.51-2.20). Note “anxiety” was not included in the wording of the table for paternal figure but it was for the maternal one (Robinson et al., 2022).

This association works in both directions: Parental stress is significantly higher in parents of those with ADHD versus parents of children with no clinical diagnoses on meta-analysis (total stress: $k=9$, $d=1.80$, $p<.001$, 95%CI: 1.24-2.37, $Q=88.04$ sig. $p<.05$, (Theule et al., 2013). The concept and measurement of parental stress suggests two domains: stress attributable to the parents’ feelings of their own lack of effective functioning (parental stress) and a child

domain reflecting stress the parent attributes to the child's behaviour or other characteristics (Deater-Deckard & Dodge, 1997). In the Theule et al.(2013) cross-sectional meta-analysis above, levels of the child domain of parental stress were most strongly associated with a child having a ADHD diagnosis vs. non-clinical controls (Child stress: $k=9$, $d=2.12$, $p<.001$, 95%CI: 1.45-2.79. $Q=68.62$, $p<.05$) with parental stress having an effect size of about half that level (parental stress: $k=10$, $d=0.90$, $p<.001$, 95%CI: 0.50-1.30. $Q=44.03$, $p<.05$), although both were significant. The presence of co-morbid oppositionality or conduct disorder was associated with greater parenting-related stress vs. parents of children with ADHD alone having a lower level of total, parent- and child- domain stress all with similar effect sizes (total stress: $k=5$, $d=-0.66$, $p<.001$, 95%CI: 0.89 to -0.44, $Q=4.98$ not sig). This MA also looked at the correlation of the indicators of adversity included in the above study with parental stress and found a large association of parental depressive symptoms with total parental stress (total stress: $k=5$, $r=.48$, $p<.001$, 95%CI: .26 to .66, $Q=21.04$ sig. $p<.05$; not enough data was available for domain breakdown) but not with marital quality/discord (measured quantitatively not taken, for example, from single parent status alone), although the number of included studies was small (total stress: $k=4$, $r=-.20$, $p<.075$, 95%CI: -.40 to .02, $Q=6.62$ not sig.: (Theule et al., 2013).

Parental stress and socio-economic status have been considered together as psychosocial theories explaining the impact of SES on child developmental pathology (Conger & Donnellan, 2007). Debate still exists as to whether the negative consequences of actual or perceived lower SES result directly in poorer child psycho-social health (the social causative perspective) or whether it is indirect through social selection. An example of the latter, social selection pathways, are familial characteristics (for example personality and intelligence) that are genetically passed on through the generations that then affect both

socio economic status and child mental health outcomes. Two main social causative models have been proposed as valid pathways to negative child ADHD outcomes: the family stress model and the family/social investment model. The latter is based on worsening of ADHD genetic risk secondary to lower levels of parental financial and emotion investment secondary to financial hardship and time availability. However aspects of ADHD, specifically its high heritability combined with its heterogeneity in expression, makes aspects of social selection more appealing in theoretical hypotheses (Miller et al., 2018) and identifying these are fundamental to lowering health inequality in those with ADHD (Daley et al., 2019).

It could well be that a combination of both causal and selective processes is involved when looking at the influence of SES and other early life/child stressors on the development of ADHD (Schofield et al., 2011). Qualitative research approaches have provided useful insights into the sources of stress for children, parents and families living with ADHD. One recent paper found (Leitch et al., 2019); (i) that despite research specifically aiming to identify all sources of parenting/family stress, the findings implied that ADHD behaviour and its consequences was the main source of this, (ii) that impact of the child's behaviour itself on the family atmosphere, relationship breakdown and perceived or resultant lack of support were the main themes and (iii) that the effect of ADHD on the child's sense-of-self and thoughts of self-harm were both profound and upsetting to the parents interviewed (n=14; all but 2 were mothers, with 5 scoring as having clinically significant parental stress levels). When addressing the levels of parental stress, family conflict and parenting readiness for change in the context of parent-led treatments for ADHD, important factors associated with parental stress are; parental self-efficacy, the level/accuracy of ADHD knowledge and addressing negative cognitions/attributions around the child's behaviour (Harrison & Sofronoff, 2002).

1.5.5 Parent-Child Relationship

When a parent is struggling to understand, accept and manage their child's expressed behaviour, one of the effects is often the mutual respect, affection and trust parent and child have for each other. One of the earliest concepts of human relationships is attachment theory initially proposed by Bowlby (1977) to explain why humans develop close relationships with other humans. Attachment is reflected in an infant or young child's behavioural response during stressful situations and is often measured using the classic Strange Situation Procedure (SPP; Ainsworth & Bell, 1970). The role of insecure (A - insecure-avoidant, C - insecure-resistant and D - disorganised attachment) vs secure (B) attachment (Main & Solomon, 1990) in the development of attentional problems has been confirmed in a recent meta-analysis (Pallini et al., 2019; $k=60$, $n=7,664$, $r=-0.21$, 95%CI: -0.25 to -0.17 , $z=9.80$, $p<.001$. $Q=165.04$, $p<.001$, $I^2=64.25$) with a lower but significant effect size to that for non-specific externalising problems (Fearon et al., 2010) in a previous MA ($k=69$, $n=5947$, $d=0.31$, $p<.01$, 95%CI: 0.23 to 0.40 . $Q=135.18$, $p<.01$). In Pallini et al. (2019) disorganised attachment was most strongly associated with levels of EB; (for attention-based EB, disorganised attachment-D versus organised - A, B & C; $k=22$, $n=3722$, $r=0.27$, 95%CI: 0.20 to 0.34 . $z=7.08$ $p<.001$. $Q(21)=90.19$, $p<.001$, $I^2=76.72$). Disorganized attachment was not analysed separately in the earlier MA (Fearon et al., 2010); their results for disorganized [D] versus secure [B] attachment were of similar magnitude with significantly larger risk for those with D-attachment to go on and have later EB symptoms vs secure-B-attachment ($k=19$, $d=0.27$, 85%CI: 0.13 to 0.41 , $p<.01$;). The only other significant predictor in the Pallini et al., MA (2019) was resistant vs. secure (C vs. B; $k=15$, $n=2580$, $r=0.21$ 95%CI: 0.11 to 0.30 . $z=3.95$, $p<.001$). Note, the majority of these findings showed significant heterogeneity between the included studies.

Several important links between attachment status and future attentional problems have been proposed. Firstly is the role of a secure attachment relationship in terms of structuring a child's learning of effortful control for self-regulation of emotions and subsequent behaviour. This is thought to be achieved by; (i) parent and child being able to express their emotions (even anger) to each other, label and explore these and co-regulate their effects together (emotional understanding), (ii) the parent to model coping strategies during both stressful scenarios (on which attachment related behaviours and measurement are based) but also during general social interactions to aid the child's social skills (e.g. smiling during conversation) and overall competence and (iii) doing this in a safe, ordered and consistent way. Second is the role of "safe haven behaviour" and the influence that having a secure base has on a child's development and independence; This practically is a balance between the child's ability to be flexible in their attention and concentration on task based behaviour (exploration) versus the need to attend to caregivers or social aspects of a situation in preference to this (e.g. needing approval or reassurance from others if they have not embodied this enough for themselves...). Thirdly is the internalising of early attachment experiences and security into "Internal Working Models" and how these influence the child's sense of self as lovable/likeable and their ability to achieve. This is thought to affect how much [over-, appropriate level- or under-] attention the emerging adult pays to attachment/social cues and the influence this has on their ability to modulate reactive elements of emotional and behavioural expression: For example a person can develop hyper-vigilance in order to maximise their chances of "getting things right" in social situations: this could lead to a false and cyclical re-affirmation of their sense of failure, due to mis-interpretation of negative social cues always being about them (Pallini et al., 2019). There is consistent findings in both the attachment (Sroufe, 2005) and ADHD data that poor

attachment and high levels of ADHD with associated sequelae (Harpin et al., 2016) are both associated with social difficulties and problems forming and keeping close relationships in later life.

1.5.6 Child Personality Characteristics

Theory and empirical findings such as those around attachment may imply that the parent's influence on future child ADHD outcomes is the main direction of causality. However, aspects of child personality, such as temperament (with components of emotionality and reactivity/reactive control), oppositionality, and early behaviours linked to latter attentional difficulties are evident from a very early age. How these then impact parental self-efficacy, stress and parent child relationship have also been explored and theoretical mechanisms of interaction proposed (e.g. the transactional model in the context of self-regulation; (Sameroff & Mackenzie, 2003).

A recent meta-analysis aimed to explore the measurement of emotionality and emotional regulation in young children (<2 years of age): they looked at the productive power of proxy/indicator measures of this for later levels of EB (as a continuous variable) or for categorical diagnosis of ADHD (Kostyrka-Allchorne et al., 2020). The average time lag between measurement of temperament and later child psychopathology was 72.9 months (SD 54.2). The following five concept/measures were explored in the paper, and these are outlined below. Detail as to what they represent in terms of temperament and personality research is presented, with the effect size for each concept/measure predicting later levels of EB or categorical ADHD diagnosis from the MA above then quoted (effect sizes calculated using Fisher's z):

(i) Negative emotionality: (emotionality or reactivity refers to a person's experience of emotions, specifically their threshold for reaction, how often they do react and finally, how quickly they react and to what relative level their emotions reach i.e. intensity. It is part of temperament along with reactive control, but this is without a "positive" or "negative" direction specified. Negative emotionality has been linked to personality concepts of neuroticism and negative affect: These imply a tendency for a person to experience negative emotions preferentially to positive ones and finding it harder to respond to life stressors; see also, Rothbart, 1981 and Rothbart et al., 2001). MA results for predictive association of early higher negative emotionality for later ADHD diagnosis: $k=4$, No.ES=6, $z=0.14$, 95%CI: 0.06 to 0.22, $p<.05$.

(ii) Self-regulation: (within temperament research reactive control is the early innate ability for an infant young child to cope with and lower their emotions. This is structured by caregivers in the early years with the methods they model then being incorporated by the child as they age, if effective emotional regulation is to emerge. Examples of behaviours observed for reactive/self- control are levels of distress, whether they can be soothed and whether the child can orientate their gaze away from the negative stimulus and how long for). Results for greater self-regulation and later ADHD diagnosis: $k=4$, No.ES=4, $z=-0.25$, 95%CI: -0.36 to -0.14, $p<.05$.

(iii) Activity level: (this MA measured the predictive association between activity levels, as reported by parental questionnaire, and later ADHD/EB. This is seen as a separate dimension of temperament in some models but thought to explain similar variance between children's temperaments as surgency/extraversion in others - see next section). Results for

higher levels of infant activity and later ADHD diagnosis: $k=4$, No.ES=4, $z=0.19$, 95%CI: 0.05 to 0.32, $p<.05$).

(iv) Surgency/extraversion: (this also encompasses other personality/temperament aspects such as a tendency to experience positive vs negative emotions, being sociable/“outgoing” vs quiet/shy and being more likely to show “approach behaviour” to emotionally triggering things versus withdrawal: Not enough ADHD studies SO results for non-specific EB shown: $k=3$, No.ES=3, $z=-0.03$, 95%CI: -0.08 to 0.02, n.s.),

(v) Behavioural inhibition: (representing a natural instinct to avoid conflict and withdraw from novel or risky situations vs being novelty-seeking or having risk-taking tendencies. It includes being more sensitive to punishment and less receptive to reward, with altered reward sensitivity being a feature of ADHD. Behavioural inhibition in temperament research is related to negative emotionality in empirical studies and theory-based analysis also). Not enough studies for ADHD nor non-specific EB, therefore predictive strength for higher behavioural inhibition and any psychopathology data was; $k=14$, $N=5,621$, $z=.10$, 95%CI: 0.01 to 0.18, $p<.001$. Note mainly [9 of 13] internalising outcome studies. Kostyrka-Allchorne et al., 2020).

These aspects of temperament and early infant behaviours are included in this section to give context to early parent-child interactions in this population: those who go on to meet behavioural characteristics for ADHD diagnosis. Mainly it is important to consider how these may affect a parent’s initial reaction to their child when/if their child frequently reacts to triggers around them in a negative way with high emotionality (Bunford et al., 2015).

Elements of poor attentional mechanisms in the child and/or parent also may add to relationship effects of early behaviours through failures of effective joint attention. This is a

theoretical mechanism looking at whether the parent and child are aware and sensitive enough to be paying attention to each other when they need to connect. In addition, is this sustained long enough for parental and child needs to be identified by the other. Elements of motivation and saliency to any potential punishment or reward on either side may affect the likelihood of successful joint attention. Successful joint attention and the result of this for the parent and child may also then effect the likelihood of the person to seek that attention next time, producing another protective- or otherwise- cycle of behaviour in families living with ADHD (Karagianni et al., 2021).

1.5.7 Parent Behaviour/Style

Parenting behaviours, as will be outlined below, are measurement and theoretical constructs that reflect common approaches seen in parents. These have been identified through observation of parent-child dyads either in naturalistic settings or during structured-task scenarios. Externalising behaviour and ADHD causality literature combines this with other relevant child development and environmental processes, some of which are outlined above, to link specific behaviours or styles to positive or negative outcomes. This is the basis of theories such as Patterson's coercion theory which provides a framework on the role of child aggression and non-compliance on parent and child interact across the early years (Patterson, 1982). In addition all parent-led programmes used for ADHD are based on social learning theory (Bandura & Walters, 1977); this describes practical and emotional learning occurring in a social situation with the child identifying certain behaviours as preferable over others by observing what happens around them. Although based on aspects of behavioural reinforcement (Skinner, 1985), it emphasises the fact that by observing/hearing verbally rewards and consequences of different choices, the child then

models their subsequent behaviours accordingly: direct reinforcement or experiential learning is not necessary for change to occur under social learning principles. Apart from the direct effects that parenting behaviours may have on the child, modelling positive versus less positive ways of managing relationships and problem solving outside of the parent-child dyad also heavily influences a child's later behavioural choices.

A recent MA (Pinquart, 2017) explored the parental behaviours and styles that are associated with higher levels of EB in children. The explored this both in terms of cross-sectional association ($k=725$ of 1,435), predictive with longitudinal data ($k=454$ of 1,435) and studies reporting cross-lagged data ($k=256$ of 1,435): a structured-equation modelling method that allows the degree of bi-directional influence of two dependent variables to be explored. The authors described five parenting behaviours that, on review of the literature, they believe are most valid in terms of their effect on EB pathology in children. Three positive parenting behaviours were coded from the study findings and hypothesised to be associated with- or predict- lower levels of EB; parental responsiveness/warmth (including level of support, sensitivity and expressed positive feelings), [good] behavioural control (expectations, monitoring and giving clear consistent boundaries for behavioural control that were "not aggressive or psychologically controlling") and autonomy granting (to encourage independence without over-control/intrusiveness). Two negative behaviours expected to associate/predict higher levels of EB were included: harsh control (involving either physical violence or harsh verbal punishment) and psychological control (described as "parental attempts to manipulate children's psychological and emotional experiences"). For parental styles the authors selected to code the relevant studies using a pre-existing model (Maccoby & Martin, 1983). These four styles are based on level of responsiveness/warmth with degree and methods of achieving behavioural control: an authoritative style (high

warmth and high behavioural control), an authoritarian style (low warmth and high/harsh control), a permissive style (high warmth and low control), and a neglectful style (low warmth and low control). Only the authoritative style above was hypothesised to be associated with or predict lower levels of EB in children.

The significant findings in this MA (Pinquart, 2017) are outlined below: these were consistent with previous findings in the parenting and EB literature (and see below for integration of these into ADHD treatment also):

(i) Although all nine behaviours/styles were associated with- or predicted- levels of EB in the expected direction only harsh control ($r=.21$) and psychological control ($r=.22$), show average ES greater than .2. (Although parental warmth ($r=-.18$) and behavioural control ($r=-.19$) were close also).

(ii) There were bi-directional effects and parent-only effects, but no child-only effects found.

(a) Bi-directional: The average change in effect size over time for the included studies was bidirectional for EB and the following parental behaviours/styles; warmth, behavioural control, harsh control, psychological control, and authoritative parenting style. For these 5, change in ES of the parenting behaviour/style over two or more time points predicted change in child externalising behaviour and change in child EB over the two time points predicted change in the parenting behaviour/style. This suggests that the level of child's behaviour affects the expression of these parenting behaviours and vice versa.

(b) Parent-only effects: In contrast autonomy granting, authoritarian and permissive parenting showed only "parent effects": used by the authors to describe the fact that change in these three parenting behaviours/style between two time points predicts the

degree of change in child EB but change in child EB does not influence the level of the parenting variables.

(iii) Finally, despite ongoing debate, the majority of parental behaviours/styles were more strongly associated with levels of EB in older children than younger children, with the exception of authoritarian and permissive parenting: studies in which the mean age of the sample was lower had stronger associations between authoritarian and permissive parenting and externalising behaviour (the number of studies measuring autonomy granting was too low to be included in this analysis). This last point in practice reflects that parents may respond to increases in their child's EB over time by either increasing their levels of harsh parenting and using psychological control or by lowering their control and response to the behaviour their child shows (i.e. decreasing behavioural control and levels of authoritative parenting (Pinquart, 2017)).

These findings, according to the authors, support previous empirical findings relating parenting styles to EB pathology along with the underlying (Granic & Patterson, 2006) and translational science that has come from this (Patterson et al., 2002). Although they also emphasise that the proportion of variance in EB levels explained by parenting behaviours/style is low. This is also consistent with the effect sizes of all contextual factors that worsen or protect against later ADHD diagnosis in a genetically at-risk child.

This MA was chosen despite it not using ADHD outcomes as the inclusion of cross-lagged analysis was deemed important for mechanisms of interaction addressed in PLIs to treat both EB-not otherwise specified and ADHD. A recent MA (Claussen et al., 2024) looked at longitudinal associations of different factors with later child ADHD symptoms (with measures of the factor being at least 6 months before the measure of the child's

symptoms). This could be prospective or retrospective in design. Both measures were in continuous form. There were enough studies to look at the following parental styles and the correlation coefficients [CC] are shown also: more sensitivity/warmth was associated with less ADHD symptoms in the child ($k=8$, $CC=-0.16$; 95% CI: $-0.20, -0.12$); more “intrusive/reactive interaction” behaviour was associated with more ADHD symptoms ($k=4$, $CC=0.17$; 95% CI: $0.08, 0.26$); more negativity/harsh discipline was associated with ($k=7$, $CC=0.19$; 95% CI: $0.06, 0.32$. $Q(6)=57.21$, $p<0.001$). Only for this last parenting style/factor, was there was significant heterogeneity as stated by the authors (Claussen et al., 2024).

1.5.8 Parental ADHD

As previously mentioned the proportion of variation in lifetime ADHD diagnosis explained by genetic factors in relevant studies is high (Chen et al., 2017). ADHD is known to persist into adulthood in between 15% (meeting full DSM-IV criteria for the condition) and 65% (ADHD in partial remission) of adults at age 25 years (Faraone et al., 2006). There may be change in character of the classic ADHD symptoms and how they are individually perceived such as hyperactivity potentially morphing into symptoms of internal restlessness in adults, making establishing the true rate of ADHD persistence hard to ascertain (Caye et al., 2016). In addition group characteristics and associative features including outcomes may be different in adult ADHD populations with, for example the gender distribution levelling out (Cortese et al., 2016). With an unexpectedly small number of studies found to include (4 with 1 later removed due to high heterogeneity), a recent meta-analysis (Uchida et al., 2021) found the occurrence rate of ADHD in offspring of parents with concurrent ADHD (either both or one parent with the condition) was over 50% (pooled prevalence=0.52, 95%CI: 0.43 to 0.61, $p<.001$. No significant heterogeneity; $I^2=10.6\%$, $p=.33$. No publication bias: Egger test - before

removal of 4th study; $t_3=1.64$, $p=.24$). Looking from the other direction, on meta-analysis (Cheung & Theule, 2016) 21.26% of parents of children with ADHD had either concurrent symptoms reaching diagnostic level for ADHD or an established ADHD diagnosis from clinical interview at the time of assessment of the child's ADHD from the included studies ($k=24$, 95%CI: 8.07 to 24.85, $p<.001$. $Q_{23}=95.02$, $I^2=75.80$).

It is hard to identify whether Parents of children with ADHD who also have significant symptomatology and/or impairment themselves may influence their child's diagnosis severity and outcome through genetic, epi-genetic or environmental means (Johnston et al., 2012). Important areas in which parental ADHD is thought to potentially affect outcome in a child's ADHD are: (i) Aspects of effective behavioural control (mainly proactive strategies of structured routines, clear behavioural boundaries and adapting their methods through functional analysis of behavioural episodes where needed) and (ii) emotional responsiveness (a mixture of sub-conscious processes, learned cognitive strategies and personality characteristics that affect the parent's awareness of a child's needs and their response to them). This is reflected in the findings from a recent meta-analysis (Park et al., 2017) which shows that increasing levels of parental ADHD symptoms are associated with higher levels of harsh parenting methods ($k=23$, $ES=23$, $r=0.17$, $p < 0.001$, 95% CI; 0.12 to 0.21. $Q(22) =43.67$, $p=0.004$) and a greater likelihood of engaging in lax parenting with their child ($k=19$, $ES=19$, $r=0.18$, $p < 0.001$, 95% CI; 0.11 to 0.24. $Q(18) =51.62$, $p < 0.001$). (Note, the author group used very similar coding methods for parenting behaviours as were applied in the MA cited earlier; Pinquart, 2017)

One mechanism by which parental ADHD may mediate its effect is postulated to be a parent's ability to scaffold their child's learning, emotional regulation and behavioural

control. Scaffolding in this context refers to a parent's ability to support the child at an appropriate developmental level in order to move the child from a place where they currently need support to achieve a task to future independence in that same area. It incorporates aspects of Vygotsky's scaffolding theory, initially explored in formal academic settings and language acquisition (Wood & Wood, 1996) but which is now an integral part of theories behind treatment's for ADHD (Thompson et al., 2009).

Higher Levels of effective parental scaffolding used during structured parent child interactions (e.g. in "tidy up" scenarios or homework completion) has been shown to predict better executive function [EF] in preschoolers (single study, $n=42$, longitudinal design: Hammond et al., 2012). As outlined earlier, children with ADHD have impaired EF which is already detectable in pre-school populations. In addition the relationship of EF ability with ADHD symptom level is significant for both concurrent association in cross-sectional design and for future prediction of ADHD symptoms from earlier EF function at pre-school age (Pauli-Pott & Becker, 2011). A recent meta-analysis (Yang et al., 2022) shows that EF (with results from of all EF domains pooled) measured in primary school aged children (no mean age given) is predictive of academic ability measured in secondary school ($k=21$, $n=7,947$, $r=0.365$, 95%CI: 0.309 to 0.419. $p<0.05$). A small but significant association has been found on meta-analysis (Valcan et al., 2018) between maternal scaffolding-type behaviours and executive functioning ability in the child: parents who either showed on observation- or had reported using- more "cognitive behaviour" in their parenting had children who at the time ($k=8$) or later ($k=10$), had significantly greater levels of EF ($k=18$, $n=8653$ $r=.25$, 95%CI: .20 to .29, $p<.001$. $Q=70.84$, $p<.001$. Fail safe $N=2431$). Whether parenting scaffolding behaviour is not as constructive in children with ADHD versus those without is not able to be ascertained from studies to date. Nor is the simple presence

and/or size of any association between childhood ADHD levels and parental scaffolding skills. Finally the ability of a parent to scaffold their child if they themselves have ADHD has not been explicitly studied. Examples of constructive scaffolding behaviours are enhancing support after failure and withdrawal of this when successful (Bibok et al., 2009) and parental autonomy granting during learning or development tasks (see; Matte-Gagné et al., 2015). These are theoretically harder skills for parents with ADHD to perform and may indeed be lowered in amount and/or quality when parenting a child with ADHD and/or ODD (Johnston et al., 2012).

Household chaos is another concept by which maternal ADHD symptoms have been thought to impact on a child's lifetime risk and outcomes from ADHD. As a concept it was proposed to explain the passive effects of lack of organisation and consistency and the effects these have may have on the ability/capacity of the parent to support and structure their child's development given the environment they live in (Bronfenbrenner & Evans, 2000).

Household chaos is reflected in how markers of less ideal environments might impact on the child through aspects such as the overall atmosphere and sense of organisation. Examples of environmental factors are the level of noise/shouting and perceptions around stability/predictability. A more practical indicator is the presence of otherwise of clear routines in the household (Dumas et al., 2005). Research appears to show that household chaos measured using similar markers outlined above, explains variance in child development, behaviour and long term outcomes over and above socioeconomic factors and macro-environment variables also (Deater-Deckard et al., 2009).

One recent paper (Agnew-Blais et al., 2022) presented results for a large UK longitudinal study (the E-risk study; n=2,232) exploring reciprocal relationships between child ADHD,

parental ADHD and home environment. It found (i) that parents with a high polygenic risk score (PRS) for ADHD themselves had higher levels of household chaos (HC) averaged across all raters and time points (observed at; (a) baseline - child age of 7 years – and at (b) 10 and (c) 12 years and by parental and child report at 12 years also) with a small but significant correlation coefficient ($b = 0.10$, $p = .003$). However (ii) once the child's PRS was taken into account, the association between maternal ADHD genetic risk was no longer significant. (iii) Children with higher ADHD PRS lived in houses with higher levels of chaos (combined total chaos: $b = 0.11$, $p < .001$) and (iv) this association between child PRS for ADHD and household chaos remained significant after parental ADHD was considered ($b = 0.08$, $p = .019$). (v) That children with higher genetic risk for ADHD had more symptoms across childhood even after counting for maternal PRS (intercept of the incidence rate ratio [IRR] $= 1.12$, 95%CI: 1.03 to 1.22, $p = .007$). This finding that maternal PRS did not predict child's level of ADHD symptoms over and above the child's PRS provided support against mothers exacerbating their child's ADHD across childhood by the way they shape the environment they live in (genetic nurture), the authors stated. (vi) Children who lived in more chaotic households had higher levels of ADHD symptoms across childhood (intercept IRR $= 1.47$, 95%CI: 1.38 to 1.57, $p < .001$) and slower rates of decline (slope IRR $= 1.04$, 95% CI 1.03, 1.05, $p < .001$). Finally, (viii) this association between household chaos and child symptom level and rate of decline remained when maternal and child PRS were accounted for (Agnew-Blais et al., 2022).

Overall, there is evidence for a theoretical and in some cases an empirical association between maternal ADHD and worsening of child ADHD severity and outcomes across the lifespan. Whether the direction and mechanism of causality is from the primary effects of parental ADHD traits on their organisation and structural skills or child symptoms

influencing the ability of the parent to create a structured and non-chaotic despite their skills is not clear. It is bi-directional like other factors in this research area. Either way, the data from scaffolding and household chaos overall emphasises the importance of consistency and order in the way parents, child and environment interact across time.

1.5.9 Parental Attributions Around Child's Behaviour and ADHD Understanding

Improving parent child relationship in the context of developing parenting styles protective against ADHD may be achieved through adapting parental negative attributions around their child's behaviour. Attributional theory is based on research around how a person decides, in the moment, why a certain event has happened, how they use these causal explanations to identify an appropriate (or otherwise) response and how recurrent experiences influence future attributions, behaviours and socialization (Weiner, 1985). Factors relevant to the nature of the cognitive inferences people make around people's behaviour are; (a) whether they believe the cause of the event is within themselves/another person or from external factors such as luck or circumstances ("locus"), (b) whether the thoughts around why the event occurred are recurrent (and potentially unlikely to change) versus transient (and therefore not necessarily as concerning; "stability") and (c) "controllability"; whether they believe that themselves or others are consciously aware of what they are doing and/or could prevent/stop it if they wished (Weiner, 1985). An extension to this initial taxonomy behind behavioural attributions is the association a person makes between the cause of a behaviour and how this reflects the innate characteristics of a person (dispositionnel influences; Dix, 1993). This may then influence the persons likelihood of making the same attributional inference the next time that behaviour occurs and can create a cycle of

positive or negative attributional direction/style. This may then influence future parent and child's behavioural responses, their feelings toward the other and their sense-of-self.

Importantly in terms of engagement and potential for change, when using hypothetical scenario-based measurements of attributions, a parents attributions around a child's behaviour can be judged as being accurate or bias: this bias can be in the child's direction (i.e. attributing cause of a behaviour to the child when actually it is due to uncontrollable external factors) or unfairly put on their own, the parents, shoulders (Sawrikar & Dadds, 2018).

In a seminal study by Johnston and Freeman (1997), the influence of an ADHD diagnosis ($n_c=30$ children and $n_p=52$ parents) towards parental attributions around their child's negative behaviours (either inattentive/overactive [IO] or oppositional/defiant [OD] in nature) and positive behaviours (pro-social behaviours [PRO]) when compared to those of parents of children without any behavioural disorder ($n_c=26$ and $n_p=42$) was explored. This study aimed to balance the advantages and disadvantages of different ways of measuring attributions; mainly these are problems around standardising the specific behaviours one is asking parents to report attributions around (e.g. using standard written descriptions versus video-taped examples of behaviours in the actual child) and in the timing of collection given that attributions may be different in the moment versus later on reflections (parent recall, versus video-taped examples of the index child thus re-producing to a degree the equivalent of being "in the moment" for a parent).

In the above study, parents of children with pre-existing ADHD (which was confirmed using structured interviews with DSM-III-R criteria) compared with parents whose children did not express symptoms of externalising or internalising problems were; (i) more likely to see

their child's IO and OD behaviour as being due to child internal causality/locus compared with PRO behaviours; this was shown by a positive Group (ADHD vs none) X Behaviour (IO vs OD vs PRO) effect from ANOVA methods (Parental recall method; $F(2, 180) = 3.30, p < .05$ and video exert of index child; $F(2, 180) = 4.29, p < .05$) and post hoc comparisons of the rating scale values for each behaviour type between the two groups. (ii) to see their child as having less control over both IO and OD behaviours (Questionnaire based method: Group X Behaviour interaction, $F(2, 180) = 8.08, p < .001$, Parent recall; $F(2, 180) = 17.84, p < .001$ and video exert of index child; $F(2, 180) = 16.59, p < .001$) and (iii) to see IO (all measurement methods) as more stable and PRO as less stable. Further-more with regards to parent-responsible attributions (versus the child causal-type just presented) (iv) parents of children with an ADHD diagnosis did not seem to feel personally responsible for IO or OD behaviours either, a finding consistent across all 3 methods of measuring attributions in this study. Not feeling responsible for a child's negative behaviour could be positive in terms of accepting facts around ADHD aetiology in order to move forward in a positive way and operationalize change. However this study also found that (v) parents of children with ADHD reported more negative affect than those of children without ADHD with this effect being worse for OD behaviours versus IO. In addition (vi) when asked, parents of children with ADHD were more likely to show a negative behavioural reaction during hypothetical or real (recalled) examples of OD and IO behaviour (Johnston & Freeman, 1997)

A recent systematic review of existing data (Pereira & Barros, 2019) explored the role of parental attributions and other factors around engagement and outcome using the frameworks of the Health Belief Model (Janz & Becker, 1984) and the Barriers to Treatment model (Kazdin & Wassell, 1999). Their conclusions were in agreement with similar reviews: that more understanding is required but that attributions may well play an important part in

the engagement and effectiveness of PLI for some individuals but not all (Sawrikar & Dadds, 2018). Despite this, consistent evidence for the role of identifying and addressing attributions in improving effectiveness of behavioural interventions to treat ADHD is limited (Hoza et al., 2006) as is similar evidence in children with oppositionality and conduct disorder (Sawrikar et al., 2020).

How exactly to address these attributions is not yet known although some modular based additions to existing PLIs to have been tried with some success (Sanders et al., 2004). In addition there is meta-analytical data that shows ADHD psycho-education alone is associated with significant improvement in parent-reported ADHD versus controls (Dahl et al., 2020). A combination of the following may well be effective in reversing any non-constructive attributions the parent may harbour: (a) increasing positivity including highlighting positive pro-social behaviour the child shows and ignoring negatives where possible, (b) educating the parent around what ADHD is including both the neurobiological and genetic elements of ADHD but also the reversible elements of early intervention around parenting style, parent-child interaction and the family environment and (c) improving parental self-efficacy through putting quick behaviour-lowering strategies into place (such as good routines and clear behavioural boundaries) and modelling aspects of attachment through the parent-therapist relationship (such as praise, trust and acknowledging emotions).

1.6 Treatment of ADHD

1.6.1 Introduction:

There are a wide variety of available treatments for ADHD across the lifespan and these can be broken down into the following groups:

(i) Medication; (a) stimulants (methylphenidate or amphetamines), (b) non-stimulant adrenergic-based medications (e.g. atomoxetine). Atomoxetine is thought to work at the pre-synaptic level as opposed to the post synaptic action of stimulants, with both resulting in the increased bioavailability of nor-adrenergic neurotransmitters such as dopamine. (c) adjunct medications for associated characteristics exacerbating ADHD (oppositonality, emotionality and internalizing tendencies) or for co-existing or secondary conditions such as mood-related issues. (However note these are unlikely to be treated medically in children before the teenage years and cause severe impact due to there not being addressed early enough especially in females; Young et al., 2020).

(ii) Behavioural interventions. These vary mostly in: (1) the target/facilitator for change; mainly parent-, teacher- family- or child/individual-led and/or (2) the modality of delivery; either face to face (individually or in a group), virtually (again 1:1 or group based), online or physical/downloaded documents. (3) These latter two can either be interactive perhaps using video or cartoon examples and activities and strategy delivery under different scenarios (often led by algorithms that respond to user-inputted data or question responses) or non-interactive (via downloaded or physical a.k.a. “bibliographic” documents/files without an interactive element).

(iii) Cognitive [re-]training interventions; there are mostly computer-game based and involve targeting behavioural inhibition, working memory, concentration/sustained attention etc. with aims for improvement in primary ADHD symptoms and/or other outcomes such as academic attainment. These are mainly used in children older than pre-school age currently and have some significant effects on meta-analysis but results vary according to reviews and effect sizes are low (Sonuga-Barke et al., 2013).

(iv) Psycho-therapeutic, systems-based approaches or cognitive-based therapies including family therapy or child-direct psychotherapy possibly through play techniques or cognitive-behavioural therapy for specific elements such as emotional regulation and social understanding or ADHD co-morbid/secondary anxiety and depression. These latter therapies are rare as first line in young children but can be needed for example in cases of trauma or past abuse. They are mainly used when past life-experiences affect the targets ability to facilitate or initiate change or when the cumulative impact of living with ADHD results in schema or cognitions that are limiting the potential of an individual with ADHD. However as primary therapies for ADHD these rarely feature in any systematic review or practitioner recommendations. This is presumed to be due to the small numbers of studies and the inability to compare the therapies delivered and/or the trial methodologies of similar trials (Catalá-López et al., 2017) along with their lack of provision in routine services currently (Coghill et al., 2021).

Treatment for all psychiatric diseases ideally should be prescribed/recommended according to local, national or international guidelines depending on the level of consensus and provision of treatment available. In the United Kingdom the main guideline body is the National Institute of Clinical Excellence [NICE], who's most recent ADHD guideline was

published in 2018 (NICE, 2018) with the last equivalent for conduct disorders in 2013 (NICE, 2013). The ADHD guideline has changed significantly since the previous version (NICE, 2008), not necessarily in terms of what is recommended but in terms of the language around how clinicians assess and make decisions around treatment choice and implementation. In this authors opinion the changes reflect accurately the difficulties clinicians face in terms of the variability in provision of behavioural, cognitive, psycho-therapeutic and systemic treatments across the UK and when it comes to retrieving timely information from multiple sources when assessing the effectiveness of treatment at critical time-points after initial instigation (Hall et al., 2016).

The most important change from 2008 to 2018 in terms of parent-led intervention treatments is that children of school age (> 5 years) should be started on medication as a first line if they meet DSM-V criteria i.e. they have symptoms that are “disruptive and inappropriate for...developmental level” and “several symptoms...present in two or more settings” along with “clear evidence that...symptoms interfere with...social, school or work functioning” (or the ICD-11 equivalent). This is the recommendation irrespective of the degree of impairment they show (NICE, 2018). The previous guideline (NICE, 2008) recommended parent-led interventions as a first line in those of primary school age (> 5 years but < 12 years) for those with mild or moderate impairment with first-line medication only for those with severe levels of impairment. Under the current guidelines Parent-led interventions remain first line for all children who reach DSM-V or ICD-11 criteria who are under the age of 5 years. This is cited as being based on concerns around relative efficacy and parental/prescriber concern for medication treatment in very-young children (see below). Parenting interventions are recommended in children more than 5 years of age if co-morbid ODD/CD is present to clinical levels (NICE, 2018).

1.6.2 Medication

Medication remains recommended in the UK as outlined above to treat ADHD in children. It is effective in reducing ADHD symptoms versus placebo-control when rated by clinicians as part of double blinded RCTs of a least a week duration with the following effect sizes from a recent meta-analysis (Cortese & Coghill, 2018): Methylphenidate ($k=9$, Standardised Mean Difference [SMD] -0.78 95%CI: -0.93 to -0.62 . Heterogeneity; $I^2(\%)=45.40$, $\tau^2=0.0229$, $p=0.066$), Amphetamines ($k=6$, SMD -1.02 95%CI: -1.19 to -0.85 . $I^2(\%)=82.90$, $\tau^2=0.1036$, $p=0.000$) and Atomoxetine ($k=21$, SMD -0.56 , 95%CI: -0.66 to -0.45 . $I^2(\%)=47.90$, $\tau^2=0.0274$, $p=0.008$). When collecting outcome reports of ADHD symptoms from those probably blinded to child's treatment or placebo status (teachers in this case), methylphenidate remains significantly effective to the same magnitude ($k=5$, SMD -0.82 95%CI: -1.16 to -0.48) but atomoxetine does not ($k=3$, SMD -0.32 95%CI: -0.82 to 0.18). No data is available on teacher ratings for Amphetamine use in children and adolescent from studies that meet the criteria for inclusion in this MA (Cortese & Coghill, 2018).

A problem with knowing the true benefits of medication on young people with ADHD is the lack of inclusion of non-core ADHD symptom outcomes, potentially due to these not being funded for or approved by interested parties supporting trials of this type (although this changed in Europe in 2010). The above meta-analysis (Cortese & Coghill, 2018) found significant improvements in the Clinical Global Impressions Scale for Children (a measure of global functioning – with positive change indicating improvement; Busner & Targum, 2007) for children for Methylphenidate ($k=11$, SMD 5.57 , 95%CI: 3.99 to 7.79 . Heterogeneity; $I^2(\%)=60.10$, $\tau^2=0.2395$, $p=0.005$), Amphetamines ($k=8$, SMD 7.71 , 95%CI: 5.52 to 10.77 . $I^2(\%)=44.30$ $\tau^2=0.1359$, $p=0.145$) and Atomoxetine ($k=4$, SMD 2.28 , 95%CI: 1.38 to 3.76 .

$I^2(\%)=74.20$, $\tau^2=0.2801$, $p=0.000$) versus placebo. However, this outcome [GIS] along with ADHD symptoms were both clinician-reported with no other reporting source (parents or teachers) included nor a second outcome measure for the same concept applied to add validity.

Effectiveness is often dependent on the process of titrating the dose and whether an optimal dose level is reached. One of the problems with this is consistency in the protocols used and the ability to compare findings across clinical trials. Evidence from varying the timing and dose of titration (“flexible dose” designs in research terms) challenges previous repeated findings: that efficacy of methylphenidate and amphetamine treatments increases with increased dose but that this is negated by tolerance at higher doses (above 30mg of methylphenidate and 20mg of Amphetamine). Being more flexible in the titration process for individuals may, these authors discuss, lower the trend for polypharmacy in more resistant cases (Farhat et al., 2022).

To look at efficacy and tolerability in preschoolers compared with children of any age, results of two recent meta-analyses are presented below: one using medication to treat ADHD in preschoolers (Chiu et al., 2023) study summary: $k=9$, $N=544$, mean age=4.86 years, percentage female=11.98, median treatment duration 4.33 weeks and another for children between 6 and 18 years (Cortese & Coghill, 2018) - study summary - $k=81$, $N=14,346$. Overall Mean age and sex distribution not reported. Follow-up data taken as that closest to 12 weeks; Chiu MA - Preschoolers (i) that reduction in ADHD in those receiving methylphenidate versus controls using symptom report by [pre-school] teachers in the short term shows a significant reduction in symptoms in those receiving medication compared to controls with large effect sizes ($n_{\text{treatment}}=263$ $n_{\text{control}}=263$, $k=5$, Hedge’s $g=0.66$, 95%CI: 0.21-

1.10. $I^2=78\%$). However (ii) that these effect sizes are lower than those seen for children of school age - Cortese MA – 6-17 years (SMD-Hedges $g = -0.82$ 95%CI: -1.16 to -0.48). (iii) tolerability in terms of likelihood for dropout on methylphenidate in children of any age compared to controls is not significant for methylphenidate (Cortese MA - odds ratio=1.44, 95%CI: 0.90 to 2.31) with side-effect statistics in the pre-school populations (Chiu MA) showing that only loss of appetite was significantly greater in preschool children compared to placebo ($k=6$, OR=2.3899, 95%CI: 1.0807 to 5.2852, $p=0.0314$) with other commonly reported side effects not reaching significance against placebo-receiving controls (OR: irritability 1.06, sleep disturbance 1.312, prone to cry 1.359 and anxiety 1.318). This may suggest concerns around the tolerability of methylphenidate in preschool children may be less of a true concern than it has been in the past.

When considering choice and efficacy of treatment for preschool children there are important things to keep in mind. (i) The median age of onset for ADHD symptoms is on average much higher than this across the world taking into account factors such as global variation (Kieling et al., 2010; Polanczyk et al., 2014) and prospective vs retrospective recall (Polanczyk et al., 2010). (ii) That the service provision barriers to accessing child and adolescent mental health assessment and treatment for ADHD both generally and for those under the age of 5 specifically are high (French et al., 2020) and that decisions around management are complex resulting in regional and individual variation from guidelines. (Kovshoff et al., 2013; Kovshoff et al., 2012). Of all the children prescribed medication at least once for ADHD from a UK country wide database study ($n=14,748$) between 1995 and 2013, the authors estimate (accounted for methodological issues such as missing month of birth) than only 4% of these individuals ($n=547$) were aged less than 6 years at the time of

their first prescription (Rimestad et al., 2019). Finally (iv) in order to prescribe medication in children under the age of 5 years a second specialist opinion needs to be sought, “with expertise in managing ADHD in young children (ideally a tertiary service)” (NICE, 2018).

1.6.3 Parent Led Interventions to Treat ADHD

Behavioural treatments targeting changes in parenting behaviours and family environments have been developed to treat childhood behavioural problems since the late 1960’s and 1970’s. There was approach of these from two directions, firstly realisation that treating child behaviour with the child as the sole target for change resulted in improvements within the confines of the therapeutic environment/location. However these dissipated when the child returned to their family environment. This mainly resulted in adding parent and child interaction within the existing child focussed, often play based, sessions. The second direction was from research into socioeconomic deprivation and abuse/neglect environments alongside the conceptual development and clinical understanding of oppositionality and conduct disorder in this context. This was all going on alongside the differentiation of internalising-type symptoms from more externalising disorders and debate around symptoms the child displays that are more likely to be primary in origin, based on genetic or more child brain development in causality, versus those that materialise secondary to early parent-child interaction, for example that based on attachment theory.

Currently, Parent led interventions to treat ADHD in children are recommended as first line treatment for all children under the age of 5 years independently to the presence or absence of oppositional/defiant disorder (ODD) and/or conduct disorder (CD) type behaviours. Psychoeducation (in written form) is recommended for all children aged 5 to 11 diagnosed with ADHD, with parent led interventions being only required for those who

reach clinical criteria for ODD/CD. Group versus individual modality of delivery is not specified but instead is left to clinical opinion and based on factors such as barriers to accessibility, parent preference and possible differential benefits such as group-based supportive aspects versus individual therapy, for example when parents have worries around stigma or parental self-efficacy when engaging in a group environment. This all sounds ideal in practice, however it is not always able to be translated in the UK clinical sphere: Reasons for this include differential treatment availability across health providers along with navigating individual preferences and public [mis-] conceptions around behavioural causality and attributions (i.e. parenting versus child-based) and beliefs around potential effectiveness of one treatment over another for them as individuals

Behavioural interventions that were parent focused significantly lower ADHD symptoms from parent report in participants receiving the intervention compared to controls when analysed at the individual participant data meta analytical level ($k=17$, $n=1,689$ estimate $=-0.42$, [SE 0.05] $t^2=-8.8$ $p<.001$), ODD ($k=14$, $n=1,568$, estimate $=-0.20$ [SE 0.04] $t^2=-4.93$, $p<.001$; Groenman et al., 2022). This finding is the same for group level meta-analytic data from parent report of child ADHD symptom change with similar effect sizes (SMD 0.40, 95%CI: 0.20 to 0.60. $Z=3.88$, $p=0.0001$ (Sonuga-Barke et al., 2013).

Change in CD symptoms in those with ADHD from parent report at the individual participant data level was significant but with an effect size about half of that for ADHD ($k=9$, $n=882$, estimate $=-0.23$ [SE 0.05], $t^2=-4.92$, $p<.001$). Equivalent values from parent report for group level data (from a different, pre-school only meta-analysis, than above as ODD/CD outcomes were not included in this) was at a similar level for parent report CD/ODD as for ADHD

(Hedge's $d=0.44$, $CI = [0.17-0.70]$, $p = .001$) although heterogeneity was large and significant ($Q = 67.1$, $df = 12$, $p < .001$, $I^2 = 82.1$) (Rimestad et al., 2017).

Whether behavioural PLIs to treat ADHD are effective in changing outcomes other than child behaviour may give surface validity to causal mechanisms behind ADHD development and environmental risk factors. Below are the findings from a recent individual participant data meta-analysis looking at these non-behavioural outcomes following receipt of behavioural PLI compared with non-treatment controls. These are presented in order of the “ADHD causality” sections above; significant improvements compared to controls in two factors relating to the child early environment, (i) self-reported parental mental health ($k=23$ [33 Effect sizes], Standardised Mean Difference-[SMD] 0.41, $p<.001$, 95%CI: 0.20 to 0.61, $I^2=0.0\%$ not significant-[n.s]) and (ii) Parental Sense of Competence ($k=17$ [29es], SMD 0.54, $p<.001$, 95%CI: 0.35 to 0.73, $I^2=43.8\%$ n.s). Significant improvement in (iii) Parent child relationship from parent report ($k=7$ [8es], SMD 0.54, $p<.01$, 95%CI: 0.18 to 0.90, $I^2=43.8\%$ n.s.) and from probably blinded sources ($k=6$ [10es], SMD 0.53, $p<.01$, 95%CI: 0.17 to 0.88, $I^2=43.8\%$ n.s.). Significant improvements in parenting behaviours/style in those receiving PLIs versus non-treatment controls, with (iv) more positive parenting from self-report ($k=9$ [10 es], SMD 0.63, $p<.01$, 95%CI: 0.28 to 0.98, $I^2=71.3\%$ n.s) and probably blinded sources ($k=12$ [17es], SMD 0.58, $p<.001$, 95%CI: 0.30 to 0.86, $I^2=71.3\%$ n.s) and (v) less negative parenting both on self-report ($k=10$ [19 es], SMD 0.54, $p<.001$, 95%CI: 0.25 to 0.83, $I^2=59.2\%$ n.s) and probably blinded sources ($k=6$ [12es], SMD 0.68 $p<.001$, 95%CI: 0.32 to 1.04, $I^2=59.2\%$ n.s).

Finally these recent individual participant data meta-analyses add some clarity to inconsistent findings around factors that may moderate, or mediate outcome of parent led

interventions to treat ADHD. Apart from, younger age and higher baseline severity of child ADHD behaviour, no other demographic, psychosocial or child/parent characteristics significantly influences the effectiveness of behavioural PLIs to treat ADHD given the method of analysis and studies included.

1.6.3.1 Effectiveness of specific Components of PLIs

Currently there is a general consensus as to what the active core components of PLIs to treat ADHD or externalising behaviour [EB] are and these have surface content validity in terms of ADHD theory and the role parenting has in long term outcomes. However higher dosage of most of these active components of PLIs have not, on the most part, been associated with better outcomes. This is the case for; (i) “hard” outcomes of child behaviour (exceptions higher doses of negative consequences associated with better EB outcomes and higher doses of psychoeducation associated with worse outcomes), (ii) for “interim” outcomes such as parenting behaviours/styles nor for (iii) “soft” outcomes such as parental stress or well-being.

Table 3: A table showing a breakdown of the components of parent led interventions to treat ADHD in children. Presented as the proportion of sessions in which that component was included. Also shown is whether the COPPI week-by-week delivery manual had more/less of that component compared with other NFPP trials (k=7) and all trials included in the study (k=25).

Active components of intervention	Proportion of sessions including the core component				Target for change in which component features (as per thesis quality of delivery measure)		
Category	All NFPP		COPPI		All trials	Number	Details
Specifics							
Shaping knowledge							
Psycho-education parent	86.8	>	83.3	>	63.1	All	
Observation and monitoring							
Monitoring	87.5	<	100.0	>	47.2	3 4b 5 6	Effective communication Child’s ADHD e.g. arousal emotions Parental self-monitoring Scaffolding child’s abilities
Functional analysis	41.7	<	100.0	>	58.8	1 4a & b	ADHD behaviours and situational variation Unwanted behaviour in the context off routines and boundaries
Manipulating antecedents							
Disciplinary communication	41.7	>	25.0	<	58.8	4b	Clarity and consistency for child to be aware of the boundary along with communicating the alternative behaviour.
Anticipate for misbehaviour	17.4	>	16.7	>	10.9	4a b & c	Identifying times of the day and situations/people when certain unwanted behaviours arise
Restructuring the environment	29.2	>	0.0	<	63.3	4a 4b	Weekly planner schedules and visual prompts/timings for routines House rules visible decluttering toys setting up play/work to remove distraction
Prompt/cues	13.9	>	8.3	<	19.8	4b 4c	Early warning when child is breaking a behavioural boundary Using timers with verbal prompts to transition between activities
Distraction	7.6	<	8.3	<	43.0	4b	Distraction in the context of avoiding conflict and preventing unwanted behaviour

Active components of intervention	Proportion of sessions including the core component				Target for change in which component features (as per thesis quality of delivery measure)	
Category	All NFPP	COPPI	All trials	Number	Details	
Specifics						
Consequences/ contingency management (Positive consequences)						
Material reward	1.4	<	8.3	<	29.3	4b & 7 Reward charts including “token” concept.
Activity reward	9.0	<	16.7	<	22.9	4b 6 & 7 Also incorporated into play to build parent-child relationship
Reward (not specified)	21.5	>	16.7	<	21.0	4b 6 & 7
Social reward	51.4	>	8.3	<	18.6	2 4b & 7 That rewards should not always be monetary and that time with the parent/family time is often as/more effective
Consistent responding	27.8	>	16.7	>	2.7	4b 8 Consistency between cares around managing unwanted behaviours General consistency and support in family/wider systems
Shaping knowledge						
Psycho-education parent	86.8	>	83.3	>	63.1	All
Observation and monitoring						
Monitoring	87.5	<	100.0	>	47.2	3 Effective communication 4b Child’s ADHD e.g. arousal emotions 5 Parental self-monitoring 6 Scaffolding child’s abilities
Functional analysis	41.7	<	100.0	>	58.8	1 ADHD behaviours and situational variation 4a & b Unwanted behaviour in the context off routines and boundaries
Manipulating antecedents						
Disciplinary communication	41.7	>	25.0	<	58.8	4b Clarity and consistency for child to be aware of the boundary along with communicating the alternative behaviour.
Anticipate for misbehaviour	17.4	>	16.7	>	10.9	4a b & c Identifying times of the day and situations/people when certain unwanted behaviours arise
Restructuring the environment	29.2	>	0.0	<	63.3	4a Weekly planner schedules and visual 4b prompts/timings for routines House rules visible decluttering toys setting up play/work to remove distraction

Active components of intervention		Proportion of sessions including the core component				Target for change in which component features (as per thesis quality of delivery measure)	
Category		All NFPP	COPPI	All trials		Number	Details
Specifics							
Prompt/cues		13.9 >	8.3 <	19.8		4b 4c	Early warning when child is breaking a behavioural boundary Using timers with verbal prompts to transition between activities
Distraction		7.6 <	8.3 <	43.0		4b	Distraction in the context of avoiding conflict and preventing unwanted behaviour
Consequences/ contingency management (Positive consequences)							
Material reward		1.4 <	8.3 <	29.3		4b & 7	Reward charts including “token” concept.
Activity reward		9.0 <	16.7 <	22.9		4b 6 & 7	Also incorporated into play to build parent-child relationship
Reward (not specified)		21.5 >	16.7 <	21.0		4b 6 & 7	
Social reward		51.4 >	8.3 <	18.6		2 4b & 7	That rewards should not always be monetary and that time with the parent/family time is often as/more effective
Consistent responding		27.8 >	16.7 >	2.7		4b 8	Consistency between cares around managing unwanted behaviours General consistency and support in family/wider systems
(Negative consequences)							
Planned ignoring		30.6 >	8.3 <	22.6		2 & 4b	“Capture the good”; praise positive behaviour and ignore negative Avoid confrontation
Use of natural/logical consequences		0.0 >	0.0 <	3.7		7	No done as well in the NFPP from this thesis study. BUT should be part of TforC7
Combined techniques							
Time-out		26.4 >	8.3 <	11.3		7	See above
Generalization and maintenance							
Rehearsal/Practicing during sessions		7.6 <	8.3 >	0.0		6	Parent-child play session recorded and fed back
Homework		53.5 >	8.3 >	0.0		6	Play diary Episode diary

Active components of intervention	Proportion of sessions including the core component				Target for change in which component features (as per thesis quality of delivery measure)	
Category	All NFPP	COPPI	All trials	Number	Details	
Specifics						
				All TforC		
Modelling	57.6	<	83.3	>	0.0	Most TforC Therapist models for the parent so they model for the child.
Techniques to increase generalization	1.4	<	8.3	>	2.9	8 Generalising
Maintenance training	7.6	<	8.3	>	1.0	8 Encouraging self-monitoring and identifying need for help in the future
Problem solving techniques	7.6	<	8.3	>	6.3	8 Transferring management of the child's ADHD to them as they grow
Relationship building communication skills						
Emotional communication	48.6	>	16.7	>	2.6	2 5 Encouraging availability sensitivity and praise while addressing attributions Encouraging parents to explore their self-regulation to help child do the same
Positive interactions with the child	87.5	>	25.0	>	12.5	2 5 6 Parent-child relationship and impact of ADHD Preventing negative behaviour being modelled in the household Play
Responsiveness	1.4	<	8.3	>	6.1	2 5 Exploring the attachment-based elements of a good parent-child emotional relationship.

The following core components were not deemed to be part of the NFPP COPPI manualised programme (percentage of sessions component included in all trials in the MA): Distraction (63.3%) Material reward (14.0%) Activity reward (20.4%) Situation-specific reward (7.0%) Reward alternative/incompatible behaviour (29.7%) Stretching the ratio's (16.0%) Consistent responding (10.0%) Planned ignoring (3.1%) Response cost (3.7%) Correction (8.9%) Daily Report Card (DRC%) (14.8%) Use of tangible rewards (0.0%) Time-out (8.0%) Premack principle (0.7%) Homework (0.0%)

Compiled from the data of the following paper: Hornstra, R., Groenman, A. P., Van der Oord, S., Luman, M., Dekkers, T. J., van der Veen-Mulders, L., Hoekstra, P. J., & van den Hoofdakker, B. J. (2023). Which components of behavioral parent and teacher training work for children with ADHD?—a metaregression analysis on child behavioral outcomes. *Child and Adolescent Mental Health*, 28(2), 258-268

Table 3 shows the proportion of content of these components included in the NFPP manual used for the COPPI trial, the data on which those thesis study is based, according to the authors of that meta-analysis (Hornstra et al., 2023). This is presented in the context of whether the COPPI trial had a greater or lesser proportion of that component compared to other NFPP trials and compared to all the trials included in the MA ($k=27$). Also included in this table is how those components of the COPPI manual are reflected in the quality of delivery measure developed for this thesis study (see Chapter Four; The Quality of Delivery Measure)

1.6.4 Programme Accessibility, Attendance, Fidelity and Therapist Factors Associated with Intervention Effectiveness

1.6.4.1 Accessibility

A single study RCT of a PLI to treat EB worked into their pre-trial planning steps to explore socioeconomic and demographic factors affecting recruitment during the pre-randomisation stages (Plueck et al., 2010). They did this by using teacher provided data only for those participants who declined to participate altogether (a quarter) along with socio-economic data of the area in which the participant child attended pre-school. Important findings were that older child age, higher social burden of the district and a greater child perceived need by the teacher were significantly associated with trial refusal prior to screening. In addition, the proportion of German as the first language in those declining to take part was half that of the national percentage (44.1% vs over 95%-current figure). Once participants had taken part in screening, those who agreed to proceed to randomisation compared with those who declined did not differ in any baseline socio-economic nor demographic factors apart from child severity of EB and parental perceived need. Parents who reported that their children

had higher severity of behaviour were more likely to consent to randomisation along with those who felt they needed more help. Teacher reported need or levels of child EB did not differ significantly nor did child age nor socio-economic status (based on parental education and income data this time; Plueck et al., 2010).

1.6.4.2 Attendance

A recent individual patient data meta-analysis (Berry et al., 2023) reviewed the effect of SES on attendance and outcome for 14 trials of a specific programme (the incredible years). It aimed to see whether increments of greater SES risk from several different measures led to a higher incidence/risk of lower attendance in these trials. They showed that for all indicators of SES, higher risk at the individual level led to significantly lower attendance. Unlike the current quantity analysis, parental education status was the strongest indicator (with single parent status the weakest). However, the authors commented that economic markers (such as low income as found in this study) were much better at predicting attendance at IY compared with single- or teen-parent status (which they refer to as socio-demographic indices of risk). These authors found a dose-response relationship when looking at attendance and programme effectiveness even when controlling for trial variation in overall attendance levels and initial child EB symptom severity. They did not look directly and/or report the effect of socioeconomic/demographic status directly on outcome nor any moderation analysis.

1.6.4.3 Programme fidelity and therapist factors

Programme fidelity and therapeutic behaviour during delivery have been shown to be related to outcome in specific parenting interventions using measures created by the programme groups. One example is the leader observation tool looking at the average

quality of group leader behaviour applying the incredible years programme to treat in preschool children in a sample of 12 groups. This showed that some aspects of the (18) possible group leader behaviours significantly predicted change in positive parenting with few effects on parent reported or observed child behaviours (Eames et al., 2009). These inconsistent results are mirrored in a recent systematic review looking at the association of “Competent Adherence” with outcomes in (Martin et al., 2023); They selected observational measures of facilitator behaviour in the context of programme fidelity based on a review and psychometric analysis of different measures used in PLI research by the same authors (Martin et al., 2021). The 2023 paper (Martin et al., 2023) found that the methodological variation in measurement of the two aspects of programme fidelity, adherence to the programme content during delivery and therapist competence in their delivery of that material, along with variation in programme and outcomes between trials meant that meta-analytical comparison was not possible. They applied synthesis without meta-analysis (SWiM) criteria (Campbell et al., 2020) to report their findings in the context of a systematic review process. The majority of the studies assessed programme fidelity aspects on a parent or child outcome for PLI to treat EB in a way that measured adherence and competence concepts inseparably (referred to as “fidelity” from here), with only 2 separating these. The proportion of studies showing a significant positive association of greater fidelity leading to better outcomes by these measures was not affected by outcome type. (i) Child behaviour outcomes; Of the 12 studies reporting analyses of fidelity against this outcome, 3 showed higher fidelity was associated with better outcomes, five found inconsistent results (i.e. contradictory results within the same paper when either comparing a single measured variable for that outcome using different statistical methods and/or comparing fidelity against more than one measure of the same outcome) and five found no association

between fidelity and outcome. (ii) parenting behaviours/skills (n=9); 3 studies found an association between better fidelity and better outcomes, 2 found inconsistent results and 4 found no association. (iii) Family functioning (n=2, measure details not provided); One study found a positive association with outcome and one no association. (iv) Parenting stress (n=2), one a positive association, one inconsistent result. Finally (v) academic achievement (n=1); Positive association of better fidelity with better outcome. The authors conclude as others have in this field, that they are indications of a relationship between improved fidelity/competence of programme delivery and better outcomes. However consistency and accuracy in methodology, analysis and reporting needs to improve.

1.6.5 Treatment Summary

Either way, whether medication or parent led interventions should be first line in young children presenting with significant ADHD there are important findings that suggest treatment provision for ADHD in the UK is not being met: Although the rates of prescribing for ADHD have increased over the last years (Beau-Lejdstrom et al., 2016) the relative level of this does not equate to that expected given then population prevalence of ADHD and the proportion of individuals expected to need medication treatment within that . That the first people to either raise ADHD as a potential issue or that are approached by parents for advice are often teachers not primary care physicians: either institutionally pervasive or individual-based mis-conceptions about ADHD may prevent some children accessing care through these “gate-keeper” figures (Russell et al., 2016). That medication is not continued long term by children, with the mean initial course of treatment duration from a fairly recent database UK study (N=1,314; the 46% treated with ADHD between 1994 and 2006) was 10.7 months (+/- .5 months), with only 35% remaining on medication treatment at 6

months (Raman et al., 2015). Long term outcome from “treated” versus “non-treated” ADHD is better. However the definition of long term outcome is actually very short (2 years often chosen), the cross comparability of studies is challenging and the ability to definitively pin down the nature of treatment (pharmacological, behavioural or multimodal) received in trials is virtually impossible due to the cross-over between these during follow up periods (Arnold et al., 2020). Anecdotally, both parent-led interventions and medication are likely to give individuals and families a chance to lower the level of chaos and conflict enough to put strategies into place to overcome some of the challenges ADHD brings. However the longevity, permanency and main instigator of these changes is impossible to ascertain. What we do know is that medication prescribing for ADHD is rising in the UK and that service provision is not ideal. Identifying for whom and why any treatments work for ADHD is a fundamental and urgent task.

1.7 PhD Rationale

This PhD aims to explore this individual variation in effectiveness of Parent Led Interventions to treat ADHD in children. The aim is to understand programme delivery content and change methods, programme delivery factors (number of sessions attended and time over which any programme content was delivered) and finally individual variation in therapist quality of delivery that may explain variation in ultimate child outcome.

Both pharmacological and psychological interventions are recommended to treat ADHD in children under UK guidelines (NICE, 2018). Unlike for medication treatments, psychosocial treatments for ADHD do not significantly decrease ADHD symptoms when reported by probably blinded or observed/objective measures. In addition we cannot predict for whom PLIs to treat ADHD in children will be effective. Although this can also arguably be said for

medication treatments also (Pagnier, 2023), the availability, accessibility and prescribing rates for ADHD medication treatments compared with psychosocial treatments are much higher in the UK especially following the pandemic. In addition these may vary according to indices of deprivation and other treatment barriers (Khan & Hasan, 2025). Given this worrying trend it is even more important we use existing data to explore how we are delivering parent-led interventions to treat ADHD in the UK in order to prevent further reliance upon medication alone. Firstly we are managing to engage parents adequately (for example in number of sessions attended), then are therapists are able to use this engagement to delivery enough programme content with adequate fidelity and if this combination of quantity of delivery with fidelity for the individual family can explain difference in effectiveness. The availability of video-taped programme delivery as part of a large scale, well conducted randomised controlled trial, the Comparison of Preschool Parenting Interventions (COPPI) trial, provides an invaluable resource for this. The financial cost of this type of trial (the total grant was £2,217,479 of which over half was for the RCT trial itself) makes it impossible to reproduce for a PhD thesis and, more importantly, means maximising the information we take from the data is essential for future translation into clinical change.

In terms of outcomes, this thesis study will focus on parent report of symptom change as this is the most consistently found and, arguably, most important initial barometer of change with parent-led interventions. Both ADHD and ODD symptom change will be looked at as there may be some difference in which one is easier to change and/or which type of behaviour needs to change first to optimize the environment to facilitate further improvement. Finally both short (immediately post intervention) and delayed follow up (6 months after programme end) will be explored as, similarly to symptom type, it may be that

some change can occur immediately (for example by predicting and preventing unwanted behaviour and improving the predictability and calm in the family environment) whereas other changes require longer time periods (for example improvement in parent-child trust and respect leading to the use of behavioural consequences being effective in coercive cycles or more-purposeful negative behaviour).

1.7.1 Chapters synopsis

Chapter one, this chapter, has presented the background of ADHD conceptualisation, diagnostic criteria and processes and the understanding of the causality behind the condition as currently defined. The associated factors behind ADHD baseline risk, diagnostic status, impact and long-term outcomes have been presented in a manner that demonstrates why parent led interventions contain the process methods they do. It is these “process methods”, defined here as the breakdown of what behavioural, emotional or system-based factors are addressed within a family in order to produce change in the child’s ADHD or ODD behaviour long-term, that will be used in the quality of delivery measure to be applied in this thesis study.

Chapter two, a systematic review, will look at quantity of delivery, the measurement of this in the exalt literature and how this influences effectiveness in published research. It will explore if and how quantity is distinguished from fidelity of delivery and link this to the findings and outstanding questions leading on to chapter 3.

Chapter three explores the background and development of the New Forest Parenting Programme and the research findings from its application. The NFPP is a parent led intervention designed from the outset to be specific to ADHD, in comparison to others that

have addressing disruptive behaviours as their primary goal. This chapter brings together the empirical and theoretical findings from chapter one and presents these in the context of NFPP change processes and accompanying course materials. The combination of the theory from Chapter one and the application of this from Chapter 3 will explain the content of the Quality of Delivery Measure as applied in the thesis study. This chapter also presents briefly the main empirical studies testing the effectiveness of the NFPP since its development, including how the programme has evolved since its inception until the version applied in the COPPI trial.

Chapter four explains the methodology of the COPPI trial and the make-up of the NFPP arm of this trial. It describes how this sample was used to finalise the thesis study participants and compares these. It highlights the important baseline variables and the tools used to collect these that are to be included in the final thesis analyses. The structure, content and scoring methods of the Quality of Delivery Measure is presented as is how this data was to be collected. Finally, the statistical analysis plan is introduced.

Chapter five presents the results of the thesis analyses relevant to the three aims below. It explores the participants that made up the NFPP arm of the COPPI trial: whether the baseline variables profile, quantity of delivery achieved and variation in child behavioural outcomes impact on the reliability and validity of testing those aims. It presents the same exploratory data analysis for the thesis participants, compares these to the whole NFPP COPPI arm sample and presents the quality of delivery data. Finally it lays out the complete regression analysis results for the final analysis: that including baseline variables, quantity of delivery and quality delivery as independent variables regressed against child behavioural change scores as the dependent measure. A general discussion concludes the findings.

Chapter six is the final discussion: putting the findings of this study into context given the existing literature along with presenting the strengths and weaknesses of this thesis study. How this may influence future research along with points of potential discussion for this research industry are also included.

1.7.2 Study aims

In conclusion, this thesis study aims to achieve the following 3 aims:

1. To explore the current literature to see if quantity of delivery of parent led interventions is adequate to explain individual variation in child behavioural change outcome over and above baseline ADHD relevant parent, child and family factors.
2. To identify the content and process methods behind a specific parent led intervention to treat ADHD in children and develop a measure based on the content and delivery fidelity.
3. Use this to explore whether “quality” of delivery can explain individual variation in outcome while accounting for baseline factors and quantity using existing data.

1.8 Conclusion

Recent advances in statistical methods and increased collaboration between authors has given empirical evidence to support anecdotal beliefs over the last half century: that intervening to improve parenting styles using social learning and other theory-based methods significantly improves parenting styles on both most proximal and probably blind reports. In addition child behaviour is reduced significantly from most-proximal reports, and this is true for both ODD/CD symptoms and for ADHD symptoms and sub-types (even inattention) also. Finally the effect sizes using individual patient data MA techniques are

greater than those using group level data. However despite increasing evidence that the programs currently being used are effective, we still cannot consistently identify baseline factors that distinguish which sub-group of children/families are more likely to benefit.

Furthermore despite clear anecdotal evidence mapping out the pathological processes behind the pathway of ADHD development from genetic risk through to stable adult phenotype, parent led interventions are still not able to show significant changes in child ADHD behavioural outcomes when assessed by teachers or on observation (probably blind reports). Whether this is due to incorrect/inconsistent programme content across included studies and/or delivery or therapist factors (such as quantity of delivery) is the next area to explore.

Chapter 2: Can Attendance Alone Explain Effectiveness of Parent-Led Interventions: A Systematic Review

The introduction of this review summarises our understanding of the reasons behind for-whom and why- parent-led-interventions to treat ADHD in primary school aged children are effective (see Chapter One: [ADHD Causality](#)). It goes on to present information around fidelity in the context of programme effectiveness along with “dosage” of intervention components and whether these explain differential effectiveness. However it concludes with clear recent findings that, despite this complex and extensive body of literature, measurement of simple measures of delivery quantity such as attendance or engagement are not routinely being included in publications. The body of this review goes on to explore the measurement of quantity of delivery using number of sessions or proportion of programme delivery in parent led interventions to treat externalising behaviour. It aims to conclude whether quantity of delivery in papers able to be included is significantly associated with effectiveness of PLIs using change in child behaviour pre- and post-intervention delivery.

2.1 Introduction

Externalising behaviour in children is a descriptive and measurement-based behavioural term (Hinshaw, 2002). It was originally derived from factor analysis using the Child behaviour checklist (Achenbach, 1991) a questionnaire-based measurement tool. Tools such as these aim to distinguish between psychopathology that is more likely to manifest as outward behaviour from those that result in internalisation of emotions and experiences.

Behaviours seen in individual's with more specific diagnoses such as Attention Deficit Hyperactivity Disorder, Oppositional Defiant Disorder and Conduct disorder would also come under the 'externalising' bracket.

Parent-led interventions have been shown to be effective in lowering levels of the main externalising behaviour sub-types to different degrees (Groenman et al., 2022): However, the effectiveness of this treatment approach has been found to vary depending on measurement factors such as whether the outcome being evaluated is child behaviour or potential pre-cursors such as parental style (Daley et al., 2014), whether the source reporting/collecting the data is or is not blinded to outcome (Sonuga-Barke et al., 2013) and the length of follow up between programme completion and outcome collection (Doffer et al., 2023).

Much work has been done on how baseline socioeconomic and demographic factors may identify groups who are more likely to show significant improvement from PLI over others. However the evidence is inconsistent (Dedousis-Wallace et al., 2021). The recent individual participant data meta-analysis specific to ADHD treatment using PLIs revealed the complexity of the relationships in terms of baseline externalising behaviour type (ADHD vs CD/ODD) and did not find socio-economic status was a moderator of effectiveness (Groenman et al., 2022).

It may be that moderating effects of low socio-economic status on programme effectiveness is mediated by other factors such as attendance, potentially through differential barriers to treatment access in the population (Kazdin & Wassell, 1999). A systematic review (Chacko et al., 2016) reviewed the evidence on predictors or moderators of attendance at parent behavioural training with any target of EB in children at or under the age of 12. They found

that low socio-economic status was significantly correlated with attrition rates (those who drop out after randomisation) and studies targeting populations with lower socio-economic status had significantly larger attrition rates ($k=44$, 34%) vs those for who did not ($k=59$, 24%) with a moderate effect size ($F=8.68$ $p<.01$, $d=.58$). The equivalent effect for SES and attendance was not significant although the effect size was still moderate (low SES $k=18$, attendance 66% vs. not low $k=22$, 75%. $F 2.89$, $p=.10$; $d =-.54$).

If measured variables around the child, parent and family are not sufficient to identify those who would benefit most from PLIs then it becomes even more crucial that the programme content being delivered is correctly targeting the right audience using potentially valid and reliable underlying processes of change. A recent meta-analysis (Dekkers et al., 2022) explored what common components were contained in various PLIs applied across 29 studies ($N=2,345$). They used a taxonomy and coding examples from various qualitative synthesis done in the recent past (e.g. Kaminski et al., 2008; Michie et al., 2013). Expanding the methodology of these past reviews, the authors went back to the original intervention delivery manuals to extract the data and included a linear measure of dose rather than the presence or absence of a component only.

They demonstrated that PBLIs for reducing child behaviour were generally consistent in what they include. For example, shaping knowledge was a process applied on average in 68.4% of the sessions per intervention with only 2 programs (from 30 studies) not having this component as a mechanism of change at all. One descriptive finding suggesting programme content has surface validity in treating externalising behaviour (especially ADHD) is that programmes focussed more on reinforcing positive behaviour (58.12% of intervention sessions had this content) versus applying consequences for negative

behaviour (35.69%). This fits with the literature on effective change methods in ADHD, in that those with ADHD respond better to positive reward-based reinforcement compared with children with non-specific/coercive type patterns of behaviour (Van der Oord & Tripp, 2020).

A dose-response relationship was found for some components against non-child-behavioural outcome including positive and negative parenting and parental mental health; these may be pre-cursors to behavioural change in the child. However very few significant associations were found and these were of very small effect size. In addition, half of the findings were not in the desired direction for change given the literature on externalising behaviour aetiology. For example, although “Manipulating antecedents” dosage was significantly associated with an increase in parental sense of competency post intervention ($k=16$, number of effect sizes=27, $\beta^2=0.01$, 95%CI: 0.00 to 0.03, $P<0.05$), “shaping knowledge” led to a worsening of parent child relationship ($k=12$, no. ES=17, $\beta^2=-0.08$, 95%CI: -0.15 to -0.00, $P<0.05$) and decreased levels of positive parenting $k=16$, no. ES=20, $\beta^2=-0.01$, 95%CI: -0.01 to -0.00, $P<0.05$ (Dekkers et al., 2022).

This same group of authors went on to explore intervention components using the same inclusion and taxonomy to explore the link between “dosage” of intervention component and child behavioural outcomes for ADHD (Hornstra et al., 2023). They found 32 studies (total $N=2594$) that could be included and the number and pattern of significant results was remarkably similar. Firstly there were medium-sized and significant effects of improvement in child ADHD following intervention delivery versus controls ($k=25$, n effect sizes [n_{es}]=29, Standardised Mean Difference [SMD]=.48, 95%CI: .35 to .61, $p<.001$. $Q(28)$ 53.67, $p<.05$. I^2 -48.70%) and for “behavioural problems” ($k=20$, $n_{es}=23$, SMD=.48, 95%CI: .35 to .61,

$p < .001$. $Q(22) = 31.82$, $p < .05$. $I^2: 32.36\%$). “Behavioural problems” potentially being more ODD/CD/aggression type-symptoms given most studies would also have had a measure of ADHD. Secondly, despite these clear benefits of PLI on ADHD symptoms, there were very few findings using their taxonomy and extraction method of specific intervention components for which higher dosage related to significantly larger changes in child behaviour (using either number and/or proportion of sessions in which component was included). Finally, these again were not always in the expected direction. Of the 3 significant findings only one was in the expected direction: studies with a higher percentage of sessions in which “negative consequences” was included as a component had significantly greater treatment effects on “behavioural problems” outcome type ($k=21$, $\beta_1 = .01$, 95%CI: .00 to .01, $p < .05$. $I^2: 17.82\%$). The other 2 significant findings were the same as for the parental outcome components MA above (Dekkers et al. 2022); that when looking either at number ($k=21$, $\beta_1 = -.04$, 95%CI: -.07 to -.01, $p < .05$. $I^2: 10.52\%$) or percentage of sessions ($k=21$, $\beta_1 = -.01$, 95%CI: -.01 to -.00, $p < .05$. $I^2: 7.75\%$) the greater the inclusion of “Psycho-education [for] parents” the smaller the effect size for “behavioural problems” in included studies (Hornstra et al., 2023).

This above literature is based on the theoretical processes of change contained within PLIs to treat externalising behaviour in children and assumes that these are indeed effective components and that compared interventions are broadly consistent in what they do. Assuming this is the case, whether or not programmes are then delivered as intended by providers is encapsulated in the concept of “fidelity”. A review on the fidelity of PLI to treat externalising behaviour in children and adolescences (Garbacz et al., 2014) used two important frameworks to explore the current status of assessing programme fidelity and applying it to outcomes in the EB literature. One was the Intervention Fidelity Assessment

Checklist [IFAC] developed by the Treatment Fidelity Workgroup of the National Institutes of Health Behaviour Change Consortium (BCC; Bellg et al., 2004) and the other was a system by which treatments could be grouped according to the level to which they were evidence based (Chambless & Ollendick, 2001). The latter has been applied to PLIs for EB by authors prior to this review for both disruptive behavioural disorders (Eyberg et al., 2008) and for ADHD (Pelham Jr & Fabiano, 2008). The IFAC breaks down fidelity into the following sections: Treatment design; Training providers; Delivery of treatment; Receipt of treatment skills; Enactment of treatment skills.

The above review (Garbacz et al., 2014) found firstly that compared to similar reviews using the IFAC, the interventions included in this study had a much greater mean adherence to the fidelity checklist (overall mean adherence =0.73, SD 0.20, n=65) than similar reviews using the IFAC for adult behavioural interventions (mean=.55, SD not mentioned, n=342; Borrelli et al., 2005) and for paediatric oncology interventions (mean=.57, SD not mentioned, n=28; Preyde & Burnham, 2011). This states that on average 71% of the studies met the criteria for each item of the checklist (25 items). In addition, 29 of 65 studies (44.6%) checked off at least 80% of the items. However only 5 of the 65 articles showed a high level of fidelity in all of the 5 categories listed above, and this was consistent with the other two reviews the author's state. The main area of strength in parent led interventions was the treatment design category (mean=.83, SD=.20) with the weakest area being Enactment of treatment skills (mean=.58, SD .38). Treatment delivery adherence was much higher for PLIs in EB (mean=.73, SD .33) than that for the adult behavioural interventions (.57) and paediatric oncology interventions (.56).

These reviews also implied that trials/interventions applying PLIs to treat EB are monitoring attendance as part of their fidelity processes. However, a review (Chacko et al., 2016) of parental engagement in behaviour parent training to treat behavioural problems in 2-12 year olds (a very comparable population to this current thesis review) found that from all possible included studies ($k=262$), 15% ($n=42$) provided no data for any engagement elements of the trial. Of the 220 that did, only 56% ($n=120$) provided data on attendance and from these, average attendance could only be extracted/calculated in 61: this was 23% of the total number of PLI trials targeting ADHD or other externalising behaviour in 2-12-year-olds published between 1974 and 2014. Given the plethora of studies trying to identify for whom parent led behavioural intervention are affective to treat childhood externalising behavioural disorders, it is hard to understand why this simple proxy measure of programme “dosage” or exposure is not being routinely reported?

The aims of this review are to explore the following.

- (i) Do studies that evaluated the use of parent-led interventions to treat externalising behaviour in primary-school aged children measure, report and link attendance to outcome measures in their publications?
- (ii) What is the reliability and validity of their attendance measure given the content and delivery structure of the programme being applied and the statistical methods used for analysis?
- (iii) Can attendance alone be used to predict variation in outcome measures at the group or individual level?

2.2 Methods

2.2.1 Search Strategy

Studies were identified using search terms entered into the following databases initially on the 25th of May 2017: Embase, Pub-Med and PsycINFO. Search terms were; parent* AND (program* or treat* or interve* or course*) combined with "and" to the results of (child* or paed* or pediatric* or juvenile*) AND (externali* and (behave* or disorder* or condition* or problem*) or (ADHD or Attention Deficit or Hyperactivity Disorder or hyperactivity or Attention Deficit Disorder or ADD or Hyperkinetic Disorder) or (ODD or Oppositional Defiant Disorder or CD or Conduct Disorder) and these were finally combined with "and" and the results of attend*. This search was refreshed in June 2018 and in December 2023. Additional studies were also sought from; the reference lists of accepted studies and relevant review articles identified in the searches and write-up (Chacko et al., 2016; Dedousis-Wallace et al., 2021; Dekkers et al., 2022; Garbacz et al., 2014; Groenman et al., 2022; Hornstra et al., 2023). The main data collection and analysis took place between June 2016 and December 2018: this was refreshed and re-collated between November 2023 and March 2024.

2.2.2 Inclusion/Exclusion Criteria

Studies had to meet the following inclusion criteria to be accepted: (1) be written in English (2) include a behavioural programme targeting externalising behaviour in the child with (3) the main component delivered through parents (4) for children with a mean age of less than 12 years and (5) should measure attendance and statistically compare relative improvement in child externalising behaviour depending on level of attendance in a quantitative way.

Exclusion criteria were: (a) studies involving children with Autism or other difficulties (b)

studies applying programmes that were self-help based i.e. with no or minimal therapeutic input. There was no restriction to study type, as long as the inclusion criteria could be met.

2.2.3 Study Selection

Inclusion of studies was done on the basis of agreement between two authors (CET and either DD or CG). The PRISMA process is summarized in Figure 1 (Liberati et al., 2009) and highlights the application of the study inclusion and exclusion criteria.

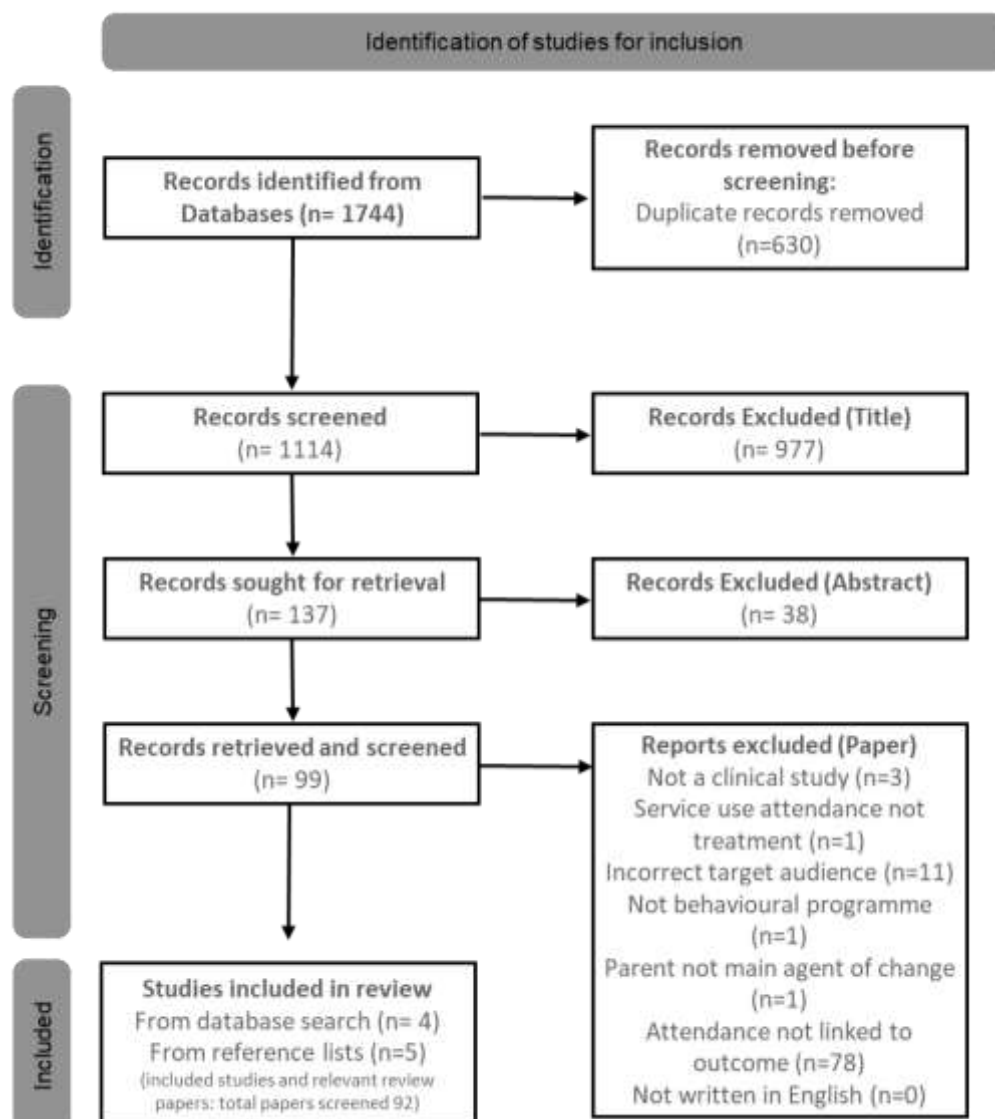


Figure 1: PRISMA diagram for papers screened during this systematic review.

2.2.4 Description of Included Papers

2.2.4.1 Paper Quality

The quality of the included studies was evaluated using the Mixed Methods Appraisal Tool, 2018 revision (MMAT; Hong et al., 2018) MMAT ratings were carried out by the primary author with concerns resolved on discussion with colleagues. The scores are designed to be able to relatively compare the quality of the studies independently of the study design; 5 being of highest quality and 0 lowest. All of the included studies were evaluated using the “Quantitative non-randomized study” type: this was due to the attendance analysis often being a sub-analysis and therefore any positive bias effect from participant selection was nulled. No studies scored 0 or 1. Three studies scored 2 (Dumas & Albin, 1986; Garvey et al., 2006; Lavigne et al., 2008) Three scored 3 (Dumas et al., 2011; Hinshaw, 1999; Lucia & Dumas, 2013). Two scored 4 (Begle & Dumas, 2011; Weeland et al., 2017). One scored 5 (Parent et al., 2011). The correlation coefficient of date of publication versus MMAT rating was moderate ($r=0.55$) with that for sample size and MMAT rating lower ($r=31$). See Table 4 for details.

Table 4: A table showing the bias assessment of the included papers: Done using the MMAT tool; Hong Q. N. Fàbregues S. Bartlett G. Boardman F. Cargo M. Dagenais P. ... & Pluye P. (2018). The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. Education for information 34(4) 285-291. Chicago

Paper	Are the participants representative of the target population?	Are measurements appropriate regarding both the outcome and intervention (or exposure)?	Is there complete outcome data?	Are the confounders accounted for in design and analysis?	During the study period is the intervention administered (or exposure occurred) as intended?		Total
Dumas & Albin (1986)	Yes	No	No	No	Yes	1-0-0-0-1	2
Hinshaw et al. (1999)	Yes	No	Yes	Yes	No	1-0-1-1-0	3
Garvey et al. (2006)	Yes	Yes	No	No	No	1-1-0-0-0	2
Lavigne et al. (2008)	Yes	Yes	No	No	No	1-1-0-0-0	2
Dumas et al. (2011)	No	Yes	Yes	No	Yes	0-1-1-0-1	3
Parent et al. (2011)	Yes	Yes	Yes	Yes	Yes	1-1-1-1-1	5
Begle & Dumas (2011)	No	Yes	Yes	Yes	Yes	0-1-1-1-1	4
Lucia & Dumas (2013)	No	Yes	Yes	No	Yes	0-1-1-0-1	3
Weeland et al. (2017)	Yes	Yes	Yes	Yes	No	1-1-1-1-0	4

2.2.4.2 Target Population:

Child age: The majority of studies that could be included (total n=9), targeted children in the pre-school age group (n=5), this being defined as aged 6 or less to take country variation into account: (Begle & Dumas, 2011; Dumas et al., 2011; Garvey et al., 2006; Lavigne et al., 2008; Lucia & Dumas, 2013). All the remaining studies had mean ages below 12 and these

ranged from 6.31 (Weeland et al., 2017) to 8.5 (Hinshaw, 1999). All except one (Dumas & Albin, 1986) only involved children from the age of 6 to 11 inclusive.

Target behaviour type: The exact nature of the externalising disorder being targeted varied: Seven studies recruited children with non-specific externalising behaviour (Begle & Dumas, 2011; Dumas & Albin, 1986; Dumas et al., 2011; Garvey et al., 2006; Lucia & Dumas, 2013; Parent et al., 2011; Weeland et al., 2017) with 1 specifically targeting ODD/CD symptoms (Lavigne et al., 2008) and 1 ADHD (Hinshaw, 1999).

Behaviour severity: The level of child symptom severity in the paper samples also varied with regards to known screening measures and categorical-based criteria for diagnosis. Four studies recruited from a community/normal sample with no specific child behaviour severity inclusion criteria or agenda (Begle & Dumas, 2011; Dumas & Albin, 1986; Dumas et al., 2011; Lucia & Dumas, 2013). Two studies targeted more high-risk children either; through targeting high risk areas (Garvey et al., 2006) or by using behavioural descriptions in advertising material (Parent et al., 2011). Finally, 3 studies required symptom count and severities reaching full-diagnostic levels using international criteria (Hinshaw, 1999; Lavigne et al., 2008; Weeland et al., 2017).

2.2.4.3 Parent-intervention delivered:

Table 5: A table summarizing the methodological details of included studies in this systematic review. The interventions used in the studies varied in three main ways:

Details of the included studies in this Systematic review

Paper	Total	Intervention-PIBI	Contr ol	Primary EB target	EB severity	Age child (year):	Complete data? (Post Rx only unless stated)	Outcome measure	Intervention Components ✓ included x - Not included	Attendance comparison method	Confounders accounted for?
Dumas & Albin ¹ (1986)	82	Bespoke (early PACE) BO: early PMTO principles ¹	0	EB: NOS	↗	2 to 15 x=7.31 (SD 3.43)	NA*	Notes review Need for >Rx engagement change in parenting skills	PT Ind ✓	Attendance (continuous variable) predicting group (Rx success or failure)	No
Hinchaw et al. ² (1999)	431	Bespoke: Multimodal Treatment BO: Defiant Children ² HMCC ³ Summer School ⁴	287	ADHD	↑	7 to 9.9 x=8.5 SD=0.8	97%	SNAP-IV ⁴ hyp/imp SNAP-IV ⁴ ODD/CD	COC ⁵ (e.g. Time off task) PT Grp ✓ PT Ind ✗	All participants included Att As- or below-intended) affecting EB change (as a continuous variable: Regression) BUT all 3 Rx conditions together (individual PT sessions "not counted" in attendance measure)	Yes
Garvey et al. ⁶ (2006)	292	Chicago Parenting Programme BO: PMTO ⁵	136	EB: NOS	↔	2-4 (Inclusion criteria) Stats: NotR	NotR	ECBI intensity ⁶ Ext scale	PT Grp ✓	Correlation with EB outcomes in the treatment group only (No stats reported)	No
Lavigne et al. ⁷ (2008)	117	Incredible Years (IV) Basic – 12 weeks ⁶	31	ODD	↑	3.00-6.11yrs x ^{mean} =4.6 (SD 1.0)	78.6%	ECBI ⁶ intensity CBCL ⁷ Ext	Forehan d & Mahmon ⁸ α- command compliance PT Grp/Ind ✓	Attendance (quantal) vs EB outcome (continuous) - Fishers exact test	No
Parent et al. ⁹ (2011)	39	Bespoke Group curriculum BO: PSMWC ⁷	0	EB: NOS	↗	3-6 x=4.50 (SD NotR)	92%	ECBI ⁶ problem and intensity	PT Grp ✓	Regression analysis of attendance vs. outcome (accounting for baseline value)	Yes
Dumas et al. ¹⁰ (2011)	124	CANNE (Spanish) ⁸ BO: PACE ⁹	0	EB: NOS	↔	2-6 x=4.32 (SD NotR)	90% 3 months 85%	SCBE30 ¹¹ Anger/aggr BASC2 ¹² -agg AND hyp	PT Grp ✓	Split into Lo (n=65) and Hi (n=59) attenders (from distribution shape - <=3 cut off)	No
Bagle and Dumas ¹³ (2011)	610	Parenting our Children to Excellence ⁹	0	EB: NOS	↔	2.87-6.00 x ^{mean} =4.45 (SD.77) x ^{mean} =4.36 (.79)	85% 1-year 72%*	ECBI ⁶ intensity	PT Grp ✓	Attendance [M = 4.32 SD = 3.12] added in as a level 2 predictor hierarchical linear model: time (level 1), group/centre (level 3), sociodemographic variables as co-variables	Yes
Lucia & Dumas ¹⁴ (2013)	100	Entré-Parents (French) ¹⁰ BO: PACE ¹¹	0	EB: NOS	↔	3-6 x=4.06 (SD .95)	100% 3 months 98%	ECBI ⁶ intensity SDQ ¹⁵ CD & Hyp	PT Grp ✓	Attendance (number of sessions attended) as a between-subjects variable in a repeated measures ANOVA over 3 time points of EB measure	No
Weeland et al. ¹⁶ (2017)	387	IY Basic – 12 weeks ⁶	190	EB: NOS	↑	4-8 x=6.31 (SD 1.33)	92.3% 8 months 93.5%	ECBI ⁶ intensity	DyPICS ³ EB-NOS PT Grp ✓ PT Ind ✗	Parents were also assigned a "buddy" for weekly check-ins Session leaders called if sessions were missed and home visits if 3 sessions missed	Yes

Table continued

ADHD - Attention Deficit/Hyperactivity Disorder; CD - Conduct Disorder; EB NOS - Externalising Behaviour Not Otherwise Specified; ODD - Oppositional/Defiant Disorder; Rx - Treatment;

PACE - Parenting our Children to Excellence; PMTO - Parent Management Training - Oregon model; HNCC - Helping the Non-Compliant Child; IY - Incredible Years; PEP - Prevention for Externalizing Problem behaviour; SPOKES - Supporting Parents on Kids Education in Schools;

Adj. - Adjusted (from original); Agg - Aggression; Att - Attendance; BASC-II: Behavior Assessment for Children (2nd. Ed.); CTRF - Caregiver-Teacher Report Form; CBCL - child behaviour check-list COC - Classroom Observation Code; CII - Coder Impressions Inventory; CPRG Conduct Problem Prevention Group; DPICS - the Dyadic Parent-Child Interaction Coding System; ECBI - Eyberg child behavior inventory; HSQ - Home-Situation-Questionnaire; PACS - Parental Account of Childhood Symptoms; PCL - Problem Check List; QJPS - Questionnaire on Judging Parental Strains; Rx - Treatment; SCBE30 - Social Competence and Behavior Evaluation Short Form; SDQ - Strength and Difficulties questionnaire;

PT - Parent Training; CT - Child Training; TT - Teacher Training;

Ind - Individual; Grp - Group.

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Firstly they varied as to whether the relevant intervention arm focused solely on parent-mediated behavioural change methods targeting externalising behaviour only (n=8: Begle & Dumas, 2011; Dumas & Albin, 1986; Dumas et al., 2011; Garvey et al., 2006; Lavigne et al., 2008; Lucia & Dumas, 2013; Parent et al., 2011; Weeland et al., 2017) or had additional treatment targets other than parents of the index child (n=1): This study had child-direct and school/teacher-based change methods in addition to the parent-led intervention (Hinshaw, 1999).

Secondly the studies varied in the total length of the parenting programme used (mean=11.44 sessions, SD: 6.44, range 6 to 27 sessions). Most (n=7) studies had PLIs that were short lasting 12 weeks or less (Begle & Dumas, 2011; Dumas & Albin, 1986; Dumas et al., 2011; Garvey et al., 2006; Lavigne et al., 2008; Lucia & Dumas, 2013; Parent et al., 2011) with one study's programme being slightly extended but still only 15 weeks (Weeland et al., 2017) and one intervention being much longer at 14 months duration (Hinshaw, 1999).

Thirdly the studies varied in the programme used and, therefore, in the theoretical origins and process methods by which they aim to produce change in externalising behaviour.

Programmes and associated reference articles are detailed in Table 5. Parent-led interventions for treating externalising behaviour can be very broadly thought to originate from either the Hanf model (2013) or the Parent-Management-Training Oregon PMTO approach (Patterson, 1982). The Hanf model programmes in this study can be further broken down into; those using or strongly based on the Incredible years (Webster-Stratton et al., 2001) series (n=2; (Lavigne et al., 2008; Weeland et al., 2017), or those based on the work by Barkley (1987), Forehand (1981; 2010; 1994) and associated colleagues (n=2; Hinshaw, 1999; Parent et al., 2011). One study cited the PMTO principles as their main

intervention approach (Garvey et al., 2006) and one group of studies added child coping methods onto this model (Rutter, 1985), the Parenting Children to Excellence PACE intervention (Begle & Dumas, 2011; Dumas & Albin, 1986) and have translated and adapted this for different cultures (Dumas et al., 2011; Lucia & Dumas, 2013).

Fidelity: Of the 9 studies included, information on methods used to maximise programme fidelity (e.g. manualisation, training, supervision with videotaping of sessions, proportion of programme content delivered, cross checking/agreement of this) was provided in all of the current papers to differing levels of detail: these were mentioned but not detailed in two (Dumas & Albin, 1986; Garvey et al., 2006), mentioned in detail but not quantified in one (Dumas et al., 2011) and described quantifiably in six (Begle & Dumas, 2011; Hinshaw, 1999; Lavigne et al., 2008; Lucia & Dumas, 2013; Parent et al., 2011; Weeland et al., 2017)

2.2.4.4 Comparison group:

Of the 9 studies, 5 studies analysed the role of relative attendance in the treatment arm of an original randomised control trial. In these, the main comparison arm[s] variously consisted of; non-active treatment control (Weeland et al., 2017), wait-list control (Garvey et al., 2006; Parent et al., 2011), minimal intervention (Lavigne et al., 2008) or treatment as usual (Hinshaw, 1999). As mentioned, one study (Hinshaw, 1999) also had two other treatment arms, in addition to parent training and non-treatment control arms.

Of the 4 studies that were not randomised, 3 were pilot studies with no comparator arm (Begle & Dumas, 2011; Dumas et al., 2011; Lucia & Dumas, 2013) and one was a clinic-based audit of all families receiving parent-led behavioural training for their child over a period of time (Dumas & Albin, 1986).

2.2.4.5 Additional treatment received by participants

This was addressed to varying degrees in 5 studies. One mentioned this in some detail (Hinshaw, 1999). Two numerically compared the randomization arms for additional treatment received (Lavigne et al., 2008; Weeland et al., 2017). For one it was part of the outcome assessment but not quantified (Dumas & Albin, 1986). For one it was not mentioned but the control arm received the intervention after follow up measures had been taken (Parent et al., 2011). Any additional treatment received by participants was not mentioned in 4 studies within the primarily cited (Begle & Dumas, 2011; Dumas et al., 2011; Garvey et al., 2006; Lucia & Dumas, 2013)

2.2.4.6 Outcome measures

All the included studies used parent reported measures of externalising behaviour in the child. Applied measures have been proven reliable and valid in terms of the behaviour they are reporting and in the population they were using them with (see Table 5).

The first potential source of bias in some included papers were whether they reported raw values of outcome measures in the results of which the vast majority (n=8) did. The exception was one study that did not report any behavioural measure values as outcomes: instead they used a notes review despite having measured child behavioural levels at baseline (Dumas & Albin, 1986). All studies presented internal reliability statistics for all their outcome variables with Dumas and Albin (1986) performing inter-rater agreement on 20 of their 82 subjects.

The next reflection of study reliability and validity of EB measures was whether more than one measure of EB outcome was used and/or reported against attendance (within the 8 studies that presented raw values of their EB measures). Two studies relied on a single

measure of child externalising behaviour as their outcome analysis (Begle & Dumas, 2011; Parent et al., 2011), although both papers did include other related parenting, child and environmental measures also. Of the 6 remaining studies all but one (Lucia & Dumas, 2013) reported all the study included EB outcome measures vs attendance analyses possible in their results. The majority of these, 4 out of 5, (Begle & Dumas, 2011; Dumas et al., 2011; Lavigne et al., 2008; Weeland et al., 2017) reported fully the values of the statistical test parameters and probability tests for all attendance vs. EB analyses conducted for comparison. The exception (Hinshaw, 1999) presented the regression slope values for all their main and sub-analyses, presenting only the full statistics for those results significantly different or found to be different than expected.

2.3 Results

2.3.1 Reporting of Attendance

The main variations in the way attendance was presented in these 9 studies was in: (i) how attendance is defined and measured and whether this influences the transparency and translation into future research and clinical application, (ii) how the measured value of attendance was statistically applied in these studies and (iii) how attendance influenced these outcomes?

2.3.1.1 How was attendance measured in the included studies?

All but two (Dumas & Albin, 1986; Hinshaw, 1999) of the 9 studies measured attendance as the number of sessions attended: Both the other studies used the percentage of therapy received: One study (Hinshaw, 1999) used percentage of intervention received to make the "attendance" value comparable with other treatment arms. In doing this they did not make relative attendance within the behavioural arm of treatment within their study clear or

reliable. The other study using proportional attendance (Dumas & Albin, 1986), had a slight variation in what was seen as maximum treatment (within a 6-10 week limit of weekly sessions) depending on parental need assessed at the start. This meant that attendance needed to be standardised.

For the 8 papers that had parent-led interventions based on a set number of sessions, excluding (Dumas & Albin, 1986), all described the length of the session and the pattern of sessions over time. There was no mention within any included studies of factors that may affect individual variation in the time spent at the session itself. Measures reflecting individual engagement were included in 6 studies; quality of participation rated by the therapist (Begle & Dumas, 2011; Dumas et al., 2011; Garvey et al., 2006; Lucia & Dumas, 2013), homework completion/adherence (Dumas & Albin, 1986) and knowledge acquisition (Lavigne et al., 2008).

2.3.1.2 Additional components from PLI and inclusion in attendance measure:

No studies included in this review had non-parent components in their relevant treatment arm on which the attendance analysis was based. However 3 studies had individual elements of support/material delivery that were not included in attendance measures. One offered individual telephone support on a weekly basis and individual one-to-one catch up sessions but did not present statistics on uptake rates (Weeland et al., 2017). Another study had individual parent training sessions as a routine part of their intervention: these were not included in attendance calculations and justification for this was not given in the referenced paper (Hinshaw, 1999). Finally, a third study had geographical issues with recruiting resulting in the group size varying substantially, with some programme delivery Notebeing given entirely on a one-to-one basis (Lavigne et al., 2008).

2.3.1.3 How was the measured value of attendance statistically applied in these studies?

Two studies (Dumas et al., 2011; Hinshaw, 1999) used attendance levels to split the groups into higher versus lower attenders using a "cut-off" number of sessions (Dumas et al., 2011) or a proportion of the intervention received (Hinshaw, 1999). One of the studies stated they used the shape of the attendance data distribution in their sample to choose a cut-off value (Dumas et al., 2011) with no specific explanation in the referenced paper of the other study as to how they decided this (Hinshaw, 1999).

These two studies above, also entered attendance as a dichotomous variable (lower vs higher) into a statistical analysis: One of these compared lower vs higher attenders within the treatment group only (Dumas et al., 2011) and one explored lower vs higher as a factor with 3 different treatment arms. They also followed this up with post-hoc comparison tests (Hinshaw, 1999).

The remaining 7 studies applied raw attendance values into their analyses, all using the main intervention arm only. Note one study (Lavigne et al., 2008) amalgamated two similar treatment arms due to no statistical difference found in the number of sessions attended. One study used correlation methods to explore the association of attendance level to outcome in the intervention arm only (Garvey et al., 2006). Two studies looked at how attendance affected outcome at the group level only using ANOVA techniques (Lavigne et al., 2008; Lucia & Dumas, 2013). One study used regression methods controlling for relevant variables (Dumas & Albin, 1986) while another did not (Parent et al., 2011; although this was part of a larger mediation analysis). Finally two studies used more complex methods; one using hierarchical linear modeling (Begle & Dumas, 2011) and one latent growth

modeling (Weeland et al., 2017), both assessing the effect of individual variation in attendance first and then accounted for or shared variation at the [parenting] group level.

2.3.2 Opening Summary

Overall, only 1 of the 9 included studies (11%: Lavigne et al., 2008) showed that greater attendance resulted in greater improvements in child externalising behaviour. This study had a single positive result for EB not-otherwise-specified (i.e. questions in the measure are not worded consistently with either conduct disorder, oppositional defiant disorder or Attention Deficit Hyperactivity Disorder) reported by the most proximal informant (i.e. the person closest to the child that is receiving the intervention).

No significant results were found linking higher attendance with greater probably blinded reporting of child improvement following treatment (so named to acknowledge that the “blinded” source (e.g. teachers) are not informed of treatment allocation by the research staff but may come to know the allocation status of the child they are evaluating by other means).

For all the studies the most proximal source was the parent and, anecdotally, the vast majority of these were biological mothers of the index child.

2.3.3 Attendance versus EB outcomes as Reported by...Most Proximal Source:

All 9 studies included a measure of child externalising behaviour as reported by the most proximal source:

2.3.3.1 Externalising behaviour – Not Otherwise Specified (EB-NOS) – Parent report

In total 7 studies measured child EB-NOS outcomes most-proximally.

Only one study (14%; Lavigne et al., 2008) showed higher attendance (continuous variable) was related to significantly greater improvements in EB-NOS compared to lower attendance: This was using the ECBI intensity scale which measures the frequency/how often symptoms of ODD, CD and inattention occur (Hukkelberg et al., 2016).

Five studies (71%; Begle & Dumas, 2011; Dumas & Albin, 1986; Garvey et al., 2006; Parent et al., 2011; Weeland et al., 2017) showed no influence of attendance on programme effectiveness using child EB NOS outcomes

One study (14%) did not report any attendance analysis with this variable type despite its measurement and inclusion in the full analysis (Lucia & Dumas, 2013).

2.3.3.2 Oppositional/defiance-, Conduct- or aggression- type – Parent report

Three studies (Dumas et al., 2011; Hinshaw, 1999; Lucia & Dumas, 2013) measured Oppositional or Conduct-type behaviours reported most-proximally.

Two studies (66%; Dumas et al., 2011; Hinshaw, 1999) showed no influence of relative attendance on Oppositional or Conduct-type behaviours by most proximal reporting.

One study (33%; Lucia & Dumas, 2013) did not report an analysis on this measured variable type.

2.3.3.3 ADHD: either hyperactivity (+/- impulsivity) alone or combined ADHD behaviour – Parent report

Three studies (Dumas et al., 2011; Hinshaw, 1999; Lucia & Dumas, 2013) measured ADHD-type behaviours reported most proximally.

All three studies (100%; Dumas et al., 2011; Hinshaw, 1999; Lucia & Dumas, 2013) showed no influence of relative attendance on ADHD behaviours by most proximal reporting.

2.3.4 Attendance versus EB outcomes as Reported by...Probably Blinded Sources:

Three of the 9 studies (Hinshaw, 1999; Lavigne et al., 2008; Weeland et al., 2017) measured and presented attendance analysis against child behaviour outcome measured using probably blinded sources.

2.3.4.1 Externalising behaviour – NOS – observed

Two studies looked at the effect of higher attendance on treatment effectiveness for child observed EB-NOS (Hinshaw, 1999; Weeland et al., 2017)..

Both of these (100%) showed no effect of relatively higher attendance on this type of observed child behaviour (Hinshaw, 1999; Weeland et al., 2017).

2.3.4.2 Oppositional/defiance-, Conduct- or aggression- type - teacher

Two studies looked at the effect of relatively higher attendance on effectiveness of PLI for teacher reported child ODD/CD or aggressive behaviour (Hinshaw, 1999; Weeland et al., 2017).

Both of these (100%) showed no effect of increased attendance on treatment effectiveness on this outcome (Hinshaw, 1999; Weeland et al., 2017).

2.3.4.3.Oppositional/defiance-, Conduct- or aggression- type – observed

Two studies looked at the effect of higher attendance on effectiveness of PLI for observed child ODD/CD or aggressive behaviour (Hinshaw, 1999; Lavigne et al., 2008).

Both of these (100%) showed no effect of increased attendance on treatment effectiveness on this outcome (Hinshaw, 1999; Lavigne et al., 2008).

2.3.4.4 ADHD: either hyperactivity (+/- impulsivity) alone or combined ADHD

behaviour – teacher AND observed

One study (Hinshaw, 1999) looked at the effect of higher attendance on effectiveness of PLI on child combined and hyperactive/impulsive subtype ADHD symptoms by teacher report.

This (100%) showed no effect of increased attendance on PLI effectiveness on either symptom dimension of child ADHD on observation (Hinshaw, 1999)

2.3.4.5 ADHD: either hyperactivity (+/- impulsivity) alone or combined ADHD

behaviour –observed

One study (Hinshaw, 1999) looked at the effect of higher attendance on effectiveness of PLI on child combined and hyperactive/impulsive subtype ADHD symptoms on observation.

This (100%) showed no effect of increased attendance on PLI effectiveness on either symptom dimension of child ADHD on observation (Hinshaw, 1999)

2.4 Results summary

One of the 9 studies (11%) showed that higher attendance led to significantly greater improvement in child behaviour for both parent and observed child EB (Lavigne et al., 2008).

The majority, 8 of 9 (89%), studies showed no effect of relatively higher attendance on effectiveness of PLI when looking at any child externalising behaviour outcomes from any source (Begle & Dumas, 2011; Dumas & Albin, 1986; Dumas et al., 2011; Garvey et al., 2006; Hinshaw, 1999; Lucia & Dumas, 2013; Parent et al., 2011; Weeland et al., 2017).

One study only reported 1 of 3 (33%) of their measured child EB variables as being explored against attendance in the trial's index paper (Lucia & Dumas, 2013). See Table 6 for details.

Table 6: A table summarising the results of the studies included in the systematic review of the influence of attendance on outcome in parent led interventions to treat ADHD in children.

Paper	MMAT rating	Parent reported		Teacher reported		Observed	
		EB NOS ODD/CD	ADHD hyp or comb	EB NOS ODD/CD	ADHD hyp/comb	EB NOS ODD/CD	ADHD hyp or comb
Dumas & Albin (1986)	2	Not significant	-	-	-	-	-
Hinshaw et al. (1999)	3	Not significant	Not significant	Not significant	Not significant	-	-
Garvey et al. (2006)	2	Not significant	-	Not significant	-	-	-
Lavigne et al. (2008)	2	Significant (EB-NOS) More attendance THEN more improvement ECBI intensity: $F(3,72.02)=4.68$ $p=.005$	-	-	-	Not significant	-
Parent et al. (2011)	5	Not significant	-	-	-	-	-
Dumas et al. (2011)	3	Not significant	Not Significant	-	-	-	-
Begle and Dumas (2011)	4	Not significant	-	-	-	-	-
Lucia & Dumas (2013)	3	Not analysed	Not analysed	-	-	-	-
Weeland et al. (2017)	4	Not significant	--	-	-	Not significant	-

ADHD - Attention Deficit/Hyperactivity Disorder; Agg - Aggression; CD - Conduct Disorder; EB NOS - Externalising Behaviour Not Otherwise Specified; MMAT - Mixed Methods Appraisal Tool; ODD - Oppositional/Defiant Disorder; SCBE30 - Social Competence and Behavior Scale–Short Form; BASC2 - Behavior Assessment System for Children–2nd ed

2.5 Discussion

When looking at the assimilated findings from this systematic review they are conclusive:

Relatively higher number of sessions attended is not related to significantly greater improvements in child externalising behaviour in all but one reported outcome.

Consistent for the literature in this area, an association of higher attendance with improved outcome was only found in behaviours reported most proximately i.e. by the parent

carrying out the intervention. All the analyses of relative attendance against outcomes from probably blinded EB measures were not significant.

These finding has more surface validity for non-specific externalising behaviour than for oppositional-, conduct- or ADHD-type behaviours, due to the smaller numbers of studies measuring these.

There was not enough data to identify any patterns between quality of study methodology and significance of outcome for the included studies. There was however both a large number of studies excluded due to not linking attendance with outcome and several studies excluded despite appearing on the surface to do this. The majority of these were because they used only adequate or higher attenders and compared this to the control group, dropping lower attenders all together. If all studies that assessed attendance and outcome presented an analysis or at least raw data around this, methodological associations with findings could be better explored.

The first important source of methodological variation was in the level of severity of child externalising behaviour that the study was targeting. Baseline levels of child behavioural severity is one consistent source of moderation in programme effectiveness in the ADHD intervention literature (Groenman et al., 2022) and in the conduct disorder literature (Leijten et al., 2013). Programmes that are aiming to treat EB are more likely to be effective than those aiming to prevent it becoming significant in normal populations (McMahon et al., 2021). The studies varied in the level of child behavioural severity clinical significance in their target audiences with as discussed above, affecting comparative findings.

The second methodological consideration is the influence of baseline characteristics of the sampled and included populations on attendance and outcome. The main moderators of

attendance in this category are socioeconomic status and parental depression, both of which are associated with higher attrition and likelihood of attending PLIs in this population (Chacko et al., 2016). Higher parental depression was also associated with lower programme effectiveness in a more recent analysis: this retrospectively used modelling techniques to create parental profiles that would predict effectiveness of PLIs in a three-armed RCT for treating ADHD (Dale et al., 2022). In this review, all 4 studies that took confounders into account in their analyses did not find a significant association of relative attendance with EB outcome from the parent-led intervention arm (Begle & Dumas, 2011; Hinshaw, 1999; Lucia & Dumas, 2013; Parent et al., 2011).

In addition, there were factors around measuring attendance and the delivery of the intervention of some trials that may have caused inconsistencies: Mainly around how attendance as a number/proportion of sessions reflects potential “dosage” of programme received. Examples of these included; interventions being delivered to some participants individually due to problems recruiting enough group numbers over time (Lavigne et al., 2008), that a large proportion of the children in the parent behavioural alone treatment arm started medication during the formal trial period (Hinshaw, 1999) and that catch up individual sessions happen as a standard part of the intervention being applied but that these are not included in the overall attendance (Weeland et al., 2017).

Overall, there are three possible conclusions from these findings: firstly that higher attendance at parent-led interventions to treat externalising behaviour is a predictor or moderator of programme effectiveness. However due to reliability and validity issues in the methodology, data handling or statistical analysis of the included studies, no association is being found.

This could be reflected in selective reporting by study groups, as suggested by; the number of studies excluded at abstract or full text level, in the creative data handling of attendance before statistically comparing it to effectiveness variables and in some selective reporting of attendance versus possible outcomes in two of the included studies in this review.

A descriptive review (Chacko et al., 2016) on attendance and engagement in parent training could only calculate relative attendance in 23% of included papers (n=61 of 262). Another recent meta-analysis of parent training effectiveness for child antisocial behaviour specifically mentioned their inability to find a measure of programme implementation that was reliably measured across enough studies to add as a moderator (Beelmann et al., 2023). There has also been no meta-analysis of attendance against outcome in this literature to date.

Given the importance placed on methodological planning and discipline in terms of execution it is unlikely that trials being published to this level have not explored the statistics of attendance with outcome at some point in their manuscript preparation. More likely is that it is not associated and so does not get presented. It seems unlikely that there are major sources of bias in the measurement of number of sessions attended nor is it likely that there is a better starting measure of potential programme “dose” than this for interventions of this type. Small variations at the group level such as chronic lateness or leaving early might make some difference but this is unlikely.

The second possible conclusion from the findings of this review is that attendance is being measured in a reliable and valid way and relative attendance is potentially related to the degree of change in individual families. However the first sign of improvement from parent-led interventions is not in the child’s behaviour but from changing the parental mindset and

their approach to child behavioural management. This may be indicated in this review from findings that almost all the positive associations/predictions of higher attendance with better outcome are from parent report alone with none of the observed measures of EB having significant results.

More likely is the third and final possible conclusion from this review: That measuring attendance alone is not enough to reflect the amount of material the parent and others have received, understood and operationalised from the amount of intervention delivered. Potentially authors feel that relative attendance “should” influence programme outcome and when it is found not to on initial analysis, it is subsequently not reported. Although there has been no large scale meta-analytical conclusion to document conclusively that no relationship exists, probably due to all the same methodological difficulties highlighted in this review, authors themselves have taken this on board it seems and moved on. It is now more common to see measures of "quality of attendance" or skill acquisition being applied as potential moderators or mediators in analyses of this type (Nix et al., 2009). Some groups have gone beyond this, utilising the large body of research on the barriers to attending and completing these interventions, to add elements to their programmes to improve attendance and completion, especially in minority groups or those with increased needs (McCabe et al., 2020).

2.6 Conclusion

It appears anecdotally that selective reporting in terms of attendance at parent-led interventions and its relative impact on programme effectiveness, is common-place in this literature. It is hard to believe that attendance is not regularly monitored and recorded in these trials and so in the future it should be reported and incorporated into outcome

analyses in all studies. This will then allow more transparent assessment of programme effectiveness and begin to give answers on other debates in the literature, such as what components need to be included and delivered or whether single or multiple component interventions are more likely to be successful. Attendance should thus be separated for different components of an intervention (e.g. group parent-led elements vs Individual, or child behavioural vs more cognitive elements) and for different agents of change (e.g. teacher or parent components).

One way of exploring retrospectively how quantity of delivery is linked to outcome is to explore existing bodies of data in terms of their measures of quantity and apply these to outcome retrospectively. Ideally this would be done on a large scale by contacting authors and analysing it in a meta-analytic approach. This is beyond the scope of this PhD but a possible future option.

Finally, in combination with clearer understanding and reporting of underlying process of change methods behind the interventions applied in this area, measures of the amount and content of intervention delivered and absorbed by the recipients are also required: "Quality of attendance" or "dosage" are possible terms of reference already used. Using an existing data set, the comparison of parenting program interventions trial, this thesis study will aim to explore both quantity of delivery (sessions attended and time over which it was delivered) and quality of delivery also to see if it explains a significant proportion of the variation in effectiveness of one of the available ADHD PLIs: The New Forest Parenting Programme.

Chapter 3: The New Forest Parenting Programme

Having shown in the above systematic review that attendance alone is not adequate to explain individual variation in the effectiveness of parent led interventions to change externalising behaviour in children, more factors need to be explored. The New Forest Parenting Programme (NFPP) will be introduced in this chapter. The aim is to understand how the written content of the programme and the processes of change developed since the programme's inception are thought to cause change in child behavioural severity. This brings together the theory from Chapter One and the concepts of engagement, programme fidelity and therapeutic behavioural mechanisms to explore the NFPP and its delivery. Finally, the methodology and results of the 4 main trials of the NFPP published prior to the trial on which this thesis is based are presented briefly. This is followed by the methodology and results of the Comparison Of Parenting Programme Interventions (COPPI) trial itself. At the conclusion to this chapter the surface validity of the content of a quality of delivery measure for the New Forest Parenting Programme should be evident. This measure will be explained in the subsequent Chapter Four.

3.1 Introduction

The New Forest Parenting Programme is an ADHD specific programme designed to lower children's core symptoms of ADHD, hyperactivity impulsivity and inattention, using parent-led behavioural strategies. These strategies aim to lower maladaptive behaviours shown either; by the parent (e.g. lack of positivity and child-directed praise secondary to poor parental self-efficacy, stress or negative child attributions), by the child (e.g. failure to attempt or see-through novel or hard-to-achieve activities due to poor self-efficacy and/or neurocognitive deficits linked to ADHD) or within the family/home environment (e.g.

unclear or inconsistent routines and behavioural boundaries resulting in inconsistent parenting and child non-compliance and unwanted behaviours secondary to anxiety around change and boundary pushing). It does this by replacing these with alternative ways of acting that are known to protect against the long-term sequelae of ADHD. For this reason, the programme targets pre-school children (under the age of 6 years in the UK) and was originally designed to be delivered on a one-to-one basis in the parent's home. This was a purposeful decision when the developers, Margaret Thompson , Cathy Laver-Bradbury and Anne Weeks first conceptualised and designed the NFPP in the late 1990s and early 2000s (Sonuga-Barke et al., 2001). Home delivery was chosen mainly to over-come practical barriers around delivering parent led interventions with young families and those that come more directly from the child's ADHD (Rooke & Thompson, 1997). Home delivery, in addition, gives the therapist more insight of how the individual child's home environment may need adapting for the intervention to be most effective.

3.2 Development of the NFPP

The materials and strategies used in the NFPP were originally developed in the early 1990s as education for practitioners, teachers and those delivering care to target families over the late 1980s (Thompson et al., 2003). The developers were mainly targeting the preschool age group due to their concern around the lack of early identification, support and effective treatment in this population (Sayal et al., 2006). This resulted in Margaret Thompson and colleagues establishing an under-fives clinic in the New Forest area and doing pioneering work in terms of applying validated screening measures throughout the referral, assessment and treatment process and in setting up an electronic database for their clinic. Methods to improve their service included exploring in detail the experiences of living with a child

experiencing behavioural difficulties such as ADHD (Thompson et al., 2002), as well as evaluating the effectiveness and satisfaction of the care they received (Thompson et al., 2004; Thompson et al., 2003). In addition, her affiliation with Edmund Sonuga-Barke (Sonuga-Barke et al., 1997) and awareness of the work on the influence of adversity by Michael Rutter and his associates (See Chapter 1 for details: Berger et al., 1975; Rutter, 1985), inspired research into the type of living circumstances experienced by families of young children in their catchment area (partly rural and partly urban): Specifically how these related to the severity of child symptoms of ADHD and other externalising conditions (Thompson et al., 1996). These studies formed the basis of the NFPP assessment process that is carried out by therapists before the NFPP programme delivery begins. This is the tool that aids therapists to adapt common parenting strategies for ADHD (e.g. adding in more support and strategy formation around routines such as warning around change and using of timers/countdowns to improve following and use of time) along with adding in specific ADHD strategies not used in generic programmes (e.g. understanding the extent of a child's lack of impulse control compared to non-ADHD peers in order to change parental attributions and expectations around this). Adaptions allowing for individualisation of the NFPP to the family were purposefully included such as; psychoeducation for child personality characteristics associated with some children with ADHD such as child temperament (emotionality and reactivity) and oppositionality, the addition of advice around secondary ADHD problems such as sleep and sensory issues and to judge the level of instruction and support needed to allow for higher levels of family stress associated with ADHD or for parental ADHD behaviours (Sonuga-Barke et al., 1997)

3.3 Theoretical Background of the Programme

The main theoretical basis behind the NFPP is, like most interventions in this area, social learning theory (Bandura & Walters, 1977). It is also heavily inspired by work of positive relationship building through play that forms the base of programmes from Constance Hanf (Reitman & McMahon, 2013) such as the non-compliant child (Forehand & McMahon, 1981) and Parent Child Interaction Therapy (Eyberg et al., 2008). See Table 7 for a summary of the NFPP theory and process methods and how these have changed over the trials to be presented below. Scaffolding was included as a techniques in its own right as part of the NFPP (Wood et al., 1976) due to the emerging understanding around ADHD neurocognitive deficits (planning, organisation, set shifting) and known impairment of academic skills in children with ADHD (Loe & Feldman, 2007).

Table 7: The New Forrest Parenting Programme and how this has been developed over successive trials (displayed over 3 pages)

The New Forest Parenting Programme and how this has been developed over successive trials (page 1 of 3)							
	Method of delivery	Context of delivery	Length of Delivery	Processes of change - Psychoeducation	Process of change - Adapting normal practices for ADHD: positive parenting & effective communication	Process of change - Enhancement of parent-child relationship through play	Process of change - Scaffolding the child's learning and improving ADHD neurocognitive deficits and behaviour through play
Important aspects Study 1 ^a	Individual Face to face	Delivered in Family home	8 weeks Consecutively delivered 1 hourly sessions (advised) Scope for individualisation of this	Factual information re ADHD. Triggers/situations when they occur and links to above. Adapting regular parenting to take ADHD into account.	Preventative parenting strategies to minimise triggers. Specific strategies to parent child interaction and daily structuring. Parent-self management strategies around impact of ADHD.	The Impact of ADHD on parent-child relationship and initiating successful joint play That children with ADHD struggle with play due to self-regulation, need/effort to be socially appropriate/compliant and finding it harder to carry out the game successfully.	Poorer academic and employment outcomes in children and adults with ADHD are compelling and are evident from an early age. Aspects of ADHD (mainly following instructions, planning, organisation and aspects of task execution e.g. problem solving and set shifting) result in children with ADHD finding the environment and process of learning hard.
Examples/ reasoning	i. Lowering emotional barriers e.g. stigma and social anxiety. ii. Optimising individual learning e.g. pace and style.	i. Reducing practical barriers e.g. childcare and traveling costs. ii. Addressing emotional barriers e.g. safe, familiar environment. iii. Therapist can observe and address problems in the home environment.	Individualisation: i. Allow for scheduling variability. ii. Re-ordering strategy delivery (e.g. clinical prioritising when families are in crisis). iii. Merging or spreading sessions across weeks if necessary for time/ability.	Addressing parental attributions and incorrect knowledge. Removing or lowering the ongoing impact of "blame". Restoring or establishing hope and motivation for change.	That living with ADHD makes it harder to parent Examples of ADHD specific processes of change including: i. Effective communication. ii. Managing time and change. iii. Parents modelling self-regulation and appropriate behaviour.	NFPP strategies to promote parent child relationships operationalised by increasing positive experiences and lowering/ignoring negatives. EITHER through play AND/OR from sharing everyday home activities such as preparing meals. iii. Overcome barriers around regular use of the games by parents: (a) By providing pairs game cards, (b) Modelling/role playing games with parent. (C) adapting the game for child's ability and to overcome non-compliance. iv. Video tape a session of parent playing with child and feedback with parent by watching this with them when the child is not present (added in for study 3, NFPP 2009).	The NFPP programme content and change processes in this area are: i. Using simple, quick games that can be played anywhere (matching pairs, SNAP, Kims game, "I went to the market and bought..."). ii. Aim to get parents to understand the level of their child's ability in a certain game using simple tools (handout with a visual representation of "zone of proximal development" concept and the "scoping diary".

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Continued (page 2 of 3)

	Method of delivery	Context of delivery	Length of Delivery	Processes of change - Psychoeducation	Process of change - Adapting normal practices for ADHD: positive parenting & effective communication	Process of change - Enhancement of parent-child relationship through play	Process of change - Scaffolding the child's learning and improving ADHD neurocognitive deficits and behaviour through play
Changes for Study 2 ^a	Therapists (I) had less ADHD and therapy experience (II) were less invested (II) more in number (IV) delivered to less families			None	None	None	None
Changes for Study 3 ^y	Two Therapists only family. Preparation, delivery and supervision for NFPP regular part of weekly work-load with protected time for preparation, delivery and supervision. Increased emphasis was put on flexibility around the timing of session delivery in this revision of the training and delivery manuals in line with the individual needs of the this.			This revision incorporated emerging work on the bidirectional influence of the child's behaviour on parental handling of conflict and high emotionality especially in the presence of co-morbid oppositionality or early conduct type symptoms. This added to processes in the area of parental modelling of emotional and behavioural self regulation: exploring the role parental self-monitoring and family environment has in achieving this.	This study expanded on the delivery and importance of effective communication: (i) How the parent achieves this (e.g. short simple messages, recruiting the the child's attention and removing distractors) (ii) How they support the child to receive the message (e.g. by getting them to repeat it back) (iii) Then supporting the child in achieving the result they wanted (e.g. repeating it/prompting them and positive motivation/rewards)	Expanding on the social aspects of play and group work (e.g. bringing siblings and friends into play settings) so as to set the child up for larger learning and socialising environments (such as nursery and the classroom).	The role of "parent as guide and trainer" was formalised in this study and was introduced in the context of a NFPP specific definition of "constructive parenting": Made up of the following steps: 1. Scoping: assessing their child's abilities given the task, activity or area in development. 2. Practice: Applying the "Zone of proximal development" principle (Vygotsky, Wood & Wood, 1996); helping the parent identify the additional skills the child needs to do for themselves something they currently cannot.

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continued (page 3 of 3)

Method of delivery	Context of delivery	Length of Delivery	Processes of change - Psychoeducation	Process of change - Adapting normal practices for ADHD to promote positive parenting & effective communication	Process of change - Enhancement of parent-child relationship through play	Process of change - Scaffolding the child's learning and improving ADHD neurocognitive deficits and behaviour through play
Changes for Study 4 ^a	The same therapist delivering both interventions in the head to head trial (NFPP & HNC)	8 weeks Consecutively delivered 1 to 1.5 hourly sessions	None	None	None	None
			Note differences in NFPP to the programme in the head to head comparison (Helping the Non-compliant Child - HNC): A. Child present at 2/8 of the NFPP sessions VS. All the HNC sessions (i.e. more therapist to parent modelling and role play with the NFPP). B. NFPP aims for positive reinforcement and strategic ignoring/distraction for lowering unwanted behaviour VS. HNC puts emphasis on "time out". C. NFPP involves several strategies which are initially presented/explained and then tailored to the individual family using the episode diary tool VS. HNC smaller number of strategies that need to be successively "mastered" before the therapist moves on to the next.			
Changes for Study 5 ^a - COPPI	Overcoming practical barriers to delivery. E.g. scaffolding the parents organisation of session timing and attendance and providing audio taped version of handouts. This was for literacy issues and for communicating programme materials between households.	12 weeks: mainly same content over the first eight weeks. THEN with four weeks of repetition, clarification and operationalising support, allowing for the "harder to reach and difficult to treat" population targeted	Substituting ADHD with Pre-school Type Attention Problems (PTAP) because.. i. The young age of the target audience (2 years 9 months to practice this was most evident in how the parent can scope this in this 4yr 6mo) ii. Debate in literature around reliability and validity of ADHD diagnosis in this age iii. Concerns around stigma and future interaction with services if the "ADHD" term/label was used/given	None	Mainly adapted due to large variation in normal child development over the 3-5 year period in fundamental ADHD and parenting related areas along with the high risk families targeted: e.g. (a) self-regulation, (b) social ability (c) empathy, theory of mind and whether contingency based behavioural management will be effective (d) language proficiency (d) in planning, organisation and execution of tasks and (e) in the emotional, physical and intellectual capacity of the family In practice this was most evident in how the parent can scope their child and get the "level" at which to pitch a game or learning point (e.g. number of cards in pairs OR use of distraction and ignoring versus punishment) and in terms of planning a play session to maximise positive success (e.g. time of day to play, length of time, setting up the environment to prevent distractors). The increased challenges of the parents and families recruited for the COPPI trial made the delivery of this element of the NFPP both more challenging and more necessary.	

ADHD - Attention Deficit/Hyperactivity Disorder; COPPI - Comparison Of Parenting Programme Interventions trial; HNC - Helping the Non-compliant Child; NFPP - New Forest Parenting Programme; PTAP - Pre-school Type Attention Problems;

^a Study 1 - Sonuga-Barke et al., 2001; ^b Study 2 - Sonuga-Barke et al., 2004; ^c Study 3 - Thompson et al., 2009; ^d Study 4 - Abikoff et al., 2015; ^e Study 5 - Sonuga-Barke et al., 2018.

Other aspects of play that children with ADHD struggle with, apart from the organisational aspects and overcoming the risk of failure/engineering successful completion, are mainly social in origin: things such as turn taking and sharing and more subtle aspects such as difficulties following instructions due to problems recruiting and maintaining attention and working memory difficulties (Alessandri, 1992). The NFPP therefore included play in the programme using specific games that were designed to address NFPP core symptoms around improving attention, mitigating neurological deficits such as auditory and visual working memory and to learn social rules to help the child play with others better in external settings. The games used are Matching pairs, Kim's game, We-Went-to-Market and Simon says.

The second aspect of play applied in the NFPP is for positive relationship building. Anecdotally parents often report that children with ADHD play better on their own and/or with play choices of their own choosing. This could be due to all the above issues which result in play experiences being distressing for all parties and often ending in the child being told off or perceiving this to be the case. In addition, parents of children with ADHD are often stressed by the increasing demands put on their parenting (Theule et al., 2013). This could often result in parents of children with ADHD playing less with their child which lowers the opportunity for positive interactions and building of trust in the relationship (Abidin, 1992). In addition ADHD literature show that levels of conflict in households living with ADHD are higher resulting in parental figures potentially modelling poor self-regulation and socially inappropriate behaviour for the child (Miller & Prinz, 1990). This then reinforces further negative responses directed by the child towards the parent or others in similar scenarios. The NFPP encourages 10 minutes of general play a day in conjunction with

shifting the parent and child's mindset towards highlighting the positives and ignoring the negatives early in the programme to move the parent-child relationship in a positive direction.

ADHD psychoeducation influences the parent child relationship independently from social learning theory, for example through influencing parental attributions for the child's behaviour. Explaining to the parent the genetic origins of ADHD can remove the element of "blame" that the parent often puts on themselves or the child which can cause self-esteem problems for everyone. This can "re-set" the relationship allowing the therapist to move forward with the strategies for change (Sawrikar & Dadds, 2018).

In the NFPP a tool called the Episode Diary is either filled in as homework, or completed contemporaneously in a session, and is used to apply functional analysis principles. This allows for patterns to be identified around antecedents to particular child behaviours and is used by therapists early in the programme to apply preventative behavioural strategies and tailor these to ADHD and the individual family. Classic behaviouralism and operant conditioning theories are used within the NFPP and the basis for their effectiveness in changing ADHD behaviours long term is probably through Patterson's work on coercive cycles of behaviour. Although mainly based on conduct disorder aetiology, aspects of ADHD and the consequences of these on family dynamics often result in the same outcomes (Granic & Patterson, 2006). Parents report the demanding nature of children with ADHD and that this results in behaviours being partially ignored but only until the parent's threshold is reached. At this point parents respond negatively with either submission, positive reinforcement of negative behaviour or with a harsh or overly punitive responses, increasing child sensitivity to negative reinforcement (Furukawa et al., 2021). None of these are

effective in the long term and (see “1.5.7 Parent Behaviour/Style” section in Chapter One) have been found to be associated with poorer outcomes in children with ADHD (Claussen et al., 2022).

When applying aspects around behavioural boundaries the following aspects are key in the NFPP programme; (i) making these clear and supporting the parent to consistently stick to them as much as possible (ii) the parent making the child aware of what these are visually if necessary (“house rules”) and (iii) helping the parent to find the right motivation for the child so that, in time, (iv) the child internalises these and chooses positive behavioural options for themselves. Bringing ADHD understanding into behavioural reinforcement techniques for the parent is a unique feature of the NFPP: An example is to ensure the parent gets praise or reward in quickly enough before the child potentially does something impulsive again; this would then make rewarding the child inappropriate or impossible (Van der Oord & Tripp, 2020). Lastly with ADHD and boundary setting, it is important to address the stigma and isolation that a child can feel secondary to ADHD within the family. “House rules” mentioned above combines clear behavioural boundaries with aspects of social learning theory and positive reciprocal interaction: parents are encouraged to make sure everyone in the house sticks to the rules and receives the same reward or consequences attached to these.

Finally, child developmental theory and specifically individual variation in development trajectories, is fundamental in a programme such as the NFPP that targets young children. This is mainly applied in the area of parental expectations and strategically is referred to in the NFPP as a parent not “setting their child up to fail”. This was important for the COPPI trial given the age of the target audience (2 years 7 months to 4yr 5 months) as “normal

development” over this period in some areas can vary significantly between individuals even if no underlying problems exist: Examples include theory of mind and the ability of a child to use the consequences of their actions to adjust their behaviour in a similar scenario in the future (effortful control of behaviour; McEwan et al., 2015): It may be that some parents think a child should “know” their actions are causing another person distress, whereas the child has not developed that capacity as yet. These children will stop behaviour associated with this through behavioural reinforcement methods (externally) but are less likely to be able to use the other’s perceived reactions or feelings (theory of mind) to make this change for themselves as yet.

3.4 NFPP Content and Process Methods

In summary the New Forest Parenting Programme applies operant learning theory, positive relationship building, behavioural reinforcement and ADHD psychoeducation in the strategies it delivers. These strategies are individually targeted to the family through a thorough assessment that elicits important ADHD factors in the child, parent and family that are known to be either protective or detrimental when it comes to long term ADHD outcomes. These strategies are based around several interim processes that are addressed either sequentially or in parallel during the delivery period. These are: ADHD understanding, parent-child emotional relationship (highlighting the positives), effective communication in ADHD, preventative behavioural strategies (routines, behavioural boundaries and ADHD issues around time/change), parental monitoring and behaviour (addressing positive modelling of self-regulation and social rules), scaffolding their child’s learning (through play), addressing behaviours that are coercive or more purposeful from the child and/or

cyclical within the family and finally supporting the parent to manage their child's ADHD through NFPP methods after the formal programme delivery period ends.

Practical methods that are used in the NFPP by therapists to deliver factual information, explain strategy use and to aid the parent in operationalising these strategies in practice include; (i) manuals (a full delivery manual and a shorter practical one for session use), (ii) parent handouts (that mirror the information in the practical therapist manual with an additional audio CD to overcome reading barriers and/or facilitate sharing of information and consistency between carers), (iii) a purposefully made DVD (designed to be either watched during sessions with the parent or to be sign-posted to, as additional homework), (iv) the therapist modelling NFPP strategies with the parent (for example using praise and positive therapist-parent interaction to build parental mood or role playing difficult scenarios from episode diary examples with relevant NFPP behavioural strategies added in. This is delivered in the context of the parent "becoming their child's guide and trainer" with them learning from the therapist and the parent then teaching the child), (v) specific tools that are designed to operationalise more difficult concepts for the parent (such as the scoping diary after delivery of the zone of proximal development concept within the strategy of scaffolding their child's learning), (v) therapist, parent and child practice of play and (vi) filming of a play session that the parent has planned, set up and led that is used as video feedback in the next session.

This is all done against the background of the therapist using generic therapeutic techniques in order to: (a) engage the parent, (b) to create a positive working relationship and (c) build a safe space for them to identify areas of change and operationalise these and (d) the therapist judging the progress and effectiveness of the programme according to session

goals, bringing any therapeutic barriers to supervision where necessary. The therapist role as a NFPP programme delivery agent is established through a 3-day training course that follows the same principles of programme delivery from therapist to parent: the trainer presenting the facts around why the NFPP is effective and how the strategies change parental behaviour to achieve lowering of core ADHD symptoms in the child. This is followed by modelling of this process through examples with the trainees and culminates in operationalising practice sessions through role playing between therapist candidates (see Appendix page - 14 -).

3.5 Effectiveness of the NFPP in Clinical Trials

Prior to the Comparison Of Preschool Parenting Interventions (COPPI) trial (Study 5 - Sonuga-Barke et al., 2018. Data collection ended in 2015), there were four clinical trials of the NFPP carried out: (Study 1 - Sonuga-Barke et al., 2001; Study 2 - Sonuga-Barke et al., 2004; Study 3 - Thompson et al., 2009; Study 4 - Abikoff et al., 2015). See Table 8 for a summary of the methodological differences between these as will be discussed in the next 5 sections.

Table 8: A table summarising the methodology and population statistics of the 5 summarised studies of the New Forest Parenting Programme

A table summarising the 5 New Forest Parenting Programme (NFPP) studies methods and population statistics															
	Program version	Length	Target families	Child age years	% male	% co-morbid ODD	Number of sites	Therapist numbers (NFPP)	Therapist investment/skill	Control group	Comparison treatment	Follow-up length (T2 to T3)	Subjects that did not consent	Subject numbers	Subjects that dropped out of Rx (by Rx arm)
Study 1 (2001)	Original	8 weeks	Clinical Normal risk	~3	62	29	1	2	High	TAU	Yes - Counselling and Support	15 weeks	171 (62%)	30 20 28	7 (9%)
Study 2 (2004)	Original	8 weeks	Clinical Normal risk	~3	Not reported	40	1	16	Lower	WLC	No	15 weeks	Not reported	59 30 -	11(14%)
Study 3 (2009)	Revised-I	8 weeks	Clinical Normal risk	4.17 (mean)	76	Not reported	1	2	Average	TAU/WLC	No	8 weeks	15 (21%)	21 20 -	12 (29%) (17% vs. 83%)
Study 4 (2012)	Revised-I	8 weeks	Clinical Normal risk	Range 2 3 to <5	74	42	1	5	High	WLC	Yes - Helping the Non-compliant Child	30 weeks	Not reported	67 63 34	11 (7%) (10% vs. 3% vs 7%)
Study 5 (2018) COPPI	Revised-II	12 weeks	Clinical High risk	3.55 (mean)	73	75	3	10	Average	TAU	Yes - Incredible Years	26 weeks	119 (18.7%)	133 42 131	124 (40%) (39% vs. 5% vs. 56%)

This control group (2004) was made up of some new recruits and the same subjects from the 2001 trial.

The control group in the 2009 trial was instigated as a treatment as usual. However it is stated that the subject in this on the sheet no treatment for ADHD Junior line length of the trial period until final follow-up (23 weeks)

% - Percentage; T2 to T3 - Time 2 (post programme delivery) to Time 3 (delayed follow up); TAU - Treatment As Usual; WLC - Wait List Control

3.5.1 Study 1 (Sonuga-Barke et al., 2001)

This first Randomised Controlled Trial (RCT) of the New Forest Parenting Programme (NFPP) recruited families from population screening at the 3-year health check (carried out routinely at that time on all children) by health visitors in the Southampton area. The sample was selected from all children born between January 1992 and September 1993 (n=3,051). The screening tool used was the Werry-Weiss-Peters [WWP] which mainly includes questions around over-activity. It was a very early measure created from observation of pre-school children and designed to separate those with clinical levels of overactivity from those without (Routh et al., 1974; Werry & Quay, 1970). Symptom count, severity and impairment criteria for hyper-kinetic disorder under ICD-10 was required for inclusion. Following screening, 286 children who reached a cut-off of more than 20 on the WWP were assessed using the Parental Account of Children's Symptoms (PACS, Section below; Chen & Taylor, 2006). The numbers/proportion able to be screened from the whole population pool was not reported.

Of the population of 3-year-olds screened (n=3,051), 286 reached the cutoff (>20) on the WWP (9.4%) and of these 78 ended up in the final sample and were randomised having reached clinically validated cutoffs on the PACS (See description below). It was reported that 171 parents "declined to take part" at "stage ii" of the process compared with 105 who agreed and the demographics and baseline measures of these families were compared with those who agreed to participate (although note the exact timing and definition of the declining to partake is not clear from the numbers presented). Those parents declining apparently had children with slightly lower levels of ADHD symptom frequency and severity. However, there were no statistics published to support this. Exclusion criteria were;

parental serious mental illness, serious learning disability in the child and the child being diagnosed with another unrelated medical condition. Of the total sample (n=78), 48 were male (62%). No mean age was given for the sample (stated as “3-year-olds”). The proportion of the sample meeting diagnostic criteria for a conduct problem using the PACS was 37.2% (n=28).

The pre-school PACS was the primary outcome for this study. It is a structured interview requiring trained interviewers to rate parents’ responses to questions about the child’s behaviour in a standardised way, using the accompanying manual. The severity of symptoms and extent of limitation caused by those symptoms are combined in a single four-point rating of problem severity to give a score from 0 to 3 for each problem. These are summed to provide an overall symptom severity score. Cut-offs can also be used for diagnostic purposes. The PACS, which was originally developed to assess the response to stimulant medication in children with hyperkinetic disorders, was created in the late 1970s/early 1980s (first published use; Taylor et al., 1986). The interview has separate sections for hyperactivity, inattention and disruptive behaviour. The hyperactivity section asks questions reflecting signs of over-activity or impulsivity, for example attention span, fidgeting and inappropriate activity. These are measured on a 0 to 3 scale and are asked in the context of different activities e.g. solitary play, watching television and traveling in a car. The inattention scale questions, versus the hyperactive just covered, are closer in wording and probable interpretation of meaning to those familiarly found in DSM-III-R onwards: the development of the PACS was occurring around the same time as the final wording of the DSM-III-R revision (American Psychiatric Association, 1980). In addition the PACS research and clinical development team was UK based and so the authors may have been using the ICD criteria more than the DSM at this time. As discussed in Chapter One ICD did not

distinguish between hyperactive/impulsive or inattentive subtype before its 11 edition (Prendergast et al., 1988; Slee, 1978). See [Chapter One](#) for more detail. For a summary of the PACS development along with reliability and validity data see Chen & Taylor (2006).

Randomisation in study 1 was to three treatment options: (1) Parent training (the NFPP as it was at that time - see Table 7, n=30). (2) Parent counselling and support (designed to mirror PT in length of contact and included psychoeducation. However no behavioural strategies were delivered however n=28). (3) Waiting list control (these families “received no contact with clinical services during the 23 weeks of the trial”, n=20). Two therapists delivered the PT using the NFPP and the PC&S. These were clinically experienced practitioners currently in the role of health visitor. They had significant knowledge of ADHD and child mental health. Treatment integrity was reported. The ability of a coder, blinded to treatment allocation, to distinguish correctly between a session of parent training versus PC&S from a sample of audiotapes was 96%. The same coder went on to summarise the content which was then compared to a schedule of expected content. They were reported as highly consistent. Participants were randomised with an even chance across arms and therapists. Sample size was based on power calculations for effect sizes of 0.7 to 1.3 quoted from recent trials for methylphenidate use (although not in pre-school children) with no other details of the power calculation parameters. This required at least 20 families per treatment arm. Time points for measurement were pre-programme (0 weeks), end of formal delivery period (8 weeks) and 23 weeks. Numbers who withdrew from the trial were low (n=7, 9%), distribution of this between treatment arms were not reported nor was whether these were dropouts from treatment or failure to collect follow up data or both. Those not completing the study were reported as not differing from those who remained in treatment on any time 1 measures (no statistics given; Sonuga-Barke et al., 2001).

A repeated measures ANCOVA was conducted with time 2 PACS (post intervention) and time 3 PACS (23-week follow-up, 15 weeks post intervention) as the within subjects factor (Time) and Group (Treatment; NFPP, PC&S vs. WLC) as the between subjects factor. Time 1 PACS was included as covariate.

There was a significant group effect ($F_{2,74}=11.64$; $p<.0001$). There was no group by time interaction indicating that the improvement in child's ADHD symptoms from the PACS due to group was maintained from time 2 to time 3 (while controlling for time 1 PACS). Post-hoc analysis comparing the benefit of NFPP over WLC in reducing parent-report child ADHD symptoms using the PACS as a dimensional measure was significant at follow-up ($F_{1,46}=14.54$; $p < .001$). The study group used the Jacobson & Traux (1992) method to calculate the percentage of children in each randomisation arm/group for whom their level of ADHD symptomatology using the PACS measure reached levels for clinical recovery post NFPP. This showed only NFPP produced significantly higher percentage of children who reached clinical criteria for recovery under this method when compared with WLC; NFPP 53% vs WLC 25%, odds ratio=3.42, 95%CI: not reported, $\chi^2=4.08$, $p=.048$. In the PC&S arm, 38% of children met these criteria for clinical recovery which was not significant compared with WLC (odds ratio=1.83, 95%CI: not reported, $\chi^2=0.92$, $p=.263$).

For oppositional/defiant symptoms measured using the PACS the pattern of results was the same: There was an overall group effect ($F_{2,74}=3.70$; $p=.029$) and no group by time interaction ($F_{1,74}=1.33$; $p=.262$). NFPP was superior to PC&S ($F_{1,55}=4.65$; $p=.035$) and WLC ($F_{1,55}=5.57$; $p=.023$) with no effect of PC&S on ODD symptoms compared with controls ($F_{1,45}=0.28$; $p=.6000$). There was a significant difference in the size of effect seen in the change in ADHD symptoms versus ODD symptoms following receipt of the NFPP programme

by parents/families: the NFPP produced reductions in ADHD symptoms that were of moderate to large effect size (combined effect sizes for ADHD symptoms measured using the PACS averaged between T2 & T3 and compared to baseline: 0.87) whereas the reduction of ODD symptoms using the PACS was half that magnitude (0.43).

Maternal adjustment results were presented as a composite measure by z-transforming the scores of individuals from the three included measures (GHQ-30 and the sub scales of Parental satisfaction and efficacy from the PSOC) to a normal distribution with mean of 0 and SD of 1 and combining these. This measure was improved significantly by NFPP over both PC&S ($F_{1,55}=8.47$; $p=.0050$) and over WLC ($F_{1,47}=17.80$; $p=.0001$). Although the comparative statistics for the three measures of well-being individually were not published the effects sizes were. These potentially give some information regarding the impact of including active components of parenting change (NFPP) over and above the influence of parent-therapist relationship and support (PC&S): The effect size for NFPP vs WLC from the GHQ results (combined across T2 and T3 and compared with baseline) was similar to that for PC&S vs WLC (0.48 vs. 0.41). However the relative improvement from receiving NFPP vs WLC when compared with PC&S looking at effect sizes for parental satisfaction (1.29 vs 0.59) and parental self-efficacy (0.61 vs 0.22) was much greater. Although this cannot be causally attributed to anything from these results, they are potentially consistent with active change (NFPP) vs supportive presence alone (Sonuga-Barke et al., 2001).

Overall study 1 was deemed by its authors and peers to be a good demonstration of the efficacy of The New Forest Parenting Program to treat core ADHD symptoms in pre-school children with ADHD. Its strengths were that it was targeting children at this early age at a period of time when the community and clinical procedures to do this were not established.

In addition there was significant debate around the reliability and validity of diagnosing ADHD in preschool children using the current tools and definitions available, adding to barriers for early intervention. The inclusion of a parent counselling and support arm to this trial was useful, especially for this thesis as it compares the influence of providing support, psychoeducation and validation to parents on the child's expression of ADHD symptoms alone versus attempts at actual behavioural change. Limitations are: (i) not including a medication arm (specifically mentioned by authors), (ii) parental report of symptoms as main outcome measure (although observational measure of attention span was included also) with pre-school/teachers as a reporting source being a possible future addition (Sonuga-Barke et al., 2001).

3.5.2 Study 2 (Sonuga-Barke et al., 2004)

This study (2) was very similar in design to study 1, the main difference being that the programme was delivered by a larger number of therapists with a more varied background/level of ADHD expertise compared with trial 1. Recruitment to this trial continued as part of established routine care in the same tertiary referral district as study one and occurred over a 4-year period (1993 to 1997). Numbers were: screened using WWP (n=3,409), PACS clinical interview (n=147), randomized (n=69).

The PT using the NFPP was delivered by 16 health visitors selected at random from the local service. These therapists were not asked about their willingness to include this as part of their workload nor on their perceived or actual ADHD knowledge or skill level to do so. However, they were allowed to refuse to take part in the study (from the paper's discussion). Training was 2.5 days and supervision was weekly either face-to-face or by telephone by a single specialist NFPP therapist. Fidelity of delivery was aided by weekly

checklist provided to the health visitor and treatment integrity was rated for 5% of “the data” using audio tapes of sessions. This was stated to be 85% with a range of 79% to 91%. This study formed part of a clinical service provision and so randomised allocation of families to treatment vs control was weighted, with 2 children assigned to received parent training [PT, n=59] to every 1 assigned to waiting list control [WLC]). This was to minimise the wait for treatment and to balance the ethical issues behind delaying treatment for some families. In addition, the parent counselling and support arm included in study 1 was dropped given its non-superiority over WLC. The control group was a combined one pooling the families randomised to WLC in this study period (n=10) and the WLC participants from study 1 (n=20, total WLC for study 2 n=30). The two pools were compared statistically and found not to differ. No gender distribution was reported. No mean age was given for the sample (stated as “3-year-olds”). The proportion of the sample meeting diagnostic criteria for a conduct problem (not specified) using the PACS was 40% (n=not stated). Time points for measurement were pre-programme (0 weeks), end of formal delivery period (8 weeks) and 23 weeks as per study 1. Dropouts were 11 participants (14%) with the timing of dropout, distribution across trial arms and relative proportion of missing data not stated. Replacement of missing values were as per study 1 with the result from the family with the worst possible outcome in that arm substituted in.

Impact of the intervention on ADHD related behaviours was presented using an ADHD composite score only, with no comparisons made for the separate measures that were collected. Unlike in study 1 the values used for the second time point for the ADHD composite score (and the equivalent for maternal wellbeing that was presented above for study one) was only that from Time 3 for this study (23 weeks, 15 weeks post intervention) not an average across both time 2 and time 3 as in study 1. Also important to note is that

the measures used to come to the ADHD composite score for study 2 were not the same as those used for study 1. The same statistical process was conducted for the three maternal wellbeing variables (GHQ, parenting satisfaction and parenting efficacy: the same as those used in study 1).

In this study 2 of the NFPP, the programme did not significantly improve ADHD behaviours compared with controls as measured using the above composite score when comparing week 23 scores to pre-treatment levels (ADHD index - Degree of change [95%CI]; NFPP $z=0.03$ [-0.32 to 0.25]) and for controls (0.26 [-0.52 to 0.01]). Difference in change between groups: $z=0.26$, [-0.24 to 0.68]). Looking at the raw values across time 1 and time 3 for the individual measures (See paper for details; Sonuga-Barke et al., 2004) these change scores reflect; (a) improvement in PACS from NFPP with the WLC showing no change, (b) worsening in the BCL attention index in the WLC group with the NFPP group showing no change and (c) worsening of the WWP in both the NFPP and WLC group. Both groups also showed a significant worsening in mean maternal well-being (well-being index - Degree of change [95%CI] - Parent training; -0.41 [-0.68 to -0.14] vs. WLC; -0.63 [-1.04 to -0.26]) with no difference in this effect between groups ($z=0.22$ [-0.23 to 0.67]).

In summary, study 2 failed to reproduce the moderate to large effect sizes shown in study 1 for NFPP efficacy in reducing parent reported ADHD and ODD compared with controls. It was clearly stated in the discussion that the difference between study 1 and study 2 may be in the number and skill level of the therapists delivering the programme. Therapist motivation/investment for delivering the NFPP and the level of qualifications and/or ADHD experience were extensions on this reasoning. Although treatment integrity was assessed as described above along with stating that “ongoing support” was offered for delivery

supervision, there was no expansion on this. For example, presentation of raw data such as number of families delivered per therapist and hours of supervision offered and/or attended may have given credence to therapist delivery factors being the problem versus the programme itself. The authors do though suggest potentially exploring what characteristics of therapists may be associated with positive change and cite study power as the reason for not being able to do so in this case (Sonuga-Barke et al., 2004).

3.5.3 Study 3 (Thompson et al., 2009)

Following the non-significant results from study 2, study 3 reverted back to employing a small number ($n=2$) of ADHD experienced therapists to deliver the NFPP, thus allowing for the maximum fidelity and inter-therapist consistency to be achieved (Thompson et al., 2009). They also adapted the programme to improve how the role of ADHD aetiology was incorporated into the operationalising of the behavioural strategies used in the NFPP. This was done in the areas of; (i) ADHD specific behaviours (such as effective communication and management of time/change), (ii) behaviours more related to child oppositionality and poor compliance, (iii) parental modelling of social rules and (iv) for parent child interaction and the impact the bi-directional nature of this has on the development of cyclical behavioural patterns (see Table 7).

Recruitment was over an 18- month period (no start date given). This study took place on an [UK] island with a limited population (686 births a year, from the publication) and so, to maximise recruitment, both clinic-based referral and self-referral from advertising was opted for. In addition to this strategy the age range of children eligible was increased (with no upper limit stated in the paper) and the threshold from screening using the WWP after initial referral was set at above 13 (as opposed to the 20 used in studies 1 and 2) to prevent

early exclusion of potential families (n=74). Of these 8 did not meet inclusion criteria and/or had exclusion criteria (3 were “too old” -see earlier comment re no target age for recruited individuals, 1 not local, 2 previous CAMHS attendance, 1 sibling also in trial, 1 had ASD, 1 was not able to be contacted and 10 decided not to proceed). For the remaining families (n=55) the PACS was administered with a “score of 16 or over on the...ADHD scale” required for study admission. Nine [9] children did not meet this threshold, and 5 families decided not to proceed with the trial at this stage (no reasons given), leaving 41 families to be randomised.

Randomisation (method stated) was done on a 1:1 basis with 21 receiving the revised NFPP and 20 assigned to the control arm which was Treatment as Usual. (None of this group received supportive, medical nor parenting support for the child’s ADHD during the treatment nor follow up period as reported in the study publication). Time points for measurement were before treatment, directly after treatment (stated as week 9) and at week 17 for both arms. Drop-outs from the trial were quite high (19.5%): Two families did not complete the 8 weeks of the NFPP (the exact number of sessions attended by these was not mentioned) and 6 TAU families dropped out. Missing data were present for 11 families of 41 (4 in PT and 7 in TAU, this is inclusive of those who dropped out - 26.8%).

Of those families who dropped out or had missing data, the children had significantly higher levels of ADHD symptom severity at time 1 (PACS parent training; 17.37 (SD 5.91), TAU; 23.36 (6.42), $t(39)=2.81$, $p=0.008$) and greater levels of ODD from the PACS (but this failed to reach significance - PACS PT; 20.43 (SD 7.99), TAU; 25.45 (7.73). $t(39)=1.80$, $p=0.081$). They did not differ in either child age, levels of ADHD from the WWP, scores on the social problems scale of the BCL nor in levels of maternal ADHD or well-being (statistics available

in the paper). The authors decided that inclusion of the families for whom there was missing data at T2 or T3 with imputation of missing values by any method was not appropriate given the small sample size. Therefore, a per protocol population (PPP) based analysis was conducted rather than an intention to treat approach (ITT). Those followed up in the PT group did not differ from those followed up in the TAU in age and gender at baseline. No other information about group comparisons for time 1 measures for the PPP was given except a mention in the results sections that levels of Maternal ADHD were greater in the treatment group vs controls; this was measured using the adult ADHD rating scale (Barkley, 2011) ; the adult equivalent of the SNAP in conceptual terms - see study 5 section for more information); PT Maternal ADHD CSS time 1; NFPP 17.38 (SD 11.55), TAU; 9.27 (SD 5.10) .

Repeated measures ANCOVAS were used for analysis, the between subjects' factor being group (PT vs TAU) and the within subjects' factor being time (T2 and T3). T1 scores for the relevant dependent variable were included as a covariant. For child ADHD by parent report there was a strong main effect of group with the NFPP having lower PACS scores compared to waitlist control (Group; $F=13.69$ $p<0.01$. ES $d=1.36$).

There was no time X group interaction suggesting that superiority of treatment group was maintained over time (group X time, $F=1.95$, $p=0.17$). The strong intervention effect was maintained even after controlling for maternal ADHD, child age and gender. Eight children (40%) in the NFPP group showed clinical improvement on the PACS compared to only one (5%) in the WLC ($\chi^2=7.025$; $P=0.008$). A large effect was seen also for child ODD on parent report as measured by PACS (Group; $F=10.40$ $p<0.01$. ES $d=1.24$) and, again, there was no group by time interaction ($F=1.27$, $p=0.27$). However, scores on the observed attention/time on task observed measure, which was rated blind, did not improve. In addition, the large

reduction in ODD using the PACS was not mirrored by changes in the BCL social problems scale (see original paper; Thompson et al., 2009) . There was also a failure to reproduce improvements in parental well-being (GHQ) seen in study one (group; $F=0.36$, $p=0.55$. Group X time; $F=0.11$, $p=0.74$. ES $d=0.23$).

In summary, study 3 of the NFPP, although small scale and with a larger range of child age within those recruited, re-produced the significant improvement for ADHD symptoms and ODD found for those receiving NFPP one-to-one programme compared with no-treatment controls from study 1. The main similarity between studies 1 and 3 and difference between 2 and 3 were the [smaller] number of therapists delivering the programme and, potentially, the experience and investment in the process by the therapists. Importantly but consistent with repeated trials of parent interventions in the ADHD literature, some included outcome measures found to be improved in those receiving the NFPP versus controls in study 1 were not significant in trial 3: mainly maternal well-being (GHQ) and objective measures of attention (a time-on-task measure; Thompson et al., 2009).

3.5.4 Study 4 (Abikoff et al., 2015)

The fourth study in the NFPP series was a head-to-head comparison trial of two parenting programmes with a wait list (no treatment) control group. The programme selected for comparison was Helping the Non-compliant Child. This is a programme designed to target children who would display behaviours that come under the Oppositional Defiant Disorder descriptions in the DSM and ICD criteria. It targets those under the age of 12 and is based on principles from the Hanf model previously described (Reitman & McMahon, 2013). The HNC programme is based on social learning principles with the therapist modelling the strategies for the parent as in the NFPP. The HNC programme involves two stages of treatment; the

first is called the “differential attention” stage aiming to; (a) help the parent identify what is and what is not positive behaviour in their child, notice these and attend to them (“attend” strategy), (b) rewarding behaviour with parental time and praise - “rewards” and (c) ignoring negative or unwanted behaviour - ‘ignores’. The second stage “compliance training” is for the parent to; (i) develop clear consistent instructions to the child, to establish for their family what behaviours constitute compliance and non-compliance and to have set consequences for these - “clear instructions sequence”, (ii) Using of ‘If...then’ sentences in the context of “time out” as a consequence for not following the instruction: this is modelled/practiced while in session using the ‘time out chair’ which is made part of the room setup since the start of delivery - “Standing rules” and the final strategy of the HNC programme (iii) situations “outside of the home” - extending the parents use of HNC strategies to outside of the home/comfort zone and making parents response to the child consistently in terms of HNC pathways. (Positive reinforcement for pro-social behaviour combined with active ignoring or warnings with consistent consequences for unwanted behaviour/non-compliance to warnings). The programme is delivered in a clinic environment with the room set up (with a child play area distinct from the therapist and parent area, for example) and other contextual factors (such as the presence of the child in every session) being important. More specifically the therapist aims to model the current strategy with the child directly and early in a session (e.g. attention given to the child positive pro-social behaviour - “attends”) with the parent then being encouraged to do this themselves at subsequent points throughout the session. This intensive coaching, practice and extending of parental skills aspect of the HNC programme is similar in style to another Hanf-based programme, Parent-Child Interaction Therapy (PCIT: Eyberg, 1988). The six strategies of the HNC child programme outlined above aim to address similar processes as

the main concepts of the NFPP: (1) Building a positive parent child relationship (2) reversing coercive cycles of behaviour between parent and child (3) building parental understanding and confidence in their methods and (4) establishing consistency and assertiveness in rules and boundaries for the child.

The main difference between the HNC and the NFPP is that the latter aims to accommodate the impact of ADHD behaviours and neurocognitive deficits on parental functioning and family life (see earlier detail). The HNC asks the parent to do either “the child’s game” (15 mins of free play where the child instigates the play and the parent follows their lead) or “the parent’s game” (for the same length of time the parent sets the play and instigates rules and boundaries such as turn-taking or tidying to operationalise compliance training). This is also used in the session itself to model (therapist) and practice (parent) the current strategy being explored. The length of sessions is recommended to be 75 to 90 minutes in the original manualized form (McMahon & Forehand, 2003), with twice-weekly sessions being seen as more likely to promote effective change. Like PCIT, the HNC programme uses behavioural criteria that a parent must meet in order to move on to the next strategy; for example, the number of times a parent gives positive attention or ignores unwanted behaviour at the appropriate time in session. This makes the number of sessions each family receives individual (within limits around engagement and saturation). In order to make HNC and NFPP comparable the following changes were made; (a) meeting of behavioural criteria to move on was dropped (b) number of sessions for “full dose” was limited to 8 (c) and recommended session length to approximately 60 mins.

Recruitment for this, study 4 of the NFPP, occurred between 2007 and 2012 in a large city in the USA. The research side was carried out through a medical school in a prominent

university in that city with the clinical assessment and treatment through a tertiary academic hospital CAMHS department. Recruitment methods were described as being based on referrals from community sources and parent self-referral through targeted advertising (Forehand et al., 2016). The targeted population was 3- to 4-year-old children attending local childcare establishments for at least 2.5 days a week. Inclusion criteria were; (i) for the parent receiving a programme to be fluent in English (ii) child IQ > 70 of Wechsler scales (Wechsler, 1992) (iii) adequate child language development (using a cited, referenced measure with established clinical norms) (iv) child ADHD scores on the screening measure, the Connors Parent Rating Scales – Revised CPRS (Conners, 1990) at a level against age and gender standardised norms with requirements of a T score ≥ 65 for either combined ADHD or either subtype; hyperactive/impulsive or inattentive and the same on the teachers version of the Connors at a lower level (T score ≥ 60) and finally (v) a diagnosis of any type of ADHD using the Diagnostic Interview Schedule for Children- Parent Report Version 4 modified Young Child Version (DISC-IV-YC; Shaffer et al., 2000). The DISC is a structured clinical interview designed to elicit symptoms of ADHD and ODD as per the DSM criteria. It contains impairment questions at the end of each section covering the effects of the symptoms in different places (home and school), in different areas of functioning (peer activities and academia) and also asks about distress associated with symptoms from each diagnostic area (Shaffer et al., 2000). Exclusion criteria for study 4 were; (a) current medical or behavioural treatment for ADHD (b) a diagnosis of pervasive developmental disorder, (c) PTSD or (d) psychosis or (e) a history of physical or sexual abuse (Abikoff et al., 2015).

Screening by telephone using the Connors -PRs took place for 905 families of which 578 were excluded at this point. A breakdown of reasons for this was not published so it was unclear how many were not eligible and how many had chosen not to enter the trial or were

unable to take part. Face to face screening assessment took place for 327 (36% of initial sample pool) with 150 being excluded at this point. The majority of these exclusions were for clinical/trial criteria reasons (Connors Parent- RS or C Teacher- RS for ADHD; $n=110$, DISC-IV-Young Child for ADHD; $n=18$, language development; $n=7$). Randomisation to either NFPP or HNC treatment arm or Wait List Control was stratified by age and gender and done in a 2:2:1 ratio for NFPP: HNC: WLC. Ideal sample size was estimated to be 187 (with a distribution between NFPP: HNC: WLC of 75:75:37) using effect sizes taken from past trials of similar programmes and trial methodologies. This was Cohen's d of 0.62–0.68 if comparing to wait list control and slightly lower for the head-to-head comparison between NFPP and HNC; $d=0.51$ –0.55. Randomisation methods were stated and adequate.

Assessments were carried out at baseline and post treatment (9 weeks) with the WLC group then receiving the treatment of their choice. An interesting method was chosen for the timing of the T3 follow-up assessment (October/November of the next school year after treatment). The authors state there was no difference in the duration between post-treatment assessments and follow-up between the two treatments. (WLC were not followed up as receiving treatment if desired). The mean length of follow-up was 6.8 months (SD 2.01: range 2.76 to 10.57 months). The final randomised sample was 164 preschoolers (NFPP $n=67$, HNC $n=63$, WLC $n=34$) with an average age of 3.57 years (SD 0.5). Of these 73.8% were male with a diverse ethnic distribution (White 49.2%, Hispanic 25.6%, African American 16.4% and Other 14.4%). From the whole sample 41.5% of the children met DSM-V criteria for ODD. The authors state there were no significant group differences on any of the demographic or clinical variables.

The paper states face-to-face training was provided by the programme developers to the therapists, 5 in number, along with ongoing weekly supervision via conference call throughout the trial period. Therapists delivered both the NFPP and the HNC programmes concurrently to minimise therapist effects according to the authors. Therapist background was in clinical psychology with at least 2 years' experience of behavioural therapy with children and families. History of previous delivery of either programme by the therapists was not mentioned nor were specifics about how many families each therapist treated and the distribution of programme type within this. Treatment fidelity was assessed for 12% of sessions from video tapes through and independent evaluator. The method used to select video data was only briefly described but had been previously applied. The implication was that it allowed for coverage across all possible sessions and individual families and for all therapists to get a representative sample. The paper also states all sessions were video recorded, implying these were all available for review (Abikoff et al., 2015).

Treatment fidelity was based on the proportion of required therapeutic elements delivered in a given session for each programme from checklists and done by an independent assessor (no details given). This was rated as high; NFPP 96.3% and HNC 96.9%. Treatment contamination of NFPP with HNC and vice versa was also assessed and taken as the perceived inclusion of elements during delivery that were not in the intended treatment checklist for that family and were exclusive to the non-intended treatment also. This was rated as extremely low 0.6% of sessions. Any discussion behind the methods to prevent cross contamination and exactly what form possible infringements of this would take was not done. However, the authors cite a previous head-to-head trial of behavioural interventions in which the attention paid to this matter was high and the presentation detailed (Abikoff et al.). Drop-outs were low - NFPP n=6 of 67 (9.6%; 1 before first session, 4

attending between one and four sessions, 3 after attending between five and seven sessions), HNC n=4 of 63 (6.5%; 3 at one-four session level and 1 at five-seven) and WLC n=1 of 34 (2.9%). Average attendance for those who sustained engagement was high with no difference across treatment arms; NFPP mean=7.40 sessions (SD 1.88), HNC mean=7.73 (SD 1.11). Proportion of missing data was acceptable across all time points; Time 2, Post-treatment; n=13 of 164 (7.9%) and Time 3, Follow-up (mean 6.8 months); n=26 of 164 (15.6%). An intention to treat analysis was followed with no information given about how missing values were handled (Abikoff et al., 2015).

No adverse effects of receiving treatment were reported with the authors specifically highlighting these as possibilities through therapist training and data collection procedures. One WLC family dropped out due to worsening symptoms of ADHD in the child, presumably requiring treatment. Medication initiation was also monitored during the trial with no children in treatment arms requiring this during programme delivery but with 6 families (NFPP n=3 and HNC n=3) starting medication for their child's ADHD between post treatment and follow up collection points.

Outcome measures were ADHD and ODD symptom count and severity from parents (most proximal), teachers and clinicians (both probably blinded). These measures were not the same as used in the UK based studies of the NFPP. However, they are worded similarly to the DSM-IV symptom descriptors for both diagnoses. Specific instructions were given to participants about the importance of not discussing their treatment allocation to relevant parties given that this trial methodology was ideal for assessing halo effects for parent report of interventions in this target group. Observed measures of attention were the measure of attention/time of task as used in study 1 and 3 of the NFPP and the cookie delay

task. This latter measure is quantifying the ability of a child to cope with delays of increasing length while waiting for a desired object.

Statistical analysis for this study (4) was regression using a linear mixed-effects model for repeated measures/longitudinal data. Post hoc tests for differences between the three treatment arms at T2 were based on likelihood ratio with pairwise comparisons on t-test methods. Finally, whether treatment effect was sustained across post-treatment (T2) and follow up (T3) in the two treatment arms was represented by a “Time” effect in the regression output with any difference in the pattern of this between groups being the Time X Treatment effect (Abikoff et al., 2015).

The NFPP group had significantly better ADHD scores post intervention (Time 2) compared to WLC as assessed by the Connors for parent report for all subtypes (NFPP vs WLC: Combined ADHD; $d=-1.01$, $p=.001$, Hyp/imp; $d=-0.97$, $p=.001$. Ina; $d=-0.89$, $p=.001$) but not for teacher report (e.g. combined ADHD; $d=0.28$, not significant [n.s.]. Hyp/Imp; $d=0.18$, n.s.. Ina $d=.33$, n.s.). Interestingly even larger effect sizes were found for clinician reported improvement in child ADHD symptoms for NFPP versus controls: NFPP vs WLC: Combined ADHD; $d=-1.66$, $p=.001$. Hyp/Imp; $d=-1.07$ $p=.001$. Ina; $d=-1.27$, $p=.001$). For oppositional/defiant associated outcomes, the NFPP significantly lowered parent reported child defiance using the New York Rating Scale versus controls (NFPP vs. WLC: NY[Parent]RS defiance; $d=-0.59$, $p=.001$) but not Aggression ($d=-0.17$, n.s.). Changes in teacher reported defiance ($d=-0.17$, n.s.) and aggression ($d=-0.01$, n.s.) were not significant.

HNC results against controls at post interventions (time 2) produced the same pattern of results but with generally larger effect sizes: ADHD symptom reductions by parent report were significantly greater compared with TAU. Combined ADHD; $d=1.24$, $p=.001$. Hyp/Imp;

$d=1.21, p=.001$. Ina; $d=, 1.09, p=.001$. There was not a significant reduction in child ADHD symptoms versus controls on teacher report; Combined; $d=0.25, n.s.$ Hyp/Imp $d=0.15, n.s.$ Ina; $d=0.23, n.s.$. Reductions in Child ADHD versus controls by [blinded] Clinician report were significant; Combined; $d=2.20, p=.001$. Hyp/Imp $d=1.68, p=.001$. Ina; $d=1.47, p=.001$.

Post hoc comparison testing of the NFPP versus HNC programmes at post intervention (Time 2) showed generally that there was no significant difference in effectiveness between the two programmes for ADHD and oppositional/defiant/aggressive symptoms. (Note negative “d” values reflect a greater reduction in variable for HNC). The exception to this were that HNC had significantly higher reduction for clinician rated child Hyperactivity and Impulsivity post intervention ($p=0.014, d=0.61$) compared to NFPP.

At extended follow-up the HNC group had better combined symptom reduction parent-rated Connors’ scores (NFPP vs HNC; $p=.051, d=0.54$) and better Connors hyperactivity/impulsivity scores (NFPP vs HNC; $p=.014, d=0.61$) A significant time by intervention group interaction for total clinician rated ADHD symptoms showed an improvement for NFPP and a small decline for HNC (Clinician reported hyp/imp ADHD; Treatment X Time effect; $p=.024, d=-0.59$) suggesting that perhaps the NFPP may have longer term or more slow burning “sleeper effects” (Abikoff et al., 2015).

3.5.4.1 Study 4 - Secondary Analysis (Forehand et al., 2016)

The two programmes in study 4 were originally created to target children with different symptom profiles as described above: The New Forest Parenting programme targets ADHD-type behaviours and the Helping the Non-compliant Child, oppositionality. The team involved in study 4 decided to explore whether the pattern of results from this study, showing that the NFPP did not seem to be more effective than HNC in lowering the levels of

ADHD symptomatology, may be related to co-morbidity of ADHD with ODD. A secondary analysis was published to look at whether the presence of a categorical diagnosis of Oppositional Defiant Disorder moderated the effects of NFPP and HNC differently (Forehand et al., 2016).

The authors' pre-testing hypothesis was that; (i) NFPP would be more effective for reducing ADHD symptoms when an ODD diagnosis was not present in the child and (ii) that HNC would be more effective for Defiance and [physical] Aggression (the two sub scales of the New York [Parent or Teacher] Rating Scales) for subjects irrespective of ODD diagnostic status of the child. Analysis was again using regression with two between-subjects factors: Treatment (NFPP vs HNC) and ODD diagnosis in the child (Present vs Absent) and with baseline levels of the dependent variable as a co-variate.

The results did not fully support the a priori hypotheses: Both interventions were equally effective for reducing ADHD symptoms regardless of ODD status for both parent and teacher reported outcomes. However, there were some interesting ODD group (ODD present vs ODD absent) by parenting programme (NFPP vs HNC) interactions for parent reported Defiance and Aggression. Post hoc testing showed HNC was more effective in reducing post-intervention, parent reported defiance and child aggression than NFPP when an ODD diagnosis was present. Within programme comparisons showed, that neither parent reported Defiance nor Aggression differed by ODD status at post intervention.

For teacher reported ODD related outcomes, significant ODD group by treatment interactions were found for aggression post intervention and follow-up [FU]. The interaction approached significance for teacher rated defiance at FU ($P=0.057$). Post-hoc analyses indicated that HNC was more effective than NFPP in reducing teacher rated aggression

when a child had comorbid ODD: Within intervention analyses by testing simple slopes showed that NFPP had differential effectiveness with better outcomes for children with ODD versus those without for all three of the significant Treatment X ODD interactions (Post intervention and Follow-up: Aggression and Follow-up defiance; Forehand et al., 2016) .

In summary, study 4 showed that the NFPP produced significant reduction in both ADHD and ODD symptoms by parent report immediately post intervention delivery and these were maintained through to time 3. The effect size for the NFPP ADHD improvement was large and between that for study 1 and study 3. It also showed even larger effect sizes for clinician reported ADHD and ODD symptoms. However, typical to other NPPP trials and other trials of this type, ADHD and ODD symptoms from probably blind sources (teachers and observed) were not significantly lowered compared with controls. This pattern was the same for both the NFPP and the comparison arm (Helping the Non-compliant Child - HNC). Although the effect sizes were even greater from HNC over NFPP for both ADHD and ODD symptoms. NFPP and HNC did not show superiority over each other at Time 2 immediately post intervention delivery in almost all outcomes (exception clinician reported combined and hyp/Imp ADHD symptoms). One interesting finding was that on clinician report on extended follow up (T3) clinicians reported those children receiving the NFPP had improved in their combined, hyperactive/impulsive and inattentive ADHD symptoms whilst those receiving HNC had worsened again. However this possible sign of sleeper effects was not substantiated by changes from other sources.

Generally the larger effects for both PLIs may be due to the increase level of expertise of the therapist delivering this program and the very small number of therapists delivering them also. The dedication to the trial given the therapist was delivering both programs will also

potentially improve results. In terms of HNC being potentially as effective if not superior in terms of ADHD behavioural change could be due to greater simplicity in the strategies delivered through HNC programme and the intensive role modelling of methods by the therapist. This would be more likely to cause instant de-escalation of behaviours and reduce household chaos hence the improvements at time 1. Longer term improvements by clinician reports for the NFPP group may reflect changes in parental functional analysis and attributions around ADHD, given potentially increased understanding, tolerance and self-efficacy encouraged by the NFPP content (Abikoff et al., 2015; Forehand et al., 2016).

3.5.5 Study 5 (Sonuga-Barke et al., 2018).

This was a three-arm, randomised, controlled comparative treatment trial of the New Forrest Parenting Programme (NFPP) vs the Incredible Years (IY) programme with a treatment-as-usual control arm (IY). The reasoning behind this study in the context of the effectiveness of the NFPP to treat ADHD was to compare a one-to-one individual parent-led behavioural programme for pre-school children with ADHD to a generic non-ADHD specific programme delivered in a group format. The IY was chosen due to; (i) its trialled use and potential effectiveness for children of the targeted age range (Webster-Stratton & Reid, 2008) with ADHD symptoms in the clinical range (Webster-Stratton & Reid, 2008; Webster-Stratton et al., 2001), (ii) due to its wide use in the UK for treating ADHD at the time of the Comparison Of Pre-school Parenting Interventions (COPPI) trial as recommended by national bodies (NICE, 2008). (iii) because of its comparative length (12 weeks) and other delivery factors such as session length, and (iv) because of its established training, delivery and supervision materials and protocols. The second progressive aim of this trial was to assess the potential effectiveness of the NFPP in high-risk families of preschool children

presenting with clinical levels of ADHD symptoms. For this reason, normal exclusion criteria were relaxed in the areas of parental mental health, child co-morbidity and child developmental delay and recruitment methods were purposefully honed to maximise accessibility to so called “hard to reach” families (Smith et al., 2015). In addition, changes were made to the NFPP to adapt it for hard to reach families and those who are thought to be “high risk” in terms of difficulty treating a child’s ADHD effectively using parent led behavioural methods (McEwan et al., 2015).

Methodological problems identified from previous NFPP studies were addressed with plans for a small number of therapists delivering both treatments in each site (2 delivering NFPP individually and 2 therapists co-facilitating one single IY group each tranche) along with attempts to standardise training and supervision and maximise supervision attendance for all therapists delivering treatment during the period (McCann et al., 2014; Sonuga-Barke et al., 2018).

The New Forest Parenting Programme was thoroughly reviewed in the context of barriers to parental attendance and clinical use (Smith et al., 2015) and in terms of process methods and strategies that may best produce effective change (McEwan et al., 2015). From this the following changes were made: (i) Overcoming practical barriers to delivery for example by scaffolding the parents’ organisation of session timing and attendance. Audiotaped versions of handouts were provided to address barriers around literacy and to enable dissemination of NFPP material to others closely involved in the child’s care (e.g. fathers not living with mothers). (ii) The delivery length was increased from 8 to 12 weekly sessions to allow for 4 weeks of repetition, clarification and operationalising support to accommodate for the higher level of learning and supportive needs this population was expected to have. (iii)

Substituting the term “ADHD” with “Pre-school Type Attention Problems” (PTAP): This came from concerns that therapists and parents had around using the “ADHD label” given the young age of the children involved (2 years 9 months to 4yr 6mo). The implications were that both therapists and parents may not be fully sure themselves whether they are treating a child who “has ADHD” or one that is “at risk” of having” ADHD in the future. This was consistent with debate in literature around reliability and validity of ADHD diagnosis in this age group at the time of the COPPI trial (Sonuga-Barke & Halperin, 2010) which still goes on. There were also concerns that using the ADHD term might be stigmatizing or impact on the family’s future interactions with services. (iv) Strategy presentation and operationalisation: There was much work done around “Scoping”, the first stage of the NFPP operationalisation of scaffolding a child’s learning. This is a hard concept for therapists to understand and apply for parents and the concerns around the high level of need the COPPI families may have required increased attention given to it. The scoping diary and a visual representation of the “zone of proximal development” were added in and the level of training around the using of scoping in NFPP games and ADHD was increased (McEwan et al., 2015).

The Incredible Years series was originally developed, designed and trialled in the late 1980s and 1990s (Webster-Stratton et al., 1989) and was originally designed as a universal parenting resource and as a preventative tool for those at risk of future ODD/CD diagnoses and negative outcomes. It is based on similar theory to the NFPP with (i) Patterson’s coercive family cycles (Patterson, 1982), (ii) social learning theory (Bandura & Walters, 1977) and (iii) attachment theory (Ainsworth & Bell, 1970) being at its core. The IY series has programmes for (a) children of all ages (baby - 4 to 9 months, toddler - 1 to 3 years, preschool - 3 to 5 years and school age - 6 to 12 years), (b) children with different levels of behavioural severity and impact (universal population based interventions e.g. the

classroom version of Dinosaur School© and the Attentive Parenting© programme, indicated or at-risk populations e.g. the BASIC© for all age groups and those with specific diagnoses or high levels of risk factors that need more support than the BASIC© programmes provide e.g. ADVANCED© and Helping Preschool Children with Autism©, for those needing further or more-specific support. The teacher-based interventions (e.g. Classroom Management©) are recommended in addition to parent-led programmes when children are at diagnostic level for behavioural severity. Process methods are based on recorded vignettes of acted out scenarios relevant to the underlying programme aims for that session (e.g. the topic of session one of the Toddler BASIC programme is “Child-directed Play Promotes Positive Relationships” with vignettes related to attentiveness versus intrusiveness, developmentally appropriate play and promoting positive behaviour and child self-esteem and ignoring negatives). These are watched in the group after the facilitator[s] introduce the sessions topic and end goals with a brain-storming exercise to engage the attendees. These vignettes are then used to build on the concepts for that session, to identify targets for change and to introduce the strategies for replacement behaviours. Homework is given in order to operationalise these strategies and reviewed in the next session. This makes attendance at successive sessions essential in terms of the programme content and, given the group nature of the delivery, it is then hard to re-cover material for individuals who have missed sessions. The IY delivery manual and fidelity process allows for individual catch up sessions to address this issue specifically along with phone calls for exploring reasons for non-attendance and/or sustained engagement of parents. Although important in terms of addressing barriers to attendance at parent-led interventions, it increases work-load and this intervention’s cost and potentially introduces variation in the dosage of intervention received by the group members (Webster-Stratton & Bywater, 2019). The IY training and

supervision methods are well publicised and standardised through the commercialisation of the materials needed to deliver groups. This increases the initial cost of running an IY group but increases standardisation of programme delivery. Over time ongoing costs should go down if staff are retained, there is ongoing support and funding by the relevant institution and there is ongoing collaboration with referring bodies and interest groups to maintain awareness and accessibility to IY treatment. The IY team and associated researchers developed a specific measure, the Leader Observation Tool (Eames et al., 2008), to assess IY fidelity objectively with some empirical evidence linking therapist delivery methods to change in parental behaviour (Eames et al., 2009; Eames et al., 2010).

Recruitment for the COPPI trial took place between February 2012 and January 2014 and the trial took place across 3 sites. These were all Major UK cities with full provision for tertiary CAMHS services, serving a diverse population representative of all demographic areas typical of England's population. As just mentioned, efforts were made in the recruitment strategy to identify hard to reach families and so community resources such as speech and language services and sure-start centres in areas of high deprivation were brought into the process. Getting the message out using local radio, posters in local community centres and on social media were additional strategies as were typical sources of referrals such as tertiary CAMHS referral sites and paediatric clinics. Recruitment was timed so as to have a single IY group running 3 times a year to coordinate with school term time, another strategy to maximise attendance at sessions and minimise no shows due to additional barriers that emerge during school holidays (e.g. childcare and holidays!).

Screening was very similar to the 3-stage process used in the other 3 UK based NFPP studies: potential participant families were telephone screened with the Werry-Weiss-Peter's (WPP; Routh et al., 1974) using a cut-off score of 20. Inclusion criteria for the COPPI

trial, Study 5 of the NFPP, were; (i) between 2 years 9 months and 4yrs 6mo old at the screening time point, (ii) a parent 18 years or older (ii) meeting the WWP cut-off and (iv) screening positive for a clinical diagnosis of ADHD (of any subtype) using the dimensional scale from the DISC-IV interview (described earlier, Lucas, Fisher, & Luby, 1998) . Exclusion criteria were; (a) clinical diagnosis of Autistic Spectrum Disorder (b) >18 months delayed using the Parent Involvement Project (PIP) developmental scales (Jeffree & McConkey, 1998) (c) Severe mental illness in caregiver (e.g. psychosis). In addition, the COPPI authors state “practical” reasons used for exclusion which were (d) children in short to medium term foster care placements (e) on the child protection register and (e) insufficient English language proficiency.

Of 665 families screened; 118 did not meet inclusion criteria (18.6%), 70 were lost to contact (11.0%), 119 declined to participate at this stage (18.7%) and 21 (3.30%) were excluded for “other reasons” (which were not expanded upon). This rate of refusal to participate is similar to that in study 3 (21%). In total 307 (48.4%) of those assessed for eligibility were randomised. Randomisation method was clearly described and was coordinated by the clinical trials unit of the main trial site with only the main trial administrators liaising with them. Randomisation and allocation was in a ratio of 3 participants to each treatment arm for each 1 participant allocated to Treatment as Usual (TAU). Allocation was also stratified by site and tranche (6 tranches for site 1, and 5 for suites 2 and 3: this was due to unavoidable delays in trial administration for the second two sites).

Research staff collecting data and those retrospectively coding any recorded observed data were blinded to treatment allocation as were teachers of the included children. Therapists

were not blinded and parents were briefed on the importance of maintaining blindness with data collection staff and in discussion with third party reporters i.e. nursery staff or teachers depending on the child's schooling level/age. (Data from these sources are referred to as "teacher" reports from here). The data collection time points were Time 1, pre-treatment, Time 2, post treatment (14 weeks; 2 weeks for processing and 12 weeks of treatment) with Time 3, follow-up being at 6 months post treatment and only being of the families in the two treatment arms: the TAU group receiving the parenting treatment of their choice (NFPP or IY) after Time 2. Power calculation elements were reported and the conclusion was a requirement of 141 families in each treatment arm and 47 in TAU. This was based on a predicted dropout rate of 10% based on previous NFPP (study 3) and IY trials. The final allocation was NFPP n=133 (initially 134; but 1 participant withdrew consent for all data), IY n=131 and TAU n=42. All these families were included in the ITT analysis.

Initial treatment engagement was high for the NFPP (n=126 attended at least one session, 94.7%) but much lower for the IY group (n=105, 80.2%). Sustained engagement was good for the NFPP (n=86, attendance at 8 or more sessions, 64.7%) and less so for IY (n=61, 46.6%); although the authors note this varied across sites (36-54%). In total, dropout was acceptable for the NFPP arms (7 attending no sessions and 12 families withdrawing, total 25; 18.8%) and higher in IY (26, no sessions, 11 withdrew; 28.2%). However once engaged those dropping out of both treatment arms were similar and low in numbers. Due to this high level of dropout, treatment provision was increased at one site from tranche four with two IY groups run and two additional NFPP therapists recruited also. The families lost to follow-up post intervention (drop-outs) did not differ in terms of basic characteristics from those remaining in the trial. Finally missing data levels were below the threshold deemed as acceptable in trials of this time with Time 1 and Time 2 parental reported ADHD symptoms

count and severity (using the Swanson, Nolan And Pelham, SNAP, Swanson, 1981) available for 79.7% of the sample across all arms (NFPP; 109 of 133, 82.0%. IY; 99 of 131, 75.6%. TAU; 36 of 42, 85.7%) at Time 1 and Time 2 with all three time point data available for 70.5% of the treatment arm groups combined (NFPP, 74.4% and IY, 66.4%; Sonuga-Barke et al., 2018).

The sample was, as aimed for, at high risk in terms of levels of factors and/or measured variables known to affect ADHD severity, long term outcomes and/or parent intervention effectiveness. (i) Parental low mood (≥ 11 on the GHQ using the Likert method of scoring each item) was 76.8% across the whole sample. (ii) Approximately a third of the main carers across the sample reported themselves as single parents (30.1%). (iii) 42.8% of children in the sample had language delay, deemed present when the child was at least 6 months behind their expected chronological age for language on the PIP scales (McCann et al., 2014) Finally (iv) three-quarters (75.5%) of the sample has significant conduct problems in addition to their ADHD diagnosis: ≥ 15 score on the Eyberg Child Behaviour Inventory problem scale (Hukkelberg et al., 2016). The ITT sample were reported as “well balanced” across the three arms on all of the demographic and time 1 measures. This higher level of risk was also reflected in the treatment received by the TAU comparison group: 9 children were reported as attending child mental health services of the 42 children allocated to the TAU group. Treatment received varied from educational (n=2, specialist nurseries and n=1, speech and language therapy), supportive groups for parents (n=2, sure start) and non-specific behavioural advice (n=1) to full parent-led interventions for externalising behaviour in the child (n=6, Triple P [Sanders 2003] and n=3 received IY instead of TAU). Finally in terms of the validity of results and the interpretation of these, reporting of the methods and outcomes from fidelity and quality checks of programme delivery was thorough. Intended

training and supervision methods were reported with this being delivered by researchers involved in the original development of the programme they were supervising. Training was standardised across both treatment arms and based on previous trials for both programmes. Supervision was planned to be regular at the start of the trial but to be tailored off due to the increasing skill of the therapists across tranches/time. One aspect of this training, therapists practicing delivery of a programme before doing so to recruited trial subjects, did not occur for those therapists starting after the first tranche at each site (this due only to sickness and staff naturally moving on to other workplaces, with no delivery problems encountered). The therapist attrition was low with numbers of additional therapists required as follows: NFPP: site 1; tranche 3 (n=1), tranche 4 (n=2). Site 2; tranche 5 (n=1) and Site 3; none. For IY: site 1; tranche 2 (n=1), tranche 5 (n=1). Site 2; Tranche 5 (n=1) and Site 3; Tranche 3 (n=1). This gave a total of 10 therapists delivering the NFPP and 6 therapists the IY over the whole trial. For the IY there was a consistent therapist across each site and tranche for the whole study. Fidelity was taken from both therapists' checklist from each programme containing the strategies to be delivered per session for both NFPP and IY. Fidelity was assessed as 70% for the NFPP and 74% for the IY. The authors do note however that the IY content fidelity checklists for one of the three sites were not submitted for all the groups across the whole trial (i.e all tranches; Sonuga-Barke et al., 2018).

Measures used in COPPI were either the same as those used in NFPP trials to date or, if not, consistent in terms of construct definition and measure structure with what they were replacing. Efficacy of the programme was based on change in scores on the Swanson, Nolan And Pelham (SNAP) questionnaire (Swanson et al., 2001). This assesses current ADHD symptom count and severity. It has questions phrased exactly or very similarly to the behaviour descriptors in DSM-IV and is fully inclusive of all the items i.e.

hyperactivity/impulsivity (9 items) and inattentive (9 items) for both subtypes of ADHD. It can be combined with 8 additional items for oppositional defiant disorder (ODD) and this, the 26-item version, was used in the COPPI trial. The SNAP-IV reliability and validity at the time of the COPPI trial (2012) had not been adequately proven to validly rate the ADHD (and ODD) construct[s] in preschool children. However other similarly constructed measures had (e.g. the DuPaul ADHD Symptom Rating Checklist from Willoughby et al., 2012). Issues that arise in these publications have been discussed in chapter 1 and include: (i) sensitivity and specificity of individual items in pre-school populations to distinguish normal versus clinical or at-risk groups due to normal variation in development of self-regulation and attention mechanisms. (ii) instability in item endorsement and ADHD subtype across time in individual children (measurement invariance e.g. Lahey et al., 2004) (iii) whether a one two or three factor solution (looking at ADHD items only) best fits the data in pre-school populations e.g. possibly due to difficulty discriminating inattentive behaviours from hyperactive/impulsive ones at this age (factor invariance, e.g. A single factor solution in Willoughby et al., 2012 vs. two-factor in Bussing et al., 2008) (iv) whether teachers perceptions and therefore ratings of children's symptoms at this early age differ to parents due to the different social expectations or behavioural attributions in the classroom versus at home e.g. teachers seeing ADHD-type symptoms that cause peer problems as disruptive in origin (Munkvold et al., 2009). See Lucio et al., (2022) for a recent, post COPPI trial, review.

The statistical approach was determined a priori and published in a peer reviewed journal (McCann et al., 2014). Missing data handling was a main priority and the two options were given depending on whether the "Missing Completely At Random" (MCAR) assumption is plausible or not on initial data analysis (Jakobsen et al., 2017). The clinical trials unit reached the assumption that the missing data was MCAR after the completion of the COPPI trial by

comparing the baseline characteristics (referred to as auxiliary variables) of participants for whom a parent reported SNAP outcome was available for Time 1 and time 2 versus those for whom it was not. The exact method of determining that these were similar enough was not given. Multiple imputation was used to replace the missing values. For analysis mixed effects regression was used with the following fixed effects; (i) T1 score of dependent variable/outcome being used (ii) treatment arm (iii) centre and (iv) tranche and random effects; (a) participant and (b) therapist. Sensitivity analyses were planned for, carried out and reported: (1) complete case analysis, (2) per protocol sample and (3) those attending 8 or more sessions to assess the validity of the ITT analysis given the need for multiple imputation of missing values. Ad hoc effect sizes were reported as Standardised Mean Differences (SMD); this allows for comparison in effect sizes for the same outcome (e.g. ADHD or ODD symptoms) when it is assessed and reported from more than one measurement tool (i.e. SNAP-IV and ECBI in this study). Some aspects of the priori published analysis plan were not reported in the final paper (for example the mediation and moderation analyses and treatment effectiveness as a function of treatment fidelity) and the authors added post hoc comparisons of the treatment arms that were not initially proposed (McCann et al., 2014; Sonuga-Barke et al., 2018).

Table 9: A table showing the Outcomes of the Fifth Study applying the NFPP programme

A table showing the Outcomes of the Fourth Study applying the NFPP programme to treat Child Attention Deficit/Hyperactivity disorder (ADHD) behaviour: Abikoff, H. B., et al. (2015). "Parent training for preschool ADHD: A randomized controlled trial of specialized and generic programs." Journal of Child Psychology and Psychiatry 56(6): 618-631.

	New Forest Parenting Programme			Control			Helping the Non-compliant Child			Effect size NFPP vs. Control	Effect size Comparison Arm vs. Control	Effect size NFPP vs. Comparison Arm
	Time 1	Time 2	Time 3	Time 1	Time 2	Time 3	Time 1	Time 2	Time 3			
Child ADHD Parent report PR (CRS total score)	75.42 (11.43)	65.26 (12.15)	68.01 (11.69)	78.01 (9.17)	76.44 (9.84)	-	75.21 (9.49)	62.62 (11.05)	63.44 (10.13)	-1.01***	1.24***	0.23
Child ODD Parent report PR (NYS Average Item Score)	1.31 (0.65)	0.85 (0.52)	0.95 (0.57)	1.17 (0.80)	1.10 (0.72)	-	1.24 (0.62)	0.75 (0.49)	0.82 (0.60)	0.59***	0.69***	0.10
Child ADHD Clinician reported (CRS total \$)	12.40 (2.79)	8.28 (4.22)	8.00 (4.89)	13.03 (2.38)	12.85 (2.92)	-	12.70 (2.47)	6.92 (4.41)	7.58 (3.65)	-1.66***	-2.20***	0.54 Δ
Maternal Well-being (PSI)	2.31 (0.58)	2.12 (0.53)	2.10 (0.54)	2.51 (0.63)	2.44 (0.70)	-	2.52 (0.54)	2.08 (0.44)	2.11 (0.62)	-0.28	0.58***	0.30*

ADHD - Attention Deficit/Hyperactivity disorder; AIS - average item score - AIS; CRS - Connors Rating Scale; GHQ - General Health Questionnaire; ODD - Oppositional Defiant Disorder; PACS - Parental Account of Children's Symptoms; PSI - Parenting Stress Index; PR - Parent reported SNAP - Swanson, Nolan and Pelham scale.

\$ This is the CRS total score from the paper even though its values are much lower than the parent equivalent.

Δ $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$

(See Table 9 Table 9 – included for context in the following thesis trial) Those participants receiving the New Forest Parenting Programme did not show a significant reduction in parent reported ADHD symptoms using the SNAP-IV at Time 2 when compared with the TAU control group (adjusted mean difference [AMD] 0.189, 95%CI: -0.380 to 0.003, $p=0.053$. SMD=0.35), although it approached significance. The NFPP did show significant efficacy in reducing conduct disorder symptoms at Time 2 on parental report using both the SNAP-IV (AMD -0.24, 95%CI: -0.48 to -0.002, $p=0.048$. SMD 0.34) and the ECBI intensity scale (AMD -13.05, 95%CI: -25.90 to -0.19, $p=0.047$. SMD=0.45) with moderate effect sizes. The IY programme did not show significant improvement in parent reported behavioural symptoms at time 2, neither for ADHD (SNAP-IV; AMD -0.16, 95%CI: -0.37 to 0.04, $p=0.121$. SMD=not reported) nor for ODD/CD symptoms (SNAP-IV; AMD -0.06, 95%CI: -0.32 to 0.20, $p=0.658$ and ECBI Intensity scale; AMD -9.08, 95%CI: -20.94 to 2.78, $p=0.133$) at time 2 compared with TAU controls. The NFPP however was not superior to IY in reducing ADHD (AMD -0.01, 95%CI: -0.19 to 0.17, $p=0.92$) and ODD/CD symptoms from either measure (e.g., SNAP-IV; AMD -0.16, 95%CI: -0.35 to 0.04, $p=0.11$).

There were no sleeper effects in NFPP versus IY from parental symptom reports as shown by no difference in NFPP and IY at time 3 on these measures (SNAP-IV ADHD; AMD 0.04, 95%CI: -0.14 to 0.23, $p=0.64$ and SNAP-IV ODD; AMD -0.04, 95%CI: -0.25 to 0.18, $p=0.75$). There were no effects seen for NFPP or IY versus TAU for teacher reported symptoms not for observed measures of attention at either time point (the latter measured using the same bespoke paradigm and observation tool as applied in previous NFPP studies). Observed measures of parental behaviour and child behaviour outcomes were not reported, nor were other included secondary outcomes such as parental well-being, family stress, parent-therapist relationship measures and parent-child relationship quality. In addition, there was

no mention of the impact of the fixed effects included in the regression model, namely; site, tranche nor the random effect of therapist. There was no reporting of potential moderation or mediation analyses using any of the aforementioned variables; something that was proposed in the a priori published protocol nor was there any discussion for the reasons of non-inclusion. The main other finding of the COPPI trial published was the financial costs of delivering the two programmes, NFPP and IY. These were calculated with meticulous attention to the methodology and collection methods. It showed that the NFPP parenting intervention, an individual programme delivered in the family home, was cheaper per family to deliver than the IY intervention, a group programme: Overall costs per family; NFPP £1591 and IY £2103. Reasons for this difference with reported values are listed in the paper: for example; reimbursing parental travel costs being much higher for IY (total costs; NFPP £4619 and IY £10,925), provision of a crèche and refreshments for each IY group, an expense not required for NFPP (total cost for IY £10,925) and the higher cost of commercial IY materials for therapists and parents through the IY programme (Materials total cost; NFPP £5296 and IY £16,719; Sonuga-Barke et al., 2018) .

In conclusion: study 5 of the NFPP was a head-to-head comparison trial of the individual NFPP against group IY with a TAU comparison control and targeted families who were potentially more “treatment resistant” and “hard-to-reach”. It showed that the NFPP significantly reduced parent reported child ODD symptoms at post-treatment in this sample compared with TAU controls but did not significantly reduce parental reported ADHD symptoms. The effect size was much smaller for the ODD significant outcome compared to previous trials (0.34). There was no reduction in ADHD nor ODD symptoms from teacher report at either time point nor from observed measures of attention. Methods to maximise fidelity of programme delivery were summarised and reported but not used in analysis.

Possible impacts of variations in fidelity across sites, time/tranche and between therapists were also not explored and/or reported.

3.6 Trials Summary

(See Table 10 – ADHD and Table 11 – ODD).

Overall 4 of the 5 trials of the NFPP that took place before 2014 show evidence that it is effective in normal risk populations of pre-school children and their families for reducing parent reported symptom count and severity of ADHD and ODD/CD symptoms against control (TAU vs controls) populations immediately post intervention.

Looking individually at these studies, the following pattern of results for parent reported (most proximal source) ADHD symptom count and severity and ODD was the following: (i) Trials which the NFPP was significantly effective versus controls in reducing parent reported symptom count/severity for both ADHD and ODD; Study 1 ($d=0.87^*$, and 0.43^* , for ADHD and ODD respectively), Study 3 ($d=1.36^{**}$ and 1.24^{**}) and Study 4, ($d=1.20^{***}$, 0.59^{***}), (ii) those in which NFPP significant against controls for ODD but not for ADHD, Study 5 ($d=0.35$ and 0.34^*) and (iii) where the NFPP was not significantly effective against controls at reducing ADHD nor ODD, Study 2 ($d=0.16$, ODD not reported. Note $*p<.05$, $**p<.01$, $***p<.001$).

Table 10: A table showing the Child Attention Deficit/Hyperactivity (ADHD) behaviour Outcomes from parent report for all the 5 summarised studies applying the NFPP programme.

A table showing the Child Attention Deficit/Hyperactivity(ADHD) behaviour Outcomes from parent report for all the 5 summarised studies applying the NFPP programme													
	New Forest Parenting Programme						Comparison arm			Effect size NFPP vs. Control	Effect size Comparison Arm vs. Control	Effect size NFPP vs. Comparison Arm	
	ADHD Time 1	ADHD Time 2	ADHD Time 3	ADHD Time 1	ADHD Time 2	ADHD Time 3	ADHD Time 1	ADHD Time 2	ADHD Time 3				
Study 1 (2001) (PACS total)	20.50 (-2.71)	15.31 (-5.75)	15.17 (-6.29)	21.50 (-3.29)	20.86 (5.67)	20.45 (5.04)	21.60 (3.67)	19.11 (5.02)	17.22 (6.09)	0.87*	0.48	(ADHD index) F=10.74 p=.0020	
Study 2 (2004) (PACS average item score - AIS)	2.26 (2.18 to 2.35)	-	2.06 (1.85 to 2.25)	2.07 (1.94 to 2.19)	-	2.08 (1.89 to 2.26)	-	-	-	0.16	-		
Study 3 (2009) (PACS total)	16.81 (6.10)	11.62 (6.19)	10.87 (3.99)	17.77 (6.02)	20.46 (7.17)	17.30 (6.93)	-	-	-	1.36**	-		
Study 4 (2012) (CSS total)	75.42 (11.43)	65.26 (12.15)	68.01 (11.69)	78.01 (9.17)	76.44 (9.84)	-	75.21 (9.49)	62.62 (11.05)	63.44 (10.13)	-1.01***	1.24***	0.23	
Study 5 (2018) COPPI (SNAP AIS)	2.08 (0.51)	1.70 (0.67)	1.76 (0.67)	2.04 (0.45)	1.83 (0.56)	-	2.14 (0.48)	1.76 (0.66)	1.73 (0.68)	0.35 Δ	Not sig No details	Not sig No details	
Incredible years													
Δ p<.01 *p<0.05 ** p<0.01 *** p<0.001													

Table 11: A table showing the Child Oppositional Defiant Disorder (ODD) behaviour outcomes from parent report of the 5 summarised studies applying the NFPP programme.

A table showing the Child Oppositional Defiant Disorder (ODD) behaviour outcomes from parent report of the 5 summarised studies applying the NFPP programme															
	New Forest Parenting Programme						Control			Comparison arm			Effect size NFPP vs. Control	Effect size Comparison Arm vs. Control	Effect size NFPP vs. Comparison Arm
	ODD Time 1	ODD Time 2	ODD Time 3	ODD Time 1	ODD Time 2	ODD Time 3	ODD Time 1	ODD Time 2	ODD Time 3	ODD Time 1	ODD Time 2	ODD Time 3			
Study 1 (2001) (PACS total)	20.93 (6.75)	16.79 (7.09)	16.96 (5.79)	17.70 (5.52)	18.48 (6.02)	19.10 (6.83)	20.86 (7.24)	20.93 (7.91)	18.43 (5.49)	0.43*	0.19		0.43*	0.19	(PACS ODD) F155=4.65 p=.0350
Study 2 (2004) (Not done)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Study 3 (2009) (PACS total)	19.69 (8.41)	14.37 (7.80)	16.56 (6.70)	21.08 (8.00)	22.63 (6.30)	21.15 (7.33)	-	-	-	-	-	-	1.24**	-	-
Study 4 (2012) (CSS total)	1.31 (0.65)	0.85 (0.52)	0.95 (0.57)	1.17 (0.80)	1.10 (0.72)	-	1.24 (0.62)	0.75 (0.49)	0.82 (0.60)	0.59***	0.69***		0.59***	0.69***	
Study 5 (2018) COPPI (SNAP AIS)	2.03 (0.70)	1.55 (0.81)	1.68 (0.86)	1.97 (0.77)	1.74 (0.83)	-	2.01 (0.75)	1.66 (0.86)	1.69 (0.88)	0.34*	Not sig No details		0.34*	Not sig No details	0.06
Incredible years															
*p<0.05 **p<0.01 ***p<0.001															

The effect sizes in all studies except study 2 are much larger for ADHD than those cited in the 2013 meta-analyses; Most Proximal reporter of ADHD symptoms; $n=19$, Overall $SMD=0.40$, $95\%CI=0.20, 0.60$. $Z=3.88$, $p=0.0001$. Heterogeneity: $\chi^2=30.73$, $df=14$, $p=0.006$, $I^2=54\%$ (Sonuga-Barke et al., 2013). The significant heterogeneity in results found in that meta-analyses reflects however the difficulty in comparing different programmes, target populations and measurement variations across these studies. Whether this larger effect size is due to the NFPP being superior to other programmes is not deducible from this fact alone. Some methodological phenomena may have artificially inflated this effect size: such as; (a) small sample size in study 3, and (b) variations in the measurement tools used to assess ADHD symptoms from studies 1-3 (the PACS, developed pre-DSM-III-R) to study 4 (CSS) and Study 5 (SNAP; both this and CSS are post DSM-III-R in design). However some of the methodological causes for artificial inflation of effect sizes actually provide surface validity for the larger effect size of the individual NFPP trials when compared to the meta-analytic summary figure (note only the first 3 NFPP studies were in the meta-analysis cited);

(A) Study 1 and 2 have comparable confidence intervals around their effect size calculation to those of other included studies (see Sonuga-Barke et al., 2013; page 282, bottom right).

(B) Ensuring that the intervention and the measure used to evaluate its effectiveness are aligned, a factor known to improve validity; This was done in study 4 but not in studies 1 and 2 with a replication of an effect size of similar magnitude despite this. (C) That larger samples are more likely to result in smaller effect sizes might account for the lower but still significant effect size seen in Study 5 (Bakker et al., 2019).

Programme delivery factors that appear to influence the efficacy of the NFPP across trials are (see Table 8): (i) The investment and/or skill level of therapists delivering the programme (although this may be related to larger number of therapists as these two

factors are not distinguishable in the two trials that have less evidence of programme effectiveness; study 2 and study 5). (ii) the level of risk of the trial population in terms of factors known to affect programme attendance, engagement and outcome. The participants in study 5 were “hard to reach” and “difficult to treat” in terms of the parent (e.g. well-being mean GHQ-12 Study 1 – 6.67 [SD 7.31] vs. Study 5 – 14.89 [SD 6.27], family (% mothers unemployed study 4 – 26.9% vs. study 5 – 68.2%) and child risk factors (% Conduct problems Trial 4 – 49.3% vs. Trial 5 – 78.3%): NFPP Trial 5 (COPPI) did not show significant improvement in ADHD symptoms in the child by parent report compared to controls. (iii) There is potential influence on NFPP effectiveness by the presence of clinically significant levels of ODD, from the secondary analysis of study 4: Co-morbid ODD did not moderate NFPP outcomes for ADHD. However, the NFPP was more effective in reducing ODD symptoms if the child did not have an ODD diagnosis. This is slightly contrary to the findings in study 5 where the levels of ODD/conduct problems were much higher as just stated, but it was ODD by parent report that was lowered significantly compared with controls when ADHD was not.

The relative complexity of the NFPP may be one of the reasons why its effectiveness in head-to-head trials against more generic programmes has not shown superiority. Neither has the programme shown sleeper effects (i.e. better results at secondary follow up times compared with other more generic programmes for externalising behaviours): this was suggested as a possible pattern of findings when using behavioural interventions to lower ADHD due to parents needing more time to make changes in hyperactivity, impulsivity and inattention as opposed to oppositional behaviours (Kostyrka-Allchorne et al., 2022). The programmes to which the NFPP were compared in head-to-head trials were not significantly different in their theoretical underpinnings (e.g. social learning theory and coercive cycles of

behaviour) neither did they differ majorly in their interim processes that mediate final change in ADHD (e.g. preventative aspects such as routines and behavioural boundaries, parents-child relationship and positive-reciprocal parent child interaction). However, the comparative programmes in study 4 (Helping the Non-compliant Child) and Study 5 (Incredible Years) are both based on modelling and rehearsal of single strategies in a more intense way, either using video scenarios (IY) or with modelling and support of parents with the child in session (HNC). These programmes were initially designed only to target the oppositional type behaviours with the NFPP needing to adapt normal parenting strategies to the ADHD causality and neurocognitive differences. It may well be that parents can only take on board “so much” of a behavioural change programme. It might be that better targeting of select strategies to the individual family is needed and/or that some individuals would benefit from delivery of the programme in a different way (for example with longer gaps between sessions or with a “holiday” to allow for operationalising of initial strategies).

3.6.1 Additional NFPP Trials Since COPPI

This above is a summary of the 5 trials of the NFPP published prior to the COPPI trial and done in primarily English-speaking countries. In addition to this there have been the following trials of the programme: (i) A trial of the self-help book version of the NFPP versus waiting list control (significant reduction in ADHD parent reported ADHD from 2 different measures; PACS $F=16.55$, $d=0.73$, $p=0.00$; Daley & O’Brien, 2013), (ii) NFPP individual face-to-face versus treatment as usual (including a psychoeducation element with 3 to 4 sessions in groups lasting over 2 hours): a Danish trial with translated materials and training processes and 6 clinic sessions with 2 home sessions adapted due to geographical barriers to home sessions due to spread-out population density. (Significant effects on parent

reported ADHD but lower effect size; $d=-0.30$, 95%CI: -0.53 to -0.08, $p=0.009$; Lange et al., 2016); a trial in Japan with translated materials and culture adaptations for issues around increased stigma and self-blame in having a child with behavioural difficulties. (Significant changes in beneficial directions for; internalising symptoms via the SNAP and CBCL, in CBCL measures of aggression, in parenting negative behaviours and measures of parenting stress and efficacy; but no significance versus control in SNAP Hyperactivity/impulsivity; $F=60.789$, $d=0.261$, $p=0.379$ or ODD $F=2.240$, $d=0.435$, $p=0.141$; Shimabukuro et al., 2020)

3.7 Overall Summary

The five trials reported in this chapter applying the NFPP and its ability to be adapted across trials and to produce effects as a self-help programme from additional publications give very little room to doubt its validity and effectiveness to treat ADHD. (Note: mainly from most proximal reporter and from pre-treatment to immediately post treatment). Although some NFPP trials also report changes in interim measures of change (such as parenting behaviours/style or parent child interaction) and potentially “softer measures” relating to capacity for change (parental well-being, parental self-efficacy or stress and family stress) these are not consistent enough to be seen as definitive outcomes of NFPP treatment. This is unfortunate as, in theory, some of the elements of parent-led interventions and the NFPP specifically may lead to changes in some specific interim or softer outcome measures directly: if this is the case these may be able to provide content validity comparators for core components of interventions within the industry. This has not been able to be demonstrated at the wider level either in the recent meta-analysis presented in chapter one: this used individual participant data meta-analysis for PLI studies and coded the retrieved delivery manuals of the interventions to identify the core components (see

Chapter one: Effectiveness of specific Components of PLIs; Dekkers et al., 2022). Overall it can be concluded that the industry feels the programme contents have surface validity, are consistent enough in their methods (Hornstra et al., 2023) and are effective (Groenman et al., 2022) however we do not know exactly how these work to produce change.

Taking a step back therefore, it is important to know if the programme is being delivered both as intended (fidelity) and when being adapted to the individual family. This latter point reflects, how a therapist's overall capacity for delivering a programme with fidelity is affected by; individual (parent, child and family) characteristics, interactive (i.e. therapist-parent factors such as relationship) and timing/situational/contextual factors (e.g. parental capacity for change or life-events around or during delivery). Some of this discussion is based on the "for whom are interventions effective" debate and it currently evaluated by assessing the significance and power of relevant predictive, moderating and mediating factors on intervention effectiveness. However, as has been summarised in chapter one, this has not brought us nearer to understanding the process behind parent led interventions to treat ADHD in children. Despite seemingly adequate assessment of fidelity in the industry this is not regularly assessed against outcome (Garbacz et al., 2014). Nor is the variation in fidelity or effectiveness between therapists regularly factored into statistical methods when exploring individually delivered programmes. This is probably to do with supportive aspects and aiming for non-judgmental attitudes around trial execution. This is especially important in the UK where trials involving clinical interventions are often done as part of a therapist's regular workload.

3.8 Conclusion

Given the COPPI trial aimed to make recorded delivery of the NFPP as a routine part of each individuals participation, this gave an opportunity to explore this individual variation in fidelity and possible reasons for this without concerns around the observer effect or the cost (Hogue et al., 2015). Given the availability of recordings of programme delivery and that these have not been analysed or published on, the potential information available is clear. Using the theory of ADHD and parenting discussed in chapter one and exploration of the NFPP process methods and content a detailed idea of what delivery fidelity appears like for the NFPP is available. The NFPP has been shown to be effective in trials as summarised here, however for whom they work and why is still not clear. Moment to moment interactions from these recordings will allow a quantifiable value to be put on “fidelity”. In addition the data for quantity of delivery in this trial in the NFPP arm is of good quality with no missing values. Combining quantity of delivery with baseline factors and quality may allow more of the individual variation in effectiveness of parenting interventions for ADHD to be explained. How this was done in this thesis study in terms of sampling, measure development and data collection is presented next in Chapter Four, Methodology.

Chapter 4: Methodology

This chapter explores the recruitment and selection of the participants that made up the NFPP arm of the Comparison of Parenting Programme Interventions trial (COPPI) population. Also presented are the methodological factors relevant to the baseline demographic, psychosocial and ADHD specific parent and child factors that are to be included in the thesis study. How this NFPP-arm was used to recruit the participants included in the PhD thesis study is explained, along with the methods behind the attendance and quality of delivery measures to be applied. The statistical analysis plan is laid out and how this is to be used to address the final aims of the study is made evident.

4.1 Design

This was a longitudinal, observational study evaluating the quantity and quality of therapist delivery of the New Forest Parenting Programme using recordings from the intervention arm of the Comparison Of Preschool Parenting Programmes [COPPI] trial (Sonuga-Barke et al., 2018) and the trial database (McCann et al., 2014). The population for the thesis study (quantity and quality analyses) was all the families for whom the NFPP was intended to be delivered according to the methodological details presented in the trial paper (Sonuga-Barke et al., 2018).

4.2 Participants

Participants were children randomized to the NFPP arm of the COPPI trial (n=133). These were recruited from three UK sites between February 2012 and January 2014. Participants were eligible for inclusion in the COPPI randomized controlled trial if; (i) they were between 2 years 9 months and 4yrs 6mo of age, (ii) the main caregiver was at least 18 years of age,

(iii) the child scored at least 20 on the Werry Weiss Peters questionnaire, a 22-item, parent reported measure of hyperactivity (Werry & Quay, 1970). Each item is measured as 0 - none to 2 - much, with scores greater than 17 denoting 2 standard deviations above the mean score in the original sample using this measure (Routh et al., 1974) and (iv) went on to reach diagnostic threshold for ADHD using the DISC-IV- (Lucas et al., 1998) derived from parental interview. Exclusion criteria for the COPPI trial were; (a) a pre-existing established clinical diagnosis of Autism Spectrum Disorder (ASD), (ii) more than 18 months developmentally delayed based on the assessment taken as baseline in the COPPI trial, (iii) severe mental illness in the caregiver (with psychosis given as an example). Note depression and anxiety to clinical levels were acceptable given the aims of the study to recruit a diverse group of families), (iv) if the child was in foster care, (v) if they were on the child protection register and (vi) if the caregiver through whom the programme was to be delivered had insufficient proficiency in the English language (informally assessed). The large geographical areas, advertising methods and inclusion criteria of the COPPI trial aimed to produce a sample that was as representative as possible of the whole population of families and children living with pre-school ADHD symptoms.

Additional inclusion criteria for the thesis study (quality of delivery) were the availability of video-taped or audio-taped recordings for a minimum of 7 therapist-delivered NFPP sessions (with the assessment session being part of this tally) and no more than one missing recording in a row from consecutive therapeutic sessions delivered. This latter criterion was harder to assess due to the number of sessions being delivered not always equating to recordings available. Additional sources of information were used to maximise accuracy, such as dates listed on therapist time sheets compared to dates making-up the file name and the date the file was time-stamped as being uploaded into digital storage. Where it was

unclear if there was a gap between sessions or whether sessions were given but not recorded and/or not uploaded, the conversation at the end of one session and the beginning of another was sometimes explored in advance of collection. Other issues in applying the inclusion criteria, were mis-filed recordings and/or mislabelled ones and these were re-explored continuously to see if more complete cases could be included.

Selection of 7 or more sessions as the cut-off for inclusion was decided upon for pragmatic reasons. Firstly continuous, uninterrupted recordings were required to ensure delivery of targets for change at each level were assessed directly and did not need to be extrapolated from references to unseen/heard missing sessions. Secondly, enough contact time was required to ensure therapists had the opportunity to deliver the fundamental basics of the NFPP processes of change. This requires applying teaching pedagogy (such as the layering of factual, conceptual and strategic information under a given area/principle) as well as ADHD related theory around priorities of change to optimise effectiveness. An example of this is the need to improve the parent-child relationship (in terms of trust and mutual respect) before applying more punitive aspects of behavioural theory (e.g. sanctions or time out). Thirdly, the COPPI trial paper quoted engagement figures at a cut-off of 8 sessions implying this was seen for both NFPP and IY as “enough” treatment (McCann et al., 2014). Originally this was the plan for inclusion in the thesis study, however lowering this to 7 sessions resulted in an additional 7 subjects able to be included without, anecdotally, affecting the saturation point of programme content being delivered. For this reason both number of sessions and total length of time over which the therapist delivered material were included in the analysis.

4.3 NFPP Intervention and Delivery

The NFPP is a manualised programme based on behavioural strategies delivered through the parent to replace known ADHD negative processes with protective, positive alternatives. These are individually adapted to the family through an initial assessment process to identify targets of change according to several interim processes known to affect ADHD prognosis long term (see; ADHD Causality section, Chapter Three). Manualised factual information is delivered through the therapist in session with the support of a NFPP DVD produced to be aligned to the manualised material. Modelling by the therapist and additional homework tools such as episode diaries are used to help the parent become the child's "guide and trainer". Generic therapeutic methods and therapist knowledge around ADHD and living with this are additional methods applied. Training to become an NFPP therapist provider for the COPPI trial involved a 3-day face-to-face training course with ongoing supervision from the original programme developers. Video or audio recording of sessions was used to aid this supervision process. The NFPP programme material was originally designed to be delivered over 8 weekly sessions of 1 hour, face-to-face in the family home (excluding the assessment session). This was extended to a possible 12 weeks to allow for recapping of information, slower delivery requirements or any problems with scheduling due to the hard to reach and difficult to treat nature of the population. Weekly delivery of all the NFPP material was still designed to be completed by 8 weeks with two of these scheduled to involve the child being present. These were a practice therapist-led play session followed by a parent-led equivalent the next week. This material was recorded (with parental permission) then used to feed back to the parent in subsequent sessions. A second child-based session could be repeated in the last 4 sessions (9-12) if this number of sessions was able to be achieved.

4.4 Measures

There is a published protocol for the COPPI trial that details all of the measures used in the study (McCann et al., 2014). Below is a summary of the measures used in this secondary reanalysis and important discussion points relevant to this thesis.

4.4.1 Demographic Variables

Demographic data extracted from the COPPI trial database included (i) child age (ii) maternal age (iii) whether parent classifies as “single parent” status (iv) parental education and (v) household weekly disposable income.

Child age was calculated in years based on the date on which the child was randomised minus their birth date. Parental age is also presented in years using the same reference date. Single parent status was self-declared and assumed to reflect a parent not living full time with a partner: this was not reflective of whether any live-in partner was or was not the child’s biological parent as this was not explicitly asked. Parental education was measured as the highest level of qualification obtained under the UK system and was collected in a way that made it comparable to the grouping system applied in the UK census for the same data type (for a relevant example see; ONS, 2011). Assessing a household’s income was done through the question “What category would best describe your total weekly income? That is what you actually get in each week to spend on living costs?” with 4 intervals: (i) £200 or below. (ii) £201 - £250. (iii) £251 - £300. (iv) £301 or above. The average (median) disposal income from UK Department of Work and Pensions data in 2013 (halfway through the COPPI trial 2-year recruitment) was approximately £470 per week before housing costs and £400 after (Office of National Statistics, 2015). Both of these are representing dimensions or elements of social hierarchy that either individually or in

combination may reflect a person's actual or perceived status in society. This is in contrast to other measures of socio-economic position such as employment status which are non-hierarchical in nature (Galobardes et al., 2007).

4.4.2 Swanson, Nolan and Pelham ADHD Symptom Rating Scale SNAP-IV (SNAP-IV; Swanson, 1992)

The primary outcome measure for this study was the SNAP-IV via parent report to assess ADHD symptom count and frequency/severity in children. The behavioural descriptors presented in the measure mirror those in the categorical diagnostic criteria systems.

However, it is primarily thought of as a screening tool rather than a diagnostic measure (Hall et al., 2016) and has been utilised mainly to assess populations over the age of 6 years (Lúcio et al., 2022). It is an 18-item scale with 9 items assessing the frequency of behaviours attributable to inattention and 9 items assessing the same for impulsivity and hyperactivity combined. These are scored on a 4-point scale: Not at all [0], Just a little [1], Often [2] and Very often [3]. This gives a total score (range 0 to 54) or can be presented as an average item score (possible range 0 to 3: Swanson et al., 2012).

For psychometric properties see cited papers (Bussing et al., 2008; Swanson et al., 2012) The sensitivity of SNAP to treatment effects has been repeatedly demonstrated both in isolation and in combination with other measures of ADHD treatment effectiveness (Pelham et al., 2005; Solanto et al., 2001).

Internal consistency of the 18 item SNAP-IV for the COPPI trial was good at time 1 (valid n=286, Cronbach's $\alpha=.892$) and excellent at time 2 (valid n=215, $\alpha=.937$) and time 3 (valid n=175, $\alpha=.945$: reporting Cronbach's alpha based on non-standardised items as the responses for all items of the SNAP-IV are the same).

4.4.3 Snap-IV – Oppositional/Defiant Disorder (ODD) Symptoms (Swanson, 1992)

The SNAP-IV has an optional additional 8 items describing the symptoms used to diagnose ODD under, at the time, DSM-IV criteria (American Psychiatric Association, 1994). Scoring is the same as that for the ADHD symptoms reflecting how often the symptom is seen on a 0 -not at all to 3 - very often interval scale (maximum total score of 24). The 8 items are thought to reflect three symptom dimensions: irritability, defiance towards authority figures and vindictiveness/spitefulness. Factor analysis of the SNAP-IV as a whole (ADHD and ODD symptom items – 26 total) puts ODD as a single dimension with the 3-factor solution (inattention, hyperactivity/impulsivity and oppositional/defiant) for the best model fit (Bussing et al., 2008). This is important in terms of exploring ADHD and ODD in terms of treatment outcomes because, although highly co-existing, the two conditions appear to reflect different behavioural constructs. When analysed individually the 8 ODD items best load onto a three factor solution from traditional research (Stringaris & Goodman, 2009): although see following citations (Aebi et al., 2010; Cavanagh et al., 2017) for other solutions.

For psychometric properties of the SNAP-IV ODD scale or similar measures in preschool children see references (Bussing et al., 2008; Keenan et al., 2007). Issues such as differences between teachers and parents in the way they conceptualize/categorize a certain behavioural type (Munkvold et al., 2009) and gender differences in this regard (Lúcio et al., 2022) have been explored in pre-school populations and are important to keep in mind.

Internal consistency of the 9 ODD items from the SNAP-IV for the COPPI trial subjects was good at time 1 (valid n=303, Cronbach's α =.891) and excellent at time 2 (valid n=240,

$\alpha=.931$) and time 3 (valid $n=181$, $\alpha=.945$: reporting Cronbach's alpha based on non-standardised items as the responses for all items of the SNAP-IV are the same).

4.4.4 Current Symptom Scale (CSS) to Assess Parent ADHD (Murphy & Barkley, 1996)

This is a self-report, questionnaire-based method of assessing ADHD symptom count and frequency/severity in adults (Murphy & Barkley, 1996) and is the original version of the now frequently used Barkley Adult ADHD Rating Scale–IV (BAARS-IV: Barkley, 2011). Item wording directly reflects the DSM-IV symptom descriptors with 9 questions for inattentive symptoms, 6 for hyperactive and 3 for impulsive-type behaviours (although adjusted to be applicable to adults). The scoring is similar to the SNAP-IV (see above).

For the psychometric properties of the CSS for adults presenting with ADHD symptoms see Gomez et al., (2011)

Internal consistency of the 18 item CSS at time 1 for the COPPI trial subjects was excellent (valid $n=295$, Cronbach's $\alpha=.908$)

4.4.5 The General Health Questionnaire (GHQ; Goldberg et al., 1997)

The GHQ originally was designed as a 60-item self-administered questionnaire to aid a two-stage screening process for “minor psychiatric disorder” in 1970 (Goldberg et al., 1970). The GHQ-12 was taken from the highest 12 items in terms of having a significant difference in the endorsement of these by those without any diagnosable (ICD/DSM) mental health disorder (“non-case”) versus those with significant psychiatric disease (“case” or distinguishing “caseness”) according to a clinical interview schedule (Goldberg et al., 1970; Goldberg et al., 1997).

The scoring method used in the COPPI trial was the Likert method. This gives 4 possible answers scored at 0-3 respectively with some positively and some negatively scored items. There is discussion that measurement bias can be introduced from negatively phrased questions specifically when using the Likert method of scoring. This supported by psychometric data and relevant theory (Hankins, 2008; Shevlin & Adamson, 2005).

For the psychometric properties of the GHQ-12 with a UK population see (Hardy et al., 1999) and (Donath, 2001).

Internal consistency of the 12 item GHQ at time 1 for the COPPI trial subjects was good (valid n=306, Cronbach's $\alpha=.886$)

4.5 The NFPP Quality of Delivery Measure

4.5.1 Development

Some of the author groups and papers that influenced the development of the measure are as follows; The leader observation tool (Eames et al., 2008), a meta-analytic review of the core components of PLIS to treat externalising behaviour (Kaminski et al., 2008), barriers/enhancement to attendance and engagement (Kazdin & Wassell, 1999), applying this in terms of the "person centre approach" to programme design and implementation (Yardley et al., 2015) and understanding learning and instruction in healthcare and behavioural change (Wolf et al., 2009)). This and other research led to various distinctions in terms of the core components and methods of change behind the NFPP: First, this thesis author (CET) felt that the role of generic therapeutic techniques (for example those covered in the LOT measure cited above) were critical for effective delivery of the NFPP and that these were augmented by the therapist modelling the strategies they wished the parent to

model for the child. However, these were integral across the whole delivery and separate from the targets for change and therefore did not need specific inclusion in the measure. Second, that these targets for change in the NFPP were mainly based on the underlying processes by which environmental and ADHD specific factors interacted to protect or worsen a child's underlying lifelong genetic risk level for ADHD (Hanf, 1972; Patterson et al., 1975; Sonuga-Barke, 2002; Sonuga-Barke et al., 2003; Van der Oord & Tripp, 2020). The evidence for these targets for change is presented in Chapter One of this thesis. Third, delivering these targets for change were dependent upon both factual based teaching/instruction and imparting of conceptual based information. The former of these allowed parents to identify what they were trying to change and why changing it was important to their child's outcomes and the latter was how the change was going to be made. There was a final level of delivery that is debated both amongst the NFPP team and in the fidelity literature: is it the therapist's job and/or is it necessary to ensure the parent has the skills to operationalise changes before moving on (Bellg et al., 2004)? Furthermore, should evidence of this treatment enactment be present before treatment ends and, theoretically, do some changes have to be made before others can be instigated. One of the principles of the NFPP that reflects that last point is that establishing a safe, trusting, positive and mutually respectful relationship between parent and child is necessary (target for change 2) before moving on to more punitive methods of behavioural management. The latter refers to the use of natural consequences, sanctions and, as a last resort in the NFPP, time out-type processes to eliminate some unwanted behaviours the child shows (target for change 7). This layered and somewhat sequential delivery process resulted in the Quality of Delivery (QofD) measure structure that can be seen in the appendix (see Page 2).

4.5.2 Content

This measures QofD of each of the ten key processes of change within the NFPP. These processes were identified by a thorough review of the New Forest Parenting Programme theory, content/materials, therapist training and instructional and therapeutic delivery methods. The processes are; (1) Psychoeducation, (2) Parent child emotional relationship, (3) Effective communication, (4) Prevention and de-escalation with sub-sections of (i) Routines, (ii) Boundaries and (iii) Managing time and change, (5) Modelling self-regulation and positivity, (6) Parent child working relationship, (7) Addressing aggressive and coercive cycles of behaviour and finally, (8) Generalising, extending, sustaining and transferring skills. These were all deemed essential to cover for each individual family in order for therapists to have fully adhered to optimum NFPP fidelity (Schoenwald et al., 2011).

Within each of these there were three distinct steps required to impart knowledge and explain strategies for parents in behavioural interventions of this type:

Mentioning – Whether relevant facts and concepts have been discussed and labelled appropriately for the individual family for future use in discussions and change processes

Exploring/explaining - Identifying what needs to be changed for each individual family, helping the parent identify relevant episodes when unwanted behaviours are occurring using functional analysis methods. From there the therapist can then explaining why change needs to occur and what this entails and explore how that family is going to do this using NFPP strategies.

Change - The process by which the therapist successfully supports the parent through the process of operationalising the strategies used to replace current non-constructive patterns of behaviour with alternative ADHD-protective ones.

This latter stage was not included as part of the measure score but was used to aid differentiation between therapist delivery and parental application when coding. In addition there were unresolved discussions with key NFPP developers around (i) whether processes of change are stand alone or if some areas need to be addressed before change can be achieved in other processes delivered in later sessions and (ii) to what degree it is important to assess whether parents are effectively applying strategies that may have been effectively delivered in theoretical terms, especially when they may appear resistant on the surface to exploring certain areas during sessions. An example of this is addressing parent-child emotional relationship and parental attributions (Process of change 2) in a positive non-critical direction early on in the programme: is this a fundamental step before a therapist can effectively support the parent using more punitive strategies such as time out and sanctions for unwanted behaviour (Process of change 7)?

Each level had a descriptor allowing for the rater to identify exchanges between therapist and parent when this process of change was being addressed and gives indicators about the content of discussion that rates that level of delivery being marked as met. Threshold of completion of a “level” was based on coder interpretation with no specific endpoints stated in the measure. The data in this study were the auditory exchanges between therapist and parent (and child if present in the session) along with non-verbal aspects of communication and observed behaviour.

4.5.3 Scoring

There were 10 targets for change. Each target had 3 mentioning levels and 4 explore levels (with change levels not being used as part of the quality of delivery score). One point was given for each mentioning level reached, with a single bonus point if all three mentioning

points for a target for change were done (sub-total mentioning levels of 4 points). Each explore level was worth 1, 2, 3 and 4 points consecutively with a bonus point being received if these were delivered in order (given at least 2 were delivered-sub-total for exploring levels was 11 points). That gave a total possible score of 15 for each of the 10 targets for change with 150 being the maximum score.

Internal consistency of the 10 item Quality of Delivery measure for the 47 thesis study subjects was good (valid $n=47$, Cronbach's $\alpha=.897$).

4.5.3.1 Intra-rater reliability

Intra-rater reliability was assessed on 9 families selected randomly but based on an equal proportion from the first ($n=40$, December 2020 to December 2021) versus second period of data collection ($n=7$, November & December 2022). The second period of collection came from the decision to lower the number of sessions required for inclusion from 8 to 7 to increase numbers. Recollection took place from July to October 2023). ICC estimates and associated 95% confident intervals were calculated using the SPSS statistical package version 28 (SPSS Inc, Chicago, IL) based on single measurement ($n=2$) with absolute agreement expected using a 2-way mixed-effects model. Table 12 shows these values for the total quality of delivery score and those for the individual Targets for Change.

For the total scores the ICC was 0.921 indicating excellent reliability based on this alone (see Table 12). The 95% confidence interval for this value was 0.702 to 0.982 however which could put reliability into the moderate range only. Looking at the ICC for individual Targets for Change these fell into three main categories.

Table 12: A table showing the intra-rater reliability on test-re-test of the Quality of Delivery (QofD) measure: this was applied to all available sessions/recordings for 9 subjects meeting the inclusion criteria from of the NFPP arm of the COPPI trial.

		95% Confidence Interval		F Test with True Value	
	Intraclass Correlation	Lower Bound	Upper Bound	Value	Sig
QofD total score	0.921	0.702	0.982	22.781	<.001
Psychoeducation	0.897	0.614	0.976	16.809	<.001
Parent-child emotional relationship	0.362	-0.304	0.805	2.162	.148
Effective Communication	0.840	0.429	0.962	10.348	.002
Routines	0.939	0.755	0.986	28.575	<.001
Lowering unwanted behaviour using...:					
Behavioural boundaries	0.164	-0.333	0.685	1.499	.290
Managing time and change	0.702	0.091	0.925	5.209	.016
Positive Reciprocal P-C interaction	0.757	0.281	0.938	7.358	.005
Scaffolding and play	0.353	-0.379	0.807	2.037	.167
Lowering behaviour using natural consequences and improving self-regulation	0.707	0.142	0.925	5.536	.013
Generalising, extending, sustaining and transferring strategies long-term	0.744	0.243	0.935	6.725	.007

First were those that were both low and not significantly alike over and above chance (parent-child emotional relationship, lowering unwanted behaviour using behavioural boundaries and scaffolding and play). Second were those that were significantly alike when re-rated but with large 95% confidence intervals with lower limits well below any acceptable level of reliability (managing time and change, positive reciprocal P-C interaction, lowering behaviour using natural consequences and improving self-regulation and generalising, extending, sustaining and transferring strategies long-term). That left three targets for change that seemed to be rerated using this measure by the same rater in this population to

a moderate to good level of reliability over and above chance; Psychoeducation (ICC=0.897, 95%CI: 0.614 to 0.976, $p<.001$) and Lowering unwanted behaviour using routines (ICC=0.939, 95%CI: 0.755 to 0.986, $p<.001$). Effective Communication was potentially an acceptable target for change also in this study using the above criteria (ICC=0.840 95%CI: 0.429 to 0.962, $p=.002$).

It was in the initial plan to apply individual Targets for Change to outcome measures to explore the relative importance of different processes. In addition there was the plan to use related measures in the COPPI trial to assess the validity of different Targets for Change, for example Expressed Emotion for Parent Child Emotional Relationship. However these intra-rater reliability measures along with missing data in the COPPI trial meant that any analyses done in this respect would be both selective and exploratory in nature.

4.5.3.2 Inter-rater reliability

No inter-rater reliability was carried out although it was in the original study plan. This was due to needing to move on within the study timeline and the burden of resources needed for someone to carry this out. Complete analysis of the delivery of the NFPP to a single family required an average of 455 minutes of data. The ability to reliably rate families using a measure of this type between personnel is vital to its translation into useful clinical practice and would need to be done if this was the long-term plan. Therefore it is unclear as to whether someone other than the creator would be able to apply it reliably.

4.6 Procedure

4.6.1 COPPI Trial

Data were collected in the COPPI trial at three-time points; baseline (Time 1 [T1]) at the time of consent. Post-treatment (Time 2 [T2] at about week 14) and follow-up (approximately 6 months after treatment had ended; Time 3[T3]). Most questionnaires were administered by trained research staff who were blind to treatment allocation and conducted in the parents' own home for all time points.

After main screening and randomisation those allocated to receive the NFPP had an initial welcome and introduction meeting by the therapist to whom they were assigned. This was not recorded as consent for treatment and future taping of sessions was only taken at this point. The first NFPP treatment session (of the 12 that were recommended for each family) was longer than the others (90 minutes as opposed to the recommended 60 minutes) and was, on the most part, audio- rather than video- recorded only. This was deemed less intrusive and more conducive to the building of the therapist-parent relationship at the start. Subsequent sessions were intended to be video recorded and uploaded in a timely fashion to an online secure sever at each site.

All the therapists who delivered the NFPP were experienced in working with children and families with mental health needs and received training for the NFPP specifically as outlined earlier. However, the level of experience delivering therapy of any kind, level of ADHD understanding and specific knowledge of managing or treating children with ADHD was very varied. Qualifications varied from family support worker level to clinical psychology practitioners.

NFPP content fidelity was assessed using structured observation of the recorded sessions of

the complete programme period i.e. all sessions, for 5 participants from each site (n=15 in total, 11.2%). The details of the numbers of recorded participants/sessions available to choose from, how these were selected (e.g. proportion of tapes selected per therapist and how this was related to the proportion of families the therapist saw) and how the selected families varied in terms of programme delivery factors (e.g. number of sessions that were documented as being delivered to an individual family versus the number of recordings actually available for review) was not reported. Fidelity was assessed as 70% for the NFPP and this was based on a pre-existing checklists for each session (see Appendix [Page 18](#)), denoting the facts and concepts and skills/strategies for change to be delivered per session (Sonuga-Barke et al., 2018).

4.6.2 Thesis study

4.6.2.1 Randomisation for screening and collection

Each participant was assigned a number and then the collection order determined from a generated random numbers table. Whether or not participants met the inclusion criteria (7 complete session recordings available including the assessment session, with no more than 1 missing session) was then determined. A complete sampling method was applied with all sessions listened to from start to finish. This was done in the order in which sessions were delivered. Finally all sessions were listened to for a family until all levels in all Targets for Change were completed or the programme delivery for that family ended.

4.6.2.2 Data identification

The data tended to divide itself into periods of exchange between present parties that could be assigned to a single Target for Change at any one time. Once these had been identified, the level[s] to which the therapist had already reached was checked and the content of the

check boxes either side of this were reviewed to aid decision making re further levels being checked off. If an exchange between therapist and parent [+/- child or other parental/family figures] may have been applicable to more than one Target for Change the most relevant one was selected. Overall, to ensure consistent decision-making regarding thresholds for checking off a level within a Target for Change, notes were made early on with reasonings behind the decisions. Labels were used to allow reference back to similar data exchanges when they came up next time round.

4.6.2.3 Collecting and documenting the quality of delivery

Two methods of documenting QofD results for each participant were used. One was an ongoing data base (see example in Appendix [Page 8](#)) with key details for each data point made: (i) Data point (all). (ii) Data point (participant). (iii) Participant ID. (iv) Tape number. (v) Session number ("1" being the assessment session and "2" the first session of delivery. These were labelled differently by different therapists on tape recordings and in session attendance calculations). (vi) Whether video and audio or just audio. (vii) Date of collection. (viii) Time on the video at which the level was reached. (ix) Which TforC and which level has been reached (using a series of 100 columns which had each TforC 10 levels filled in with a different colour. These reference colours were also used in all other relevant documents e.g. the measure itself and the individual participant "plates"; see below). (x) Who was present (mum, dad, child). Finally, (xi) notes as mentioned above.

The second concomitant method of documenting data collection for each participant was a visual "plates" system (see example in Appendix [Page 10](#)). This was a 10 by 10 grid with the ten targets for change as the rows and each level as the columns. Once a data point was added to the main database the relevant box in the plate was checked off and the data

point (all) number was entered below it. This used conditional formatting so that the level only “coloured [itself] in” when it had been checked off. Once an exchange was identified as referring to a certain TforC it was then quick to identify which level on the measure was currently under consideration for being met. This then allowed quick reference to the measure content (also colour coded) to see if the therapist was indeed moving the parent on in their delivery process from that piece of data. Both the database and the plates system also allowed for cross reference to ensure that the number of levels checked off married up with the number of data points recorded at the end of each individual family collection. A final triple check was whether the coloured boxes in the data base showed the same final level had been reached compared with the plates. Overall, this meant that the following could be elicited for each participant: (i) if a level had been checked off, (ii) when it was checked off for both (a) session of delivery and (b) time within the session, (iii) the order in which levels were checked off (denoted by the overall data point reference numbers which were sequential) during delivery. Although potentially beyond this thesis, this method of documenting when within sessions certain TforC and levels were reached will also provide useful information about fidelity to the intended order of delivery and how the speed of effective delivery (number of sessions taken to reach each level) varies between participants and with different TforCs.

Once a therapist had completed the measure for the participant or all data had been exhausted, final tallies and additional information was uploaded onto a central SPSS file which would be used to combine QofD data with other measures from the COPPI study.

4.6.2.4 Data preparation

SNAP: ADHD as measured by the SNAP can give two sub-scale scores (hyperactivity/impulsivity and inattention). However due to low power, missing data and the exploratory nature of the analysis, a decision was made to use the combined score only. This is further supported by the debate around the effectiveness of parenting interventions to specifically treat the inattentive ADHD sub-type.

4.6.2.5 Quantity of Delivery - Time in Minutes Delivered

Time in minutes was calculated for each subject using time sheets submitted by therapists as part of their routine trial and pay related paperwork.

4.6.2.6 Quantity of Delivery - Number of Sessions Completed

Number of sessions completed was taken from multiple sources; time sheets above, reported session attendance from the COPPI database and, when there was a discrepancy from recorded files available also.

4.7 Statistical Analysis

Regression analysis was chosen for this thesis study for two main reasons: firstly the power available was not adequate enough for multivariate methods. Secondly, although using more complex methods allowing for the nesting of different factors may be appealing, we still do not know enough about how ADHD related variables interact at the individual nor group level. Therefore cutting these down using extant theory and exploratory data analysis versus retaining them all is preferable, especially when the focus is on quantity and quality in this thesis study. Finally regression analysis will allow the individual contribution of attendance and quality of delivery on individual variation in outcome to be explored.

4.7.1 Dependent variable selection

Despite debates around the role of interim outcomes (e.g. parental behaviours/style), child ADHD behaviour reduction was seen as the primary outcome by parent report. This was looked at for both immediate post intervention reduction and delayed reduction (to look for sleeper effects). Due to both the high level of ODD in the COPPI population and due to industry debates around the need to reduce ODD in order to improve household conflict before ADHD symptoms are able to be addressed, ODD was also applied as a primary outcome/dependent variable. Intention to treat methods were used and last-value-carried-forward was used to fill in missing values. Change in ADHD and ODD were calculated and baseline ADHD or ODD was included to allow for the influence on amount of change based on the initial value.

4.7.2 Independent variable selection:

As per regression theory, exploratory data analysis was used to look at the relationship of the independent variables with both the dependent variable[s] and each other. Initially the degree of missing data amongst all the possible COPPI variables and time points were explored. Both of these factors (missingness and the relationship of independent variables) were explored at several levels to allow for understanding the role of baseline variables on first outcomes (without delivery factors) then with quantity and quality of delivery as dependent variables before the final analysis.

On analysis the amount of missing data was a significant limiter to inclusion of variables.

One possible pathway of measure validation was to explore whether change in certain intervention process variables over the period of intervention delivery correlated with quality of delivery of the relevant target for change. However with the exception of parent-

child emotional relationship at time 1 (missing 1.5% of NFPP subjects at T1 but 30.1% at T2), none of the other moderator or mediator variables included in the COPPI trial had acceptable levels of data available. Interestingly despite this high level of missing data, the Little's test of missingness completely at random was not significant when including all 38 variable and time point measures for the 133 NFPP-arm individuals (Chi-Square = 3131.507, DF = 3286, Sig. = .973). The level of missing data for the demographic and socio-economic data was very low.

Correlation of independent variables with each other was explored: The best circumstances for regression are when the IVs are strongly correlated with the DV but not with each other. Over and above the level of missing data, parental mental health measured using the General Health Questionnaire-12 item version was highly positively correlated with parental ADHD total scores (on the Current Symptom Scale: Pearson's $\rho = .413$, $p < 0.001$). As a result only parental ADHD was included, and this was deemed more relevant given parental attributions and capacity for change in PLIs to treat ADHD in their child. Family environment using a proxy measure of family stress (through the family stress index 5 item version) is an important concept in terms of ADHD severity and capacity for change. This had a moderately high level of missing data (17.3%) but also was correlated with parental mental health using the GHQ (both at time 1 from parent report; $r = .228$, $p = .017$), suggesting some of the variance in both variables was shared. Finally correlation of most of the included baseline variables with quantity of delivery (when measured by both session number and total time over which delivered) were high, hence the decision to explore these relationships first before doing the full regression analysis against the change scores. Only quantity of delivery and baseline severity of child behaviour (ADHD or ODD relatively) were correlated with behaviour change scores over both T1 to T2 and T1 to T3.

The final selection of dependent variables to include were; age of caregiver, highest grade of education obtained, parental ADHD, weekly disposable household income, baseline severity of child behaviour (ADHD or ODD to match independent change variable), quantity of delivery (one or other of Number of Sessions or total time over which programme was delivered) and quality of delivery.

Possible variables not included were; child temperament, child development, externalising symptoms using another measure (ECBI), observed impulsivity (cookie delay task), observed parent-child interaction, parental motivation to change, family stress levels, parent-child emotional relationship (expressed emotion) and parent-therapist relationship (Working Alliance Inventory).

4.7.3 Outliers

There were significant outliers (11 participants at more than 3 standard deviations from the mean) when looking at the four change scores for all the NFPP participants and the distributions of all the four dependent variables significantly deviated from a normal distribution. These were positively skewed with more outliers having significantly larger reductions in child symptom severity ($n=8$) than having increases post intervention period. In addition the majority of the participants with outlying large reductions in child symptom severity were retained in the thesis study sample as could probably be expected. These were not removed.

4.7.4 Statistical approach

Regression analyses using the enter method were carried out with independent variables being those identified as significant in the association exploratory data analyses and with

dependent variables being the following: (a) The 4 change score combinations (n=133); ADHD or ODD behaviour AND time 1 (pre-intervention) to time 2 (immediately post-intervention) or time 1 to time 3 (6-months post-intervention end). (b) Quantity of delivery (n=133). (c) Quality of delivery (n=47; both with and without quantity of delivery also included. Finally, (d) change scores (DEPENDENT) with Quantity and quality of delivery and baseline variables (INDEPENDENTS) for the thesis study population only (note relatively low power n=47). After initial data exploration only intention to treat [ITT] population outcomes were used: this was for clarity in presentation and due to there being no major differences in findings between analyses when using either data handling method (ITT versus only those with complete data available).

4.7.5 Regression assumptions

(Tabachnick & Fidell, 2007)

Linearity: Plotting the dependent variable[s] against the independent variables revealed no evidence of curvilinear or other non-linear relationships, although the absence of a clear linear relationship must also be noted.

Outliers: Significant outliers for the ADHD and ODD change scores were present both in sample of NFPP arm of COPPI and in the thesis only sample. The latter contained only change scores in the highly negative direction (i.e. a large reduction in child symptom severity) as to be expected anecdotally: these participants had greater attendance than those who could not be included. These were not removed as this would have further lowered our sample size.

Normality of dependent variables and residuals: The 4 change scores (ADHD and ODD both for time 1 to time 2 and time 1 to time 3) were not normally distributed in the full NFPP COPPI sample but were (with the exception of ODD T1 to T3) in the thesis subjects. Residual plots for the three regression runs (1-independents; baseline variables vs. dependents: change scores, 2-baseline and quantity [sessions or time] vs. Change scores, 3-baseline, quantity [sessions or time] and quality [total score]) showed the following patterns: (a) histograms of the NFPP COPPI residuals sample show an element of negative skewness that is worse for those regressions including quantity measured by total time [vs. sessions] and (b) Flatter (negative kurtosis) distributions in the thesis sample participants, worse in the change scores for delayed follow up (i.e. T1 to T3). The P-P plots of standardised residuals and scatterplots of residuals plots did not show severe heteroscedasticity, however.

Multicollinearity: Examination of the correlation tables for each of the three regression runs showed no independent variables that were highly correlated (i.e. no “r” values greater than 0.8). Some were correlated and see earlier for the reasoning behind inclusion.

4.7.6 Implication of Exploratory Data Analysis for hypothesis testing in this thesis study

The null hypothesis in this thesis study is that measuring quality of delivery of a parent led intervention to treat ADHD in children does not explain a significant proportion of the variation in outcome measures (using child symptom severity change scores).

Type I error: The chances of finding a statistical relationship between quality and outcome when in practice one doesn't exist may be affected in this study due to the lack of primary registration of the hypothesis and intended statistical analysis. However the randomised nature of the trial, the selection of variables for inclusion and methods of analysis used were

led from the data itself and no retrospective analysis changes were carried out, minimising the risk.

Type II error: Due to the amount of missing recordings only approximately half of the NFPP arm of the COPPI trial could be included in the thesis study. This reduced the power of the study and inflated the change of a type II error i.e. accepting the null hypothesis where a relationship between quality of delivery and outcome does in fact exist.

Both types of error may have been affected because inter-rater reliability of the measure was not carried out and that it is a bespoke measure with no reliability and validity data published. However the magnitude and direction of the effect on error type cannot be estimated.

The small proportion of variation in outcome from parent led interventions for ADHD explained by any variables in this study and the literature in general further adds to the possibility of statistical error in studies of this type. Further-more, the overlapping nature of the concepts included in social research and measurement errors/tool validity is another important factor to consider.

For all these reasons the results of this thesis study are seen as exploratory only.

4.8 Ethics

Ethical approval for the original COPPI trial was obtained from the NHS research ethics committee (approval number - 11/SC/0391. See Appendix [Page 11](#)). Consent was given by the parents in the original consent process for store of anonymised (pseudo- or truly- not specified) data for at least 15 years after the study had finished (see Appendix [Page 12](#)).

Consent for secondary analysis of stored data was made through the University of

Southampton Ethics and Research Governance Online (ERGO) system (reference number; 48454. See Appendix Page 13). This primary author has Visitor Status at Southampton University in order to access this data whilst complying with data protection. This was approved and informally supervised kindly by Professor Jana Kreppner during the entire period of this PhD.

Chapter 5: Results

The relevant results of this thesis study are laid out below. Association of baseline variables included in this study were explored for inclusion in regression analyses at several points in the process: (i) For those whose had complete data available [CDA] at time 2 (n=109) versus those who did not (n=24) (ii) and the same for those with CDA at time 3 (n=99) versus those who did not (n=34). (iii) Against change scores (for both symptom types – ADHD & ODD, for both time frames – T1 to T2 and T1 to T3 and for those with CDA only and using an intention to treat approach – see results – Chapter Five) for the whole NFPP arm (n=133). (iv) Against quantity of delivery using both number of sessions attended and time over which a therapist delivered all the sessions to each family (from time sheets). (v) Against those who were able to be included in Study 3 (n=47) versus those who could not (n=86).

Finally regression analysis was carried out in three stages; (i) looking at how baseline variables and quantity of delivery (independents) explains outcome (change scores – dependents) using the whole NFPP arm of the COPPI trial (n=133), (ii) then looking specifically at how baseline variables either including or not including quantity (independents) explains quality of delivery (dependents) from only those participants included in thesis study (n=47) and finally (iii) the full regression analysis (n=47) with baseline variables, quantity and quantity (independents) against ADHD/ODD change scores (dependents).

The null hypotheses for the three regression analyses were the following:

1. That combining ADHD/ODD relevant baseline factors and quantity of delivery will not be adequate to explain a significant proportion of the variation in ADHD/ODD

change scores following receipt of the NFPP programme in the NFPP-arm of the COPPI trial sample population

2. That ADHD/ODD relevant baseline factors with or without quantity of delivery will not be adequate to explain a significant proportion of the variation in quality of delivery of the NFPP programme as measured using the bespoke quality of delivery method developed for this study in the thesis study sample selected.
3. That adding quality of delivery into the regression model will still not be sufficient to explain a significant proportion of the variation in ADHD/ODD change scores from the NFPP using the thesis sample population.

5.1 Recruitment, Randomisation and Trial Attrition

From the original 336 participants in the COPPI trial, 133 were randomized to the New Forest Parenting Programme arm under the intention to treat protocol (McCann et al., 2014).

The flow of participants through the trial is shown in Figure 2:

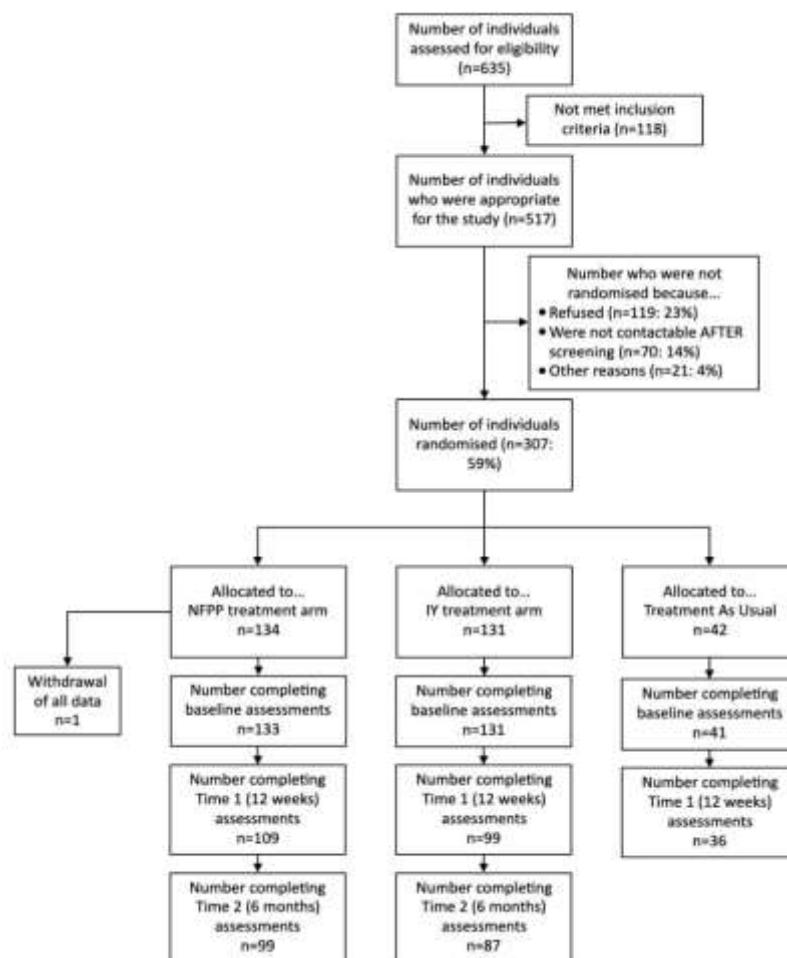


Figure 2: The PRISMA diagram showing the flow of recruitment, assessment, randomisation and completion of the COPPI trial; a comparison of the New Forest Parenting Programme with Incredible Years and a Treatment as Usual control group.

5.2 Sample Characteristics (NFPP arm n=133)

Table 13 shows the demographic and ADHD relevant characteristics for the whole NFPP arm of the COPPI trial (n=133). The average age of the child was 3.61 years (SD 0.58) with the ratio of males to females being representative of the ADHD population at 3.16:1 (boys; n=101, 76.9% and girls; n=32, 24.1%).

Table 13: Baseline characteristics of the NFPP arm of the COPPI trial (total n=133).

Variable or factor	Descriptive Stats
Characteristics of caregiver receiving intervention	
Age - Mean (Standard Deviation - SD)	29.95 (6.51)
Female gender (%)	128 (96.2%)
Single parent status (%)	41 (31.3%) ^a
Graduate level education (%)	15 (11.5%) ^b
School to 16 no qualifications	23 (17.7%)
School to 16 GCSE's/ 'O' levels	38 (29.2%)
Highers, Scotvec or NVQ's	32 (24.6%)
Sixth form school or college 'A' levels	22 (16.9%)
University degree	13 (10.0%)
Professional or postgraduate degree	2 (1.5%)
Parental ADHD (Binary/group: Number scoring 5 or more items in inattention and/or hyperactive/impulsive subtypes, %)	8 (6.1%)
Parental mental health – GHQ-12 total score - mean (SD)	14.89 (5.71)
Parental mental health: GHQ-12 (total score >=11 - %)	100 (75.2%)
Characteristics of individual child	
Age – mean (SD)	3.61 (0.58)
Female gender (%)	32 (24.1%)
ADHD symptom count/severity at baseline - SNAP parent reported average item score [AIS] – mean (SD)	2.06 (0.51)
ODD symptom count/severity at baseline - SNAP parent reported AIS - mean (SD)	2.03 (0.69)
Environmental factors	
Disposable income in £s per week - median (Inter-Quartile range)	£255 (£170->£300) ^c

Variable or factor	Descriptive Stats
£200 or below	37 (29.4%)
£201 - £250	24 (19.0%)
£251 - £300	22 (17.5%)
£301 or above	43 (34.1%)

ADHD - Attention Deficit/Hyperactivity Disorder; CSS - [Barkley's] Current Symptom Scale GHQ - General Health Questionnaire; ODD - Oppositional/Defiant Disorder; SNAP - Swanson Nolan And Pelham questionnaire.

Missing values: a=2 b=3 c=7

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

From the DISC-IV (Lucas et al., 1998; Shaffer et al., 2000), 75.9% (n=101) had an ADHD diagnosis of combined-subtype, 21.9% (n=29) hyperactive/impulsive and 2.3% (n=3) inattentive. The levels of oppositionality were high with 78.9% (n=105/133) of the individual children recruited into the NFPP arm of the trial meeting DSM-IV criteria for Oppositional Defiant disorder.

Characteristics of the parents of the individual children receiving the NFPP arm of treatment showed that; (i) most primary parent recipients of the intervention were female (n=128/133, 96.2%), (ii) with an average age of 29.95 years (SD 6.51), (iii) with a relatively low level of graduate education (n=15/130, 11.5%) along with (iv) household disposable income with a median value of £255 (Inter-Quartile range: £170->£300). (v) The proportion of parents self-identifying as single was in line with population-norms at the time (n=41/131, 31.3%). However (vi) parental mental health of the NFPP sample in COPPI was poor with 75.2% (100/133) of the sample scoring 11 or more (Piccinelli et al., 1993; Politi et al., 1994) using the Likert method for scoring with the General Health Questionnaire and (v)

9.0% (12/133) of the primary carers had indications of significant adult ADHD symptom levels from the Current Symptom Scale.

5.3 ADHD and ODD Outcomes in the NFPP Arm (n=133)

5.3.1 Missing Data Evaluation

SNAP-IV outcome scores (ADHD AND ODD) were available for 109 (82%) children directly post intervention (Time 2). The mean time between pre-programme SNAP measure and that post intervention for the COPPI NFPP arm (n=109) was 23w 2d, Standard Deviation (SD) 4w 6d. Children with missing data for time 2 SNAP-IV ADHD and ODD symptom counts (n=24) had parents who were on average significantly younger than those without (n=109; mean parental age for those with missing SNAP-IV data 27.33 years, SD 5.71 vs. T2 data available 30.53 years, SD 6.56; $t=2.210$, $p=.029$). These two groups did not differ significantly in mean value/distribution for any other baseline variable included in this study.

SNAP-IV scores were available at Time 3 for 99 (74.4%) of the 133 randomised to NFPP. This was aimed to be measured 6 months after conclusion of programme delivery: the mean (n=94) was 23w 4d, SD 4w 0d (taken as the time between SNAP at time 2 and at time 3). Those who did or did not have SNAP-IV data for Time 3 did not vary significantly in any of the baseline variables. There was a trend of those with missing SNAP-IV T3 data having lower weekly disposable income compared to those returning T3 SNAP-IV data $z=-1.765$, $p=.078$, $n=126$).

Note the following values were substituted for both ADHD and ODD analysis in the ITT results; time 2 with time 1 values (n=24) and time 3 with either T1 if both were missing (n=19) or with T2 when it was available (n=15) results substituted. There were 5 participants

for whom time 2 values for SNAP-IV parent report were not available but time 3 were. As the complete case analyses and intention to treat (ITT) analyses produced similar results throughout only the ITT results are presented.

5.3.2 Change in ADHD and Odd Child Behaviour Across All Three Time Points

A repeated measures ANOVA using change in child ADHD behaviour measured using parent reported SNAP-IV questionnaire outcomes across all three time points showed a significant within-subjects effect of time ($n=133$, $F[2,131]=36.731$, $p<0.001$. Partial $\eta^2=.218$). This showed a large effect size as interpreted from the partial eta squared results (Levine & Hullett, 2002).

Repeating this analysis for child ODD behavioural change produced the same results and effect size magnitude ($n=133$, $F[2,131]=31.962$, $p<0.001$. Partial $\eta^2=.195$).

5.3.2.1 Change in ADHD and ODD outcomes from time 1 to time 2

Change scores for T1 to T2 and for T1 to T3 were calculated for both child ADHD and ODD symptoms from the SNAP-IV by subtracting Time 1 scores from Time 2 or 3 scores so that more negative scores represent greater improvement in symptoms.

Table 14: A table showing; (i) the outcome data for ADHD and ODD at time one (T1-pre-intervention) (ii) Time two (T2-immediately post intervention) and (iii) Time three (T3-6months post intervention end) for the whole of the NFPP arm of the COPPI trial (max n=133) and the change scores (T1 to T2 and T1 to T3)

	Time 1 (n=133)	Time 2 (n=109)	Time 3 (n=99) [§]	Change (T1toT2)	Change (T1toT3)
SNAP-IV ADHD					
Mean (SD)	2.06 (0.51)	1.75 (0.66)***	1.75 (0.68)***	-0.31 (0.53)	-0.32 (0.56)
Median (Range)	2.17 (2.28)	1.72 (2.72)	1.72 (1.00)	-0.17 (2.78)	-0.23 (0.61)
SNAP-IV ODD					
Mean (SD)	2.03 (0.69)	1.66 (0.81)***	1.71 (0.86)***	-0.37 (0.63)	-0.32 (0.68)
Median (IQ Range)	2.13 (2.50)	1.63 (3.00)	1.75 (1.38)	-0.25 (3.13)	-0.12 (0.74)

ADHD-Attention Deficit/Hyperactivity Disorder IQ-inter-quartile ODD-Oppositional Defiant Disorder SNAP- Swanson Nolan And Pelham SD-standard deviation

*** $P < 0.001$

[§] Significance of Time 3 values are calculated against time 1/baseline

There was a significant improvement in ADHD symptoms (for means and SDs see Table 14) from pre-intervention (T1) to immediately post intervention with a medium effect size (n=133, Paired samples $t=6.818$, $p < .001$. $d=.59$). For ODD symptoms the reduction from T1 to T2 including was also significant with a medium effect size comparable to that for ADHD symptoms (n=133, $t=6.911$, $p < .001$. $d=.60$).

In addition to the changes score, the reliable change index was calculated using the Jacobson and Truax method (1992). This looks at the change scores in an outcome measure and assesses what proportion of the sample can be thought of making a reliable change by comparing variation in the sample values with that in published population norms. An inter-correlation coefficient from the Bussing et al. data set (2008) was taken as 0.8.

(See Table 15) For ADHD T1 to T2; 34% made a reliable improvement (n=37 of 110, 23 missing values), 64% showed indeterminant change (n=70) and 3% showed a reliable deterioration (n=3). For ODD T1 to T2; 25.5% reliable improvement (n=27 of 106, 27 missing

values), 72% showed indeterminant change (n=76) and 3% showed a reliable deterioration (n=3).

Table 15: A table showing the outcome data for ADHD and ODD at time one two and three the change scores.

	ADHD T1 to T2	ODD T1 to T2	ADHD T1 to T3	ODD T1 to T3
Reliable improvement	n=37 (34%)	n=27 (25.5%)	n=29 (29%)	n=19 (19.2%)
Indeterminate change	n=70 (64%)	n=76 (71.7%)	n=68 (68%)	n=77 (77.8%)
Reliable deterioration	n=3 (3%)	n=3 (2.8%)	n=3 (3%)	n=3 (3.0%)
Total	110	106	100	99
Missing	23	27	33	34

ADHD-Attention Deficit/Hyperactivity Disorder; IQ-inter-quartile; ODD-Oppositional Defiant Disorder; SNAP- Swanson Nolan And Pelham; SD-standard deviation; T1 to T2 - Time 1 (pre-intervention) to Time 2 (immediately post intervention); T1 to T3 - Time 1 to Time 3 (6-months post-intervention end)

5.3.2.2 Change in ADHD and ODD outcomes from time 1 to time 3

Repeating the analyses for the 6-month outcome measures (T3), found both child behavioural outcomes were significantly improved with only slightly lower effect sizes than the post-intervention (T2) measure. Reduction in ADHD scores using SNAP-IV from T1 to T3; n=133, $t=6.549$, $p<.001$. ES .57. Reduction in ODD from T1 to T3; n=133, $t=5.476$, $p<.001$. ES .47.

Reliable change for ADHD T1 to T3; 29% made a reliable improvement (n=29 of 100, 33 missing values), 68% showed indeterminant change (n=68) and 3% showed a reliable deterioration (n=3). For ODD T1 to T3; 19% reliable improvement (n=19 of 99, 34 missing values), 78% indeterminant change (n=77) and 3% reliable deterioration (n=3).

5.3.2.3 Factors associated with improvement in outcomes (child ADHD and ODD)

between T1 and T2

ADHD T1 to T2 change scores were unrelated to any of the included baseline demographic, socioeconomic or ADHD relevant variables in this study (see Table 16).

ODD change T1 to T2 were not significantly associated with any of the baseline variables.

The relationship with child's ODD symptom severity at baseline was close to significance but not at threshold ($n=133$, $\rho=-0.165$, $p=.058$).

5.3.2.4 Factors associated with improvement in outcomes (child ADHD and ODD)

between T1 and T3

ADHD T1 to T3 change scores were unrelated to any of the included baseline demographic, socioeconomic or ADHD relevant variables in this study (see Table 16). There was a trend towards a negative association between child ADHD symptom severity at baseline (T1 SNAP-IV ADHD levels) and outcome: children with more severe baseline ADHD symptoms tended to have greater improvements in their ADHD symptoms between time 1 and time 3 ($\rho=-0.147$, $p=.092$, $n=133$).

ODD change scores T1 to T3 were not significantly associated with any of the baseline variables. There was a negative trend with baseline ODD symptom severity: Higher ODD at baseline was associated with a greater improvement in ODD symptoms between T1 and T3 ($\rho=-0.162$, $p=.062$, $n=133$). In addition, there was a trend towards an association of parental mental health with ODD change score from T1 to T3 when using GHQ score as a continuous variable ($n=133$, Spearman's $\rho=0.161$, $p=0.063$).

Table 16: Association of baseline characteristics of the whole NFPP COPPI arm with outcome change scores. Spearman's correlations (continuous or ordinal variables) or Z scores from Mann-Whitney U tests (nominal/binary).

Variable or factor	n=	ADHD T1toT2	ODD T1toT2	ADHD T1toT3	ODD T1toT3
Characteristics of caregiver receiving intervention					
Age (Continuous: Years)	133	-0.068	-0.002	-0.103	-0.009
Female gender (Binary: male or female)	133	-0.256	-0.738	-0.350	-1.141
Single parent status (Self-declared: Yes or No)	131	0.022	1.1037	0.328	0.726
Graduate level education (Ordinate variable)	130	-0.073	0.051	-0.144	-0.012
Parental ADHD: (Continuous: Total score CSS - symptom count and severity)	133	-0.012	-0.020	0.012	0.105
Parental ADHD (Binary/group: Number scoring 5 or more items in inattention and/or hyperactive/impulsive subtypes)	132	-1.702 Δ	-1.008	-0.158	1.092
Parental mental health (Continuous: GHQ-12 total score mean (SD))	133	0.033	0.072	0.043	0.161 Δ
Parental mental health: (Binary/Group: GHQ-12 total score ≥ 11 or < 11)	133	-.511	-.661	-.746	-.913
Characteristics of individual child					
Age (Continuous: Years)	133	0.054	0.033	0.042	0.089
Female gender (Binary: male or female)	133	0.262	0.122	0.551	-0.008
Baseline ADHD severity (Total score SNAP - symptom count and severity)	133	-0.136	-0.042	-0.147 Δ	0.002
Baseline ODD severity (Total score SNAP - symptom count and severity)	133	0.029	-0.165 Δ	0.059	-0.162 Δ
Environmental factors					
Disposable income (Ordinate variable)	126	-0.046	0.004	-0.023	-0.012

ADHD - Attention Deficit/Hyperactivity Disorder; CSS - [Barkley's] Current Symptom Scale GHQ - General Health Questionnaire; ODD - Oppositional/Defiant Disorder; SNAP – Swanson Nolan And Pelham questionnaire; ; T1 to T2 - Time 1 (pre-intervention) to Time 2 (immediately post intervention); T1 to T3 - Time 1 to Time 3 (6-months post-intervention end)

Missing values: a=2 b=3 c=7

$\Delta P < 0.1$ * $P < 0.05$ ** $p < 0.01$ *** $p < 0.001$

5.3.3 Relationship Between Quantity of Intervention and Outcomes (ADHD and ODD) at Time 1 and Time 2

5.3.3.1 Quantity of intervention descriptives

The mean number of sessions attended was under the 8 sessions used to define programme completion (mean attendance =7.81, SD 3.50 – see Table 17). The mean number of minutes over which therapists took to deliver all the sessions to an individual family was 653 (SD=301) with a similar medium value donating a symmetrical distribution. The standard deviation was relatively large. The average session length from timesheets was 81.40 mins (SD=16.94). Number of sessions given by therapists to each individual family was a composite of therapist report, COPPI trial database variable and number of files available (n=133). Time as a quantity of delivery variable was obtained from time sheets filled in by therapists and was available for 130 participants (total n=130).

Table 17: A table showing the attendance engagement and completion data for the NFPP group along with quantity of programme delivery proxy variable.

Variable	Descriptive Stats
Number of sessions (n=133)	
Mean (SD)	7.81 (3.50)
Median (IQ range)	8.0 (3.0)
Range	0-13
Number of Individuals attending... (n=133)	
...0 sessions	9 (6.8%)
...1-6 sessions	23 (17.3%)
...7 sessions	12 (9.0%)
...8 or more sessions	89 (66.9%)
Number of files available to collect data from (n=133)	
0 files	42 (31.6%)
1-6 files available	44 (33.1%)
7 files available	11 (8.3%)
8 files available	36 (27.1%)
Total time of delivery in minutes (from timesheets n=130)	
Mean (SD)	653 (301)
Median (IQ range)	685 (335)
Range	0 to 1605
Average session length in minutes (n=124)	
Mean (SD)	81.40 (16.94)
Median (IQ range)	82.58 (67.64-90.15)
Range	40-150.5

IQ-inter-quartile NFPP-New Forest Parenting Programme SD-standard-deviation

5.3.3.2 Factors Influencing Quantity of Intervention Received (Maximum N=133)

5.3.3.2.1 Number of sessions attended

Out of the baseline variables included in this study two were associated with quantity of delivery using number of sessions attended (see Table 18); weekly disposable income (as an ordinal variable) in a positive direction (as the level of weekly disposable income went up the number of sessions parents attended also went up - $\rho=.279$, $p=.002$, $n=126$) and parental ADHD levels reaching diagnostic levels in a negative direction (those with parents with diagnostic levels of ADHD, 5 or more symptoms self-reported at "often" or "very often" in either inattention and/or hyperactive/impulsive sub-scales, receiving less sessions than those without - $z=-3.035$, $p=.002$, $n=132$). There were statistical trends towards parents who received more sessions being older ($\rho=.166$, $p=.056$, $n=133$), having higher level of education ($\rho=0.148$, $p=0.094$, $n=130$) and lower level of ADHD symptom count/severity total score at baseline ($\rho=-.114$, $p=.097$, $n=133$).

Table 18: Associations of attendance by session number and time over which all session were delivered with baseline demographic psychosocial and ADHD relevant variables and each other.

Variable or factor	Relationship to attendance FROM...		
	...number of sessions	...time sessions delivered over	...average session length
Characteristics of caregiver receiving intervention			
Age (Continuous: Years)	-0.166 ^Δ	-.206*	.195*
	133	130	124
Female gender (Binary: male or female)	0.573	-0.849	-2.030*
	133	130	124
Single parent status (Self-declared: Yes or No)	0.555	1.180	1.477
	131	128	122
Level of education (Ordinate variable)	-0.148 ^Δ	-0.064	-0.091
	130	127	121
Parental ADHD: (Continuous: Total score CSS - symptom count and severity)	-0.146 ^Δ	--0.109	0.077
	133	130	124
Parental ADHD (Binary/Group: Number scoring 5 or more items in inattention and/or hyperactive/impulsive subtypes)	-3.035**	-2.740**	-0.344
	132	129	123
Parental mental health (Continuous: GHQ-12 total score)	--0.039	--0.048	0.081
	133	130	124
Parental mental health: (Binary/Group: GHQ-12: total score >=11 or <11)	-0.336	-0.292	-0.584
	130	130	124
Characteristics of individual child			
Age (Continuous: Years)	-0.022	-0.034	-0.155
	133	130	124
Female gender (Binary: male or female)	-0.573	0.603	1.526151
	133	130	124
Baseline ADHD severity (Total score SNAP - symptom count and severity)	-0.017	-0.022	0.052
	133	130	124
Baseline ODD severity (Total score SNAP - symptom count and severity)	-0.092	-0.076	-0.004
	133	130	124
Environmental factors			

Variable or factor	Relationship to attendance FROM...		
	...number of sessions	...time sessions delivered over	...average session length
Disposable income (Ordinate variable)	-.279** 126	-.316*** 123	0.175 117
Programme delivery factors			
Attendance: Number of sessions	N/A	-.848*** 130	0.000 124
Time over which programme delivered - minutes (timesheets)	-.848*** 130	N/A	.474** 124
Average length of session: minutes	0.000 124	.474** 124	N/A
Outcomes			
ADHD Change score T1 to T2	-.196* 133	-0.162 ^Δ 130	-0.043 124
ODD Change score T1 to T2	-0.150 ^Δ 133	-0.113 130	0.011 124
ADHD Change score T1 to T3	-0.110 133	-0.057 130	-0.065 124
ODD Change score T1 to T3	-0.113 133	-0.101 130	-0.029 124

ADHD - Attention Deficit/Hyperactivity Disorder; CSS - [Barkley's] Current Symptom Scale GHQ - General Health Questionnaire; ODD -Oppositional/ Defiant Disorder; SNAP – Swanson Nolan And Pelham questionnaire.

$\Delta p < 0.1$ * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

5.3.3.2.2 Total length of time over which parent received intervention

Repeating this analysis using the total of time that therapists spent delivering sessions to an individual family (taken from timesheets) resulted in an even greater significant association with disposable income ($\rho=.316$, $p<.001$, $n=123$) and one of similar magnitude for parental ADHD reaching diagnostic levels ($z=-2.740$, $p=0.006$, $n=129$). In addition, with this measure of quantity of intervention, the association of older parents receiving more intervention became significant ($\rho=.415$, $p=.001$, $n=130$). Minutes of intervention were unrelated to education, parental ADHD symptoms nor parental wellbeing using the GHQ. These two measures of quantity of delivery, number of sessions and total time of programme delivery, were significantly correlated as expected ($\rho=.848$, $p<.001$, $n=130$).

5.3.3.2.3 Average session length

Finally looking at quantity of delivery in terms of average session length, parental age remained positively associated with this quantity delivery measure ($\rho=.195$, $p=0.030$, $n=124$). However parental ADHD levels to diagnostic significance ($z=-0.624$, $p=0.533$, $n=124$) and weekly disposable income ($\rho=0.175$, $p=0.059$, $n=117$) no longer did (although the latter was trending towards significance). Although the numbers in the “male” group were small ($n=5$), the gender of the parent participant primarily receiving the intervention became significantly associated with quantity using length of session; male parents were associated with significantly shorter sessions ($z=-2.030^*$, $p=0.042$, $n=124$). Length of session was associated significantly with the total length of time over which the programme was delivered ($\rho=.474^{**}$, $p<.001$, $n=124$) but not with the number of sessions that parents attended ($\rho=0.000$, $p=0.998$, $n=124$).

5.3.3.3 Association of Quantity of Delivery Measures and Outcomes Using Change Scores

5.3.3.3.1 Number of sessions attended

Time 1 to Time 2: Number of sessions attended was significantly negatively related to ADHD change T1 to T2 ($\rho=-.196$, $p=.024$, $n=133$) and trended towards this with ODD T1 to T2 ($\rho=-0.150$, $p=.085$, $n=133$): higher quantity of delivery predicting greater reduction in child ADHD/ODD symptoms.

Time 1 to Time 3: There was no relationship between quantity of delivery measured as number of sessions received and child ADHD nor ODD change scores from T1 to T3.

5.3.3.3.2 Total length of time over which parent received intervention

Time 1 to Time 2: Time over which the program was delivered trended towards being significantly negatively related to ADHD change T1 to T2 ($\rho=-0.162$, $p=.065$, $n=130$). This was not the case for ODD T1 to T2

Time 1 to Time 3: There was no relationship between quantity of delivery measured as time over which the program was delivered and child ADHD nor ODD change scores from T1 to T3.

5.3.3.3.3 Quantity of delivery (length of session) and outcomes

There was no relationship between length of session and any of the change scores.

5.3.3.4 Regression Analysis with Baseline Variables and Quantity of Delivery as the Independent Variables and Child EB Change Scores as the Dependent

Regression models were run with both number of sessions attended and time over which the program was delivered for each individual family as independent variables (see Table 19).

Baseline variables highlighted earlier as potentially relevant were included as independent variables in the regression: Age of caregiver (n=133), education level (as an ordinate variable, n=130), parental ADHD (continuous from total score of the CSS, n=133) and Weekly disposable income (ordinate, n=126). Baseline child symptom severity, either ADHD or ODD depending on the dependent variable, was included due to its association with child EB change scores (n=133).

Missing values; the three participants missing graduate level education values were also missing weekly disposable income. The 3 participants missing values for quantity of delivery (time) were different from the 7 missing income data. That gave n=126 for regressions involving quantity of delivery (sessions) and n=123 for those involving quantity of delivery (time).

All four assumptions for linear regression were met. There was a linear relationship between each independent variable and the dependent variable (on scatter plots; with no curvilinear relationships evident). Multivariate normality was found with the histogram of the residuals (difference between the observed and predicted values from the regression equation) showing a normal distribution. There was no multicollinearity between the independent variables with all correlation coefficients being below 0.80 and all variance inflation factors being below 10. Finally there was no evidence of homoscedasticity on the residual versus predicted value scatter plot.

Linear Relationship: The core premise of multiple linear regression is the existence of a linear relationship between the dependent (outcome) variable and the independent variables. This linearity can be visually inspected using scatterplots, which should reveal a straight-line relationship rather than a curvilinear one.

Multivariate Normality: The analysis assumes that the residuals (the differences between observed and predicted values) are normally distributed. This assumption can be assessed by examining histograms or Q-Q plots of the residuals, or through statistical tests such as the Kolmogorov-Smirnov test.

No Multicollinearity: It is essential that the independent variables are not too highly correlated with each other, a condition known as multicollinearity. This can be checked using:

1. Correlation matrices, where correlation coefficients should ideally be below 0.80.
2. Variance Inflation Factor (VIF), with VIF values above 10 indicating problematic multicollinearity. Solutions may include centering the data (subtracting the mean score from each observation) or removing the variables causing multicollinearity.
3. Homoscedasticity: The variance of error terms (residuals) should be consistent across all levels of the independent variables. A scatterplot of residuals versus predicted values should not display any discernible pattern, such as a cone-shaped distribution, which would indicate heteroscedasticity. Addressing heteroscedasticity might involve data transformation or adding a quadratic term to the model.

5.3.3.4.1 Number of sessions attended

Time 1 to Time 2 change scores as the dependent variable

Neither of the T1 to T2 regression models (see Table 19) significantly predicted child behavioural change when including sessions as the quantity of delivery variable: ADHD

T1toT2 - $F(6, 119)=1.752, p=.115. R^2=0.081, R^2_{Adj}=0.035$ and ODD T1toT2 - $F(6, 119)=2.078, p=.061. R^2=0.095, R^2_{Adj}=0.049$).

Quantity of delivery in sessions significantly predicted outcome in the T1toT2 ODD change model; $\text{Beta}=-0.185$, $t=-1.990$, $p=0.049$, with increasing number of sessions attended resulting in a significantly greater drop in child ODD symptoms between Time 1 and Time 2. This was not the case for ADHD although this did closely trend towards significance ($\text{Beta}=-0.185$, $t=-1.978$, $p=0.050$).

Initial severity of child behaviour (ADHD or ODD given the dependent variable in the regression) predicted outcome in both the T1toT2 ADHD ($\text{Beta}=-0.205$, $t=-2.248$, $p=0.026$) and ODD ($\text{Beta}=-0.260$, $t=-2.807$, $p=0.006$) change models (that included sessions) also. Higher severity of child behaviour at baseline led to a greater decrease in the same child EB from time 1 to time 2.

Table 19: A table showing the regression statistics FOR Baseline variables and quantity of delivery [INDEPENDENTS] predicting child externalising behaviour outcomes [DEPENDENT]

Statistics	ADHD change score T1toT2		ODD Change Score T1toT2		ADHD change score T1toT3		ODD Change Score T1toT3	
	Sessions	Time	Sessions	Time	Sessions	Time	Sessions	Time
Overall regression stats	F(6 119) =1.752 p=.115 R2=0.081 R2Adj=0.035	F(6 116) =1.519 p=.178 R2=0.073 R2Adj=0.025	F(6 119) =2.078 ^Δ p=.061 R2=0.095 R2Adj=0.049	F(6 116) =1.897 ^Δ p=.087 R2=0.089 R2Adj=0.042	F(6 119) =2.033 ^Δ p=.067 R2=0.093 R2Adj=0.047	F(6 116) =1.766 p=.112 R2=0.084 R2Adj=0.036	F(6 119) =2.343* p=.036 R2=0.106 R2Adj=0.061	F(6 116) =2.198* p=0.048 R2=0.102 R2Adj=0.056
Age of caregiver	b=0.027 t=0.282 p=0.778	b=0.027 t=0.274 p=0.784	b=0.032 t=0.339 p=0.736	b=0.034 t=0.353 p=0.725	b=-0.020 t=-0.208 p=0.836	b=-0.017 t=-0.180 p=0.858	b=-0.032 t=-0.340 p=0.734	b=-0.031 t=-0.329 p=0.743
Highest grade of education achieved (ordinal variable)	b=-0.097 t=-1.061 p=0.291	b=-0.104 t=-1.122 p=0.264	b=0.006 t=0.060 p=0.952	b=-0.001 t=-0.006 p=0.995	b=-0.151 ^Δ t=-1.664 p=0.099	b=-0.153 t=-1.653 p=0.101	b=-0.040 t=-0.431 p=0.667	b=-0.046 t=-0.486 p=0.628
Parental ADHD	b=-0.058 t=-0.635 p=0.526	b=-0.058 t=-0.619 p=0.537	b=-0.021 t=-0.227 p=0.821	b=-0.015 t=-0.165 p=0.869	b=0.011 t=0.120 p=0.905	b=0.022 t=0.238 p=0.812	b=0.111 t=1.227 p=0.222	b=0.112 t=1.216 p=0.226
Weekly disposable household income (ordinal variable)	b=0.027 t=0.277 p=0.782	b=0.029 t=0.294 p=0.769	b=0.037 t=0.389 p=0.698	b=0.040 t=0.408 p=0.684	b=0.005 t=0.058 p=0.954	b=0.006 t=0.065 p=0.949	b=0.059 t=0.613 p=0.541	b=0.059 t=0.609 p=0.544
Baseline symptom count/severity (ADHD/ODD)	b=-0.205* t=-2.248 p=0.026	b=-0.209* t=-2.257 p=0.026	b=-0.260** t=-2.807 p=0.006	b=-0.267** t=-2.838 p=0.005	b=-0.255** t=-2.818 p=0.006	b=-0.259** t=-2.817 p=0.006	b=-0.284** t=-3.081 p=0.003	b=-0.289** t=-3.092 p=0.002
Quantity of delivery; No. of sessions	b=-0.185 ^Δ t=-1.978 p=0.050		b=-0.185* t=-1.990 p=0.049		b=-0.116 t=-1.246 p=0.215		b=-0.169 ^Δ t=-1.835 p=0.069	
Quantity of delivery; Total time		b=-0.152 t=-1.594 p=0.114		b=-0.147 t=-1.553 p=0.123		b=-0.060 t=-0.629 p=0.531		b=-0.142 t=-1.514 p=0.133

ADHD - Attention Deficit/Hyperactivity Disorder; F-Fishers exact test statistic; ODD - Oppositional/Defiant Disorder; R2Adj- R2Adjusted; T1 – Time 1 (pre-intervention) ; T2 – Time 2 (immediately post intervention); T3 – Time 3 (6-months post-intervention end)

Δ p<0.1 * p<0.05 ** p<0.01

Time 1 to Time 3 change scores as the dependent variable

There was a trend towards the T1 to T3 ADHD regression model (see Table 19) significantly predicting child EB change when including sessions as the quantity of delivery variable:

ADHD T1toT3- $F(6, 119)=2.033^{\Delta}$ $p=.067$. $R^2=0.093$, $R^2_{Adj}=0.047$.

The T1 to T3 ODD regression model significantly predicted variation in child EB when including sessions as the quality of delivery variable: ODD T1toT3 - $F(6, 119)=2.343^*$, $p=.036$. $R^2=0.106$, $R^2_{Adj}=0.061$.

Quantity of delivery in sessions trended towards significance T1toT3 ODD change model; $\text{Beta}=-0.169$, $t=-1.835$, $p=0.069$, in the same direction as with T1 to T2.

Initial severity of child behaviour (ADHD or ODD) predicted outcome in both the T1toT3 ADHD ($\text{Beta}=0.255$, $t=-2.818$, $p=0.006$) and ODD ($\text{Beta}=-0.284$, $t=-3.081$, $p=0.003$) change models, in the same direction as with T1 to T2,

Highest grade of education achieved (entered as an ordinal variable) was the only other included baseline variable that trended towards being a significant predictor for ADHD only - $\text{Beta}=-0.151$, $t=-1.664$, $p=0.099$: As parent's level of education increased there was a greater decrease in child ADHD from Time1 to Time 3.

5.3.3.4.2 Total length of time over which parent received intervention

Time 1 to Time 2 change scores as the dependent variable

Neither of the T1 to T2 regression models (see Table 19) significantly predicted child behavioural change when including time as the quantity of delivery variable: ADHD T1toT2 - $F(6, 119)=1.752$, $p=.115$, $R^2=0.081$, $R^2_{Adj}=0.035$, although there was a trend towards the

model explaining significant variance in change in child ODD behaviour from T1 to T2: ODD T1toT2 - $F(6, 119)=2.078, p=.061, R^2=0.095, R^2_{Adj}=0.049$.

Quantity of delivery as measure by time in minutes did not significantly predict change in either T1toT2 ADHD or ODD change models.

Initial severity of child behaviour (ADHD or ODD) predicted outcome (when quantity of delivery in time was included also) in both the T1toT2 ADHD (Beta=-0.209, $t=-2.257, p=0.026$) and ODD (Beta=-0.267, $t=-2.838, p=0.005$) change models, in the same direction as with T1 to T2.

Time 1 to Time 3 change scores as the dependent variable

The T1 to T3 ADHD regression model (see Table 19) was not significant when including time as the quantity of delivery variable: ADHD T1toT3- $F(6, 116)=1.766, p=.112, R^2=0.084, R^2_{Adj}=0.036$.

The T1 to T3 ODD regression model predicted a significant proportion of the variance in child EB when including sessions as the quality of delivery variable: ODD T1toT3 - $F(6, 116)=2.198, p=0.048, R^2=0.102, R^2_{Adj}=0.056$.

Quantity of delivery in time did not significantly predict change in either T1toT3 ADHD or ODD change models.

Initial severity of child behaviour (ADHD or ODD) predicted outcome (when quantity of delivery in time was included also) in both the ADHD T1toT3 (Beta=-0.259, $t=-2.817, p=0.006$) and ODD T1toT3 (Beta=-0.289, $t=-3.092, p=0.002$) change models, in the same direction as with T1 to T2.

5.3.3.4.3 Quantity of delivery (length of session) and outcomes

Repeating these regressions with mean length of session as the quantity of delivery variable did not change the pattern of results or significance of independent variables as outcome predictors (data available on request).

5.4 Thesis study: Quality of delivery of the NFPP and Outcome

5.4.1 Sample Characteristics: Those Included Vs Those Excluded in the Thesis Study

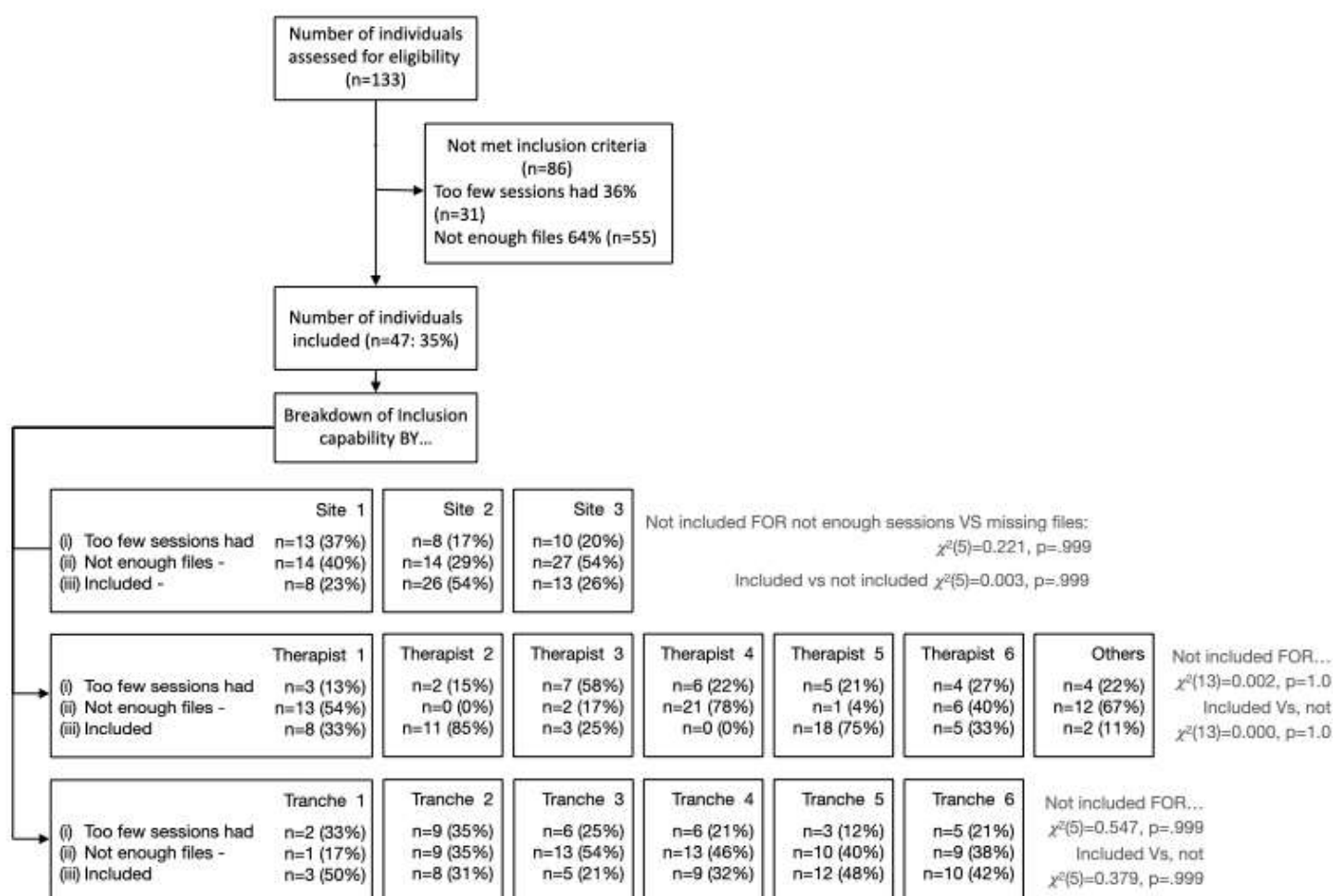


Figure 3: A flow diagram showing the availability of participants for the thesis study according to site, therapist and tranche (recruitment period over time). Further breakdown is presented as to why the participants were not able to be included.

Of the 133 randomised to the NFPP treatment arm in the COPPI trial, 101 (75.9%) had received a minimum of 7 sessions but only 47 (46.5%) of those met the inclusion criteria for availability of recorded sessions (i.e. [a] at least 7 recordings available with the assessment session being counted [b] these being complete sessions and not truncated early or started late and [c] with no more than 1 recording missing from consecutive sessions delivered). Thus, only just over a third (35.3%) of the participants randomised to receive the NFPP intervention met the inclusion criteria for the thesis study (see Figure 3).

Table 20: A table showing the mean (and standard deviation in brackets) of the change scores for child ADHD and ODD behaviours for both time periods BY site, therapist and tranche.

Factor	Change score				Numbers included
	ADHD T1toT2	ODD T1toT2	ADHD T1toT3	ODD T1toT3	
Site 1	-0.41 (0.49)	-0.47 (0.53)	-0.39 (0.44)	-0.33 (0.57)	n=35
Site 2	-0.36 (0.59)	-0.40 (0.72)	-0.40 (0.62)	-0.37 (0.74)	n=48
Site 3	-0.20 (0.49)	-0.28 (0.59)	-0.18 (0.56) ^Δ	-0.28 (0.70)	n=50
Total	-0.31 (0.53)	-0.37 (0.63)	-0.32 (0.56)	-0.32 (0.68)	n=133
Therapist 1	-0.34 (0.57)	-0.44 (0.57)	-0.34 (0.56)	-0.31 (0.66)	n=24
Therapist 2	-0.38 (0.52)	-0.43 (0.65)	-0.42 (0.63)	-0.33 (0.89)	n=13
Therapist 3	-0.26 (0.53)	-0.36 (0.66)	-0.27 (0.49)	-0.17 (0.46)	n=12
Therapist 4	-0.10 (0.50)	-0.22 (0.63)	-0.07 (0.53)	-0.24 (0.70)	n=27
Therapist 5	-0.39 (0.62)	-0.36 (0.85)	-0.47 (0.67)	-0.43 (0.82)	n=24
Therapist 6	-0.50 (0.45)	-0.56 (0.42)	-0.37 (0.35)	-0.30 (0.56)	n=15
Others	-0.33 (0.43)	-0.35 (0.46)	-0.38 (0.54)	-0.44 (0.58)	n=18
Total	-0.31 (0.53)	-0.37 (0.63)	-0.32 (0.56)	-0.32 (0.68)	n=133
Tranche 1	-0.19 (0.34)	-0.08 (0.32)	-0.27 (0.43)	-0.21 (0.48)	n=6
Tranche 2	-0.26 (0.45)	-0.37 (0.58)	-0.28 (0.56)	-0.33 (0.61)	n=26
Tranche 3	-0.17 (0.41)	-0.34 (0.68)	-0.26 (0.48)	-0.28 (0.60)	n=24
Tranche 4	-0.31 (0.47)	-0.35 (0.62)	-0.25 (0.43)	-0.41 (0.70)	n=28
Tranche 5	-0.58 (0.76)	-0.55 (0.74)	-0.51 (0.81)	-0.41 (0.90)	n=25
Tranche 6	-0.28 (0.50)	-0.34 (0.57)	-0.31 (0.49)	-0.21 (0.62)	n=24
Total	-0.31 (0.53)	-0.37 (0.63)	-0.32 (0.56)	-0.32 (0.68)	n=133

ADHD - attention deficit hyperactivity disorder; ODD - Oppositional Defiant Disorder; T1 to T2 - Time 1 (pre-intervention) to Time 2 (immediately post intervention); T1 to T3 - Time 1 to Time 3 (6-months post-intervention end)

Note: tranche refers to 6 consecutive periods of recruitment used to control therapist workload and stratify randomisation. Therapist and site are labelled and presented in a randomised order (not equating to publications or existing databases)

^Δ*p*<.10

Those able to be include versus those not able to be included and the reasons for not meeting the inclusion criteria (too few sessions had versus there not being enough files available to sample) did not vary significantly across site, therapist nor time/trial tranches. (Although there was a trend towards significance of ADHD change score T1 to T3 across sites; $F(2)=2.350$, $p=.099$).

Those able to be included in this study differed from those excluded on only one of the baseline variables (see Table 21). The mean level of ADHD symptom count and severity at baseline was significantly greater in those individuals included (mean average item score AIS SNAP-IV parent report=2.18, SD 0.38, $n=47$) than those who could not be included (mean AIS=2.00, SD 0.56, $n=86$. $t=2.212$, $p=0.029$, $n=133$). There was a trend towards included individual families having a higher disposable income than those not included, when applying income as an ordinal variable ($z=-1.859$, $p=.063$, $n=126$).

Table 21: Table showing the baseline demographic socioeconomic and ADHD relevant variables for the excluded group versus the included group in Study 3.

Variable	Thesis study...	
	Included	Not included $n=86$
Characteristics of caregiver receiving intervention		
Age – years Mean (SD)	30.47 (6.60)	29.67 (6.49)
Gender female (vs. Male only - binary) n (%)	45 (95.7%) ^a	83 (96.5%) ^a
Single parent - self declared n (%)	12 (26.1%)	29 (34.1%)
Education - to graduate level n (%)	6 (13.0%) ^a	9 (10.7%) ^b
Education - Highest Level attained		
School to 16 no qualifications	6 (13.0%)	17 (20.2%)
School to 16 GCSE's/ 'O'levels	13 (28.3%)	25 (29.8%)
Highers Scotvec or NVQ's	17 (37.0%)	15 (17.9%)
Sixth form school or college 'A' levels	4 (8.7%)	18 (21.4%)

University degree	4 (8.7%)	9 (10.7%)
Professional or postgraduate degree	2 (4.3%)	0 (0.0%)
Parental ADHD - CSS total score Mean (SD)	11.61 (9.14)	13.38 (9.81)
Parental ADHD: Number scoring > ADHD cutoff value n (%)	7 (14.9%)	14 (16.3%)
Parental mental health/wellbeing - GHQ total score. Mean (SD)	15.43 (5.99)	14.60 (5.57)
Parental mental health: Number scoring >=11 GHQ n (%)	36 (76.6%)	64 (74.4%)
Child characteristics		
Gender female n (%)	8 (17.0%)	24 (27.9%)
Age Mean (SD)	3.61 (0.58)	3.61 (0.59)
ADHD symptom severity (T1/Baseline) Mean (SD)	2.18 (0.38)	2.00 (0.56)*
ODD symptom severity (T1/Baseline) Mean (SD)	2.11 (0.62)	1.99 (.73)
Environmental factors		
Income - weekly household disposable		
£200 or below	9 (19.6%)	28 (35.0%)
£201 - £250	10 (21.7%)	14 (17.5%)
£251 - £300	7 (15.2%)	15 (18.8%)
£301 or above	20 (43.5%)	23 (28.7%) ^Δ

ADHD - Attention Deficit/Hyperactivity Disorder; CSS - [Barkley's] Current Symptom Scale GHQ - General Health Questionnaire; ODD - Oppositional/Defiant Disorder; SNAP - Swanson Nolan And Pelham questionnaire.

Missing values: a=1 b=2 c=6

^Δ $p < 0.10$ * $p < 0.05$

Looking at programme delivery factors (see Table 21), those who were included as expected had a significantly greater mean number of sessions attended (mean =9.77, SD 1.64, n=47) than those not included (mean=6.74, SD=6.74. n=86; $t = 6.385$, $p < .001$). Similarly using timesheet data, the time over which therapist delivered a participant's sessions was significant greater in those included (mean number of minutes 767, SD 214, n=44) than those not included (588, SD 324, n=83. $t = 3.790$, $p < .001$, n=130. The average session length

did not differ significantly between those who were able to be included (mean length =78.4 minutes, SD 15.7) and those who were not (mean=83.2, SD 17.5. $n=124$. $t=-1.536$, $p=.127$).

5.4.2 Inclusion Status and Child Outcome

5.4.2.1 Time 1 to Time 2

There was a significant difference in mean ADHD T1 to T2 change score with those included (mean average item reduction -0.49, SD 0.51) having a greater reduction in ADHD symptoms between Time 1 and time 2 than those not included (mean=-0.22, SD 0.52; $t=-2.900$, $p=.004$, $n=133$ – see Table 22). ANOVA equivalent stats: sig Time x group interaction ($F=8.412$, $p=0.004$).

There was a trend towards a significant difference in mean ODD T1 to T2 change score with those included (mean=-0.50, SD 0.65) having a greater reduction in ODD symptom reduction between Time 1 and time 2 than those not included (mean=-0.31, SD 0.60; $t=-1.753$, $p=.082$, $n=133$). ANOVA equivalent stats: trend towards sig Time x group interaction ($F=3.073$, $p=0.082$).

Table 22: A table showing programme delivery factors and outcomes across included and excluded individuals in the thesis study.

	Included (n=47)	Not included (n=86)
Programme delivery factors		
Number of sessions attended – Mean (SD)	9.77 (1.64)	6.74 (3.78) ***
Time over which all sessions were delivered (Timesheets) Mean (SD)	767 (214)	588 (324) *** ^a
Average length of session for that participant (minutes) Mean (SD)	78.4 (15.7)	83.2 (17.5) ^b
Outcomes		
ADHD Change score T1 to T2 (n=133) Mean (SD)	-0.49 (0.51)	-0.22 (0.52)**
ODD Change score T1 to T2 (n=133) Mean (SD)	-0.50 (0.65)	-0.31 (0.60) ^Δ
ADHD Change score T1 to T3 (n=133) Mean (SD)	-0.51 (0.58)	-0.21 (0.52)**
ODD Change score T1 to T3 (n=133) Mean (SD)	-0.48 (0.73)	-0.24 (0.64) ^Δ

ADHD - Attention Deficit/Hyperactivity Disorder; COPPI - Comparison of Preschool Parenting Interventions; Oppositional/Defiant Disorder;
Missing data: ^a 3 ^b 9

^Δ $p < 0.1$ ** $p < 0.01$ *** $p < 0.001$

5.4.2.2 Time 1 to Time 3

There was a significant difference in mean ADHD T1 to T3 change score with those included (mean=-0.51, SD 0.58) having a greater reduction in ADHD symptoms between Time 1 and time 2 than those not included (mean=-0.21, SD 0.52. $t = -3.103$, $p = 0.002$, $n = 133$ - see Table 22). ANOVA equivalent stats: sig Time x group interaction ($F = 9.631$, $p = 0.002$).

There was a trend towards a significant difference in mean ODD T1 to T3 change score with those included (mean=-0.48, SD 0.73) having a greater reduction in ODD symptom reduction between Time 1 and time 2 than those not included (mean=-0.24, SD 0.64; $t=-1.753$, $p=.082$, $n=133$). ANOVA equivalent stats: trend towards sig Time x group interaction ($F=3.880$, $p=0.051$).

5.4.3 Quality of Delivery Scores Descriptives

Table 23: A table showing the summary statistics for the total Quality of delivery (QofD) scores and the individual item scores for all the Targets for Change (TforC) for all included subjects in thesis study (n=47).

Variable	Mean	Standard Deviation	Minimum	Maximum	Item total correlation
QofD total score	118.66	27.85	51	150	Total $\alpha=.897$
TfoC1: Psychoeducation	12.87	3.22	3	15	0.641
TfoC2: Parent-child emotional relationship	13.77	1.95	7	15	0.497
TfoC3: Effective Communication	10.32	4.93	0	15	0.673
TfoC4: Lowering Routines	11.66	4.90	0	15	0.625
unwanted behaviour using...;	13.70	2.14	8	15	0.523
Behavioural boundaries	10.49	4.83	0	15	0.784
Managing time and change	12.28	3.17	5	15	0.700
TfoC5: Positive Reciprocal P-C interaction	11.02	3.70	3	15	0.576
TfoC6: Scaffolding and play	10.51	4.47	2	15	0.827
TfoC7: Lowering behaviour using natural consequences and improving self-regulation	12.04	3.93	3	15	0.729
TfoC8: Generalising extending sustaining and transferring strategies long-term					

The mean Quality of Delivery (QofD) score for therapists applying the New Forest Parenting Programme to the individuals included in this thesis study was 118.66 out of a maximum score 150 (SD 27.85, range 51 to 150, $n=47$). The individual item means and standard deviations are shown in Table 23.

Internal consistency for the measure items was good (Cronbach's $\alpha = .897$, 10 items). All items were moderately or strongly correlated with total score ($r \geq 0.5$)

5.4.4 Factors Associated with Quality of Delivery Total Score

Quality of Delivery score was significantly associated with several of the baseline continuous variables in the thesis study included participants (see Table 24); (i) parental age was positively correlated with QofD (Spearman's $\rho = .396$, $p = 0.006$, $n = 47$) with quality of delivery increasing with age. (ii) Single parents received lower quality of delivery ($z = 2.267$, $p = .023$, $n = 46$). (iii) higher level of education attained was significantly associated with higher quality of delivery ($p = .411$, $p = 0.005$, $n = 46$) (iv) Parental ADHD symptom count/severity was negatively correlated with QofD ($\rho = -.296$, $p = 0.043$, $n = 47$) with lower QofD associated with higher levels of parental ADHD symptomatology. Finally (v) increasing amounts of weekly disposal income in the household was significantly associated with higher QofD ($r = .438$, $p = 0.002$, $n = 46$).

Table 24: A table showing the associations of baseline characteristics of participants included in the thesis study against the Total Quality of Delivery score.

Variable or Factor	Distribution of variable...;		Association with Quality of delivery...	Missing
	(i) Across binary groups (mean [standard deviation])		... EITHER significantly correlated with variable	
	(ii) In those with high quality of delivery (greater than mean of 119) or low		OR significantly different across groups	
	(iii) Across different values of ordinal variable (mean [standard deviation])			
Characteristics of caregiver receiving intervention				
Parental Age	QofD>=119	<119		
	28.26 (7.44)	31.96 (5.61)	.396** (p=0.006)	0
Caregiver gender	Male	Female		
	96.50 (37.48)	119.64 (27.49)	0.950 (p=.389)	
Single parent status	Single parent	NOT single parent		1
	102.17 (32.40)	123.62 (24.11)	2.267* (p=.023)	
Graduate Education Had	HAS graduate level education	DOES NOT		1
	129.33 (18.67)	116.32 (28.72)	-1.012 (p=.329)	
Education as ordinal variable				
School to 16, no qualifications	97.17 (18.88)		8.622 (p=.125)	1
School to 16, GCSE's/ 'O' levels	112.54 (29.64)			
Highers, Scotvec or NVQ's	121.00 (30.62)			
Sixth form school or college, 'A' levels	137.50 (9.98)			
University degree	128.00 (18.92)			
Professional or postgraduate degree	132.00 (25.46)			
Parental ADHD total CSS	QofD>=119	<119		
	14.74 (11.40)	9.48 (6.64)	-.296* (p=0.043)	0
Parental ADHD: Number scoring > ADHD cutoff value >=5 symptoms	Yes	No		
	80.50 (24.37)	122.21 (25.61)	2.588* (p=.007)	

Variable or Factor	Distribution of variable...;		Association with Quality of delivery...	Missing
Parental mental health total GHQ	QofD>=119 15.53 (6.65)	<119 15.36 (5.62)		
Parental mental health: Number scoring >= 11 GHQ	Yes 118.91 (27.36)	No 118.00 (30.25)	-0.122 (p=0.415) -.095 (p=.924)	0
Characteristics of target child				
Child Gender	Male 116.44 (27.34)	Female 129.50 (29.66)	1.275 (p=.212)	
Child age	QofD>=119 3.41 (0.40)	<119 3.75 (0.64)	0.078 (p=0.600)	0
ADHD symptom count/severity at baseline - SNAP parent reported, average item score [AIS], mean (SD)	2.22 (0.36)	2.15 (0.40)	-0.123 (p=0.411)	0
ODD symptom count/severity at baseline - SNAP parent reported, AIS, mean (SD)	2.16 (0.58)	2.07 (0.66)	-0.172 (p=0.247)	0
Environmental factors				
Disposable income (as an ordinal variable)				1
£200 or below	89.11 (30.16)		11.118* (p=.011)	
£201 - £250	120.30 (25.59)			
£251 - £300	119.86 (34.54)			
£301 or above	129.25 (15.15)			
Programme Factors				
Attendance: Number of sessions	QofD>=119 9.21 (1.78)	<119 10.14 (1.46)	.432** (p=0.002)	0
Time over which programme delivered - minutes (timesheets)	697 (268)	816 (156)	.502** (p<.001)	0
Average session length (minutes)	54.21 (17.08)	56.19 (12.02)	0.286 ^Δ (p=0.051)	0

Variable or Factor	Distribution of variable...;		Association with Quality of delivery...	Missing
Outcomes				
ADHD Change score T1 to T2	-0.42 (0.46)	-0.54 (0.54)	-0.199 (p=0.179)	0
ODD Change score T1 to T2	-0.38 (0.65)	-0.58 (0.65)	-0.205 (p=0.166)	0
ADHD Change score T1 to T3	-0.43 (0.51)	-0.57 (0.63)	-0.111 (p=0.457)	0
ODD Change score T1 to T3	-0.35 (0.61)	-0.56 (0.80)	-0.099 (p=0.510)	0

ADHD - Attention Deficit/Hyperactivity Disorder; CSS - [Barkley's] Current Symptom Scale, GHQ - General Health Questionnaire; ITT-Intention to treat; ODD - Oppositional/Defiant Disorder; SD - Standard Deviation; SNAP - Swanson, Nolan And Pelham questionnaire.

^Δ p<0.1 *p<0.05 **p<0.01 ***p<0.001

5.4.5 Quality of Delivery and Quantity of Delivery

5.4.5.1 Quantity of delivery (sessions)

Total quality of delivery score was significantly positively associated with quantity of delivery using number of sessions received ($r=.432^{**}$, $p=0.002$, $n=47$. See Table 25).

All but three of the ten individual targets for change Quality of Delivery scores were significantly correlated with quantity of delivery in sessions. Those that were not correlated were the following: Parent-child [P-C] emotional relationship ($\rho=0.053$, $p=.726$. $n=47$), Lowering unwanted behaviour using behavioural boundaries ($\rho=0.215$, $p=.148$. $n=47$) and Positive reciprocal P-C interaction ($\rho=0.175$, $p=.241$. $n=47$).

Table 25: A table showing the correlations and significance levels for the quality of delivery [QofD] total scores and those for the separate Targets for Change within the measure. Also included is the relationship between the total and individual QofD scores with quantity of delivery (number of sessions). This is also referred to in the section “Quality of delivery and child outcomes” (N=47 for all).

		Quantity of delivery (sessions)	Quantity of delivery (sessions)	ADHD T1 to T2	ODD T1 to T2	ADHD T1 to T3	ODD T1 to T3
QofD total score		r=.432**	rho=.502**	r=-0.199	r=-0.205	r=-0.111	r=-0.099
		p=.002	p=<.001	p=.179	p=.166	p=.457	p=.510
TfoC1: Psychoeducation		r=.331*	rho=.351*	r=-0.202	r=-0.034	r=-0.078	r=0.041
		p=.023	p=.016	p=.172	p=.822	p=.600	p=.783
TfoC2: Parent-child emotional relationship		r=0.053	rho=0.093	r=-0.094	r=-0.212	r=-0.136	r=-0.120
		p=.726	p=.534	p=.531	p=.152	p=.363	p=.423
TfoC3: Effective Communication		r=.427**	rho=.457**	r=-0.201	r=-0.244 ^Δ	r=-0.210	r=-0.219
		p=.003	p=.001	p=.175	p=.098	p=.156	p=.140
TfoC4: Lowering unwanted behaviour using...;	Routines	r=.307*	rho=.390**	r=-0.149	r=-0.032	r=-0.174	r=0.056
		p=.036	p=.007	p=.318	p=.832	p=.242	p=.708
	Behavioural boundaries	r=0.215	rho=.347*	r=-0.035	r=-0.176	r=-0.009	r=-0.153
		p=.148	p=.017	p=.815	p=.237	p=.950	p=.303
	Managing time and change	r=.433**	rho=.483**	r=-0.119	r=-0.162	r=0.040	r=-0.004
		p=.002	p=<.001	p=.425	p=.277	p=.789	p=.979
TfoC5: Positive Reciprocal P-C interaction		r=0.175	rho=.399**	r=-0.041	r=-0.109	r=0.031	r=-0.092
		p=.241	p=.005	p=.787	p=.465	p=.837	p=.539
TfoC6: Scaffolding and play		r=.325*	rho=0.180	r=-0.274	r=-.330*	r=-0.204	r=-0.269 ^Δ
		p=.026	p=.225	p=.062	p=.023	p=.168	p=.068
TfoC7: Lowering behaviour using natural consequences and improving self-regulation		r=.427**	rho=.517**	r=-0.024	r=-0.112	r=0.154	r=0.013
		p=.003	p=<.001	p=.870	p=.454	p=.300	p=.929
TfoC8: Generalising extending sustaining and transferring strategies long-term		r=.298*	rho=0.278	r=-0.052	r=-0.021	r=0.059	r=-0.027
		p=.042	p=.059	p=.730	p=.888	p=.694	p=.859

ADHD - Attention Deficit/Hyperactivity Disorder; F-Fishers exact test statistic; ODD - Oppositional/Defiant Disorder; R2Adj- R2Adjusted;; T1 – Time 1 (pre-intervention) ; T2 – Time 2 (immediately post intervention); T3 – Time 3 (6months post intervention end)

^Δ P<0.10 *P<0.05 **p<0.01 ***p<0.001

5.4.5.2 Quantity of delivery (time)

Total quality of delivery score was significantly positively associated with quantity of delivery using programme time from timesheets ($r=.502^{**}$, $p<.001$, $n=47$ – see Table 25). Again, all but three of the ten individual targets for change Quality of Delivery scores were significantly correlated with quantity of delivery in sessions. However, those that were not differed from the associations with sessions as the quality of delivery measure: Parent-child [P-C] emotional relationship was also not correlated with time ($\rho=0.093$, $p=.534$, $n=47$). The other two though were Scaffolding and play ($\rho=0.180$, $p=.225$, $n=47$) and Generalising, extending, sustaining and transferring strategies long-term ($\rho=0.278$, $p=.059$, $n=47$) although this trended towards significance.

5.4.6 Regression Analysis with Quality of Delivery as the Dependent Variable (N=47)

A regression analysis was carried out with the baseline variables as above as independents (including both baseline child ADHD and ODD severity) first including quantity of delivery (sessions and time) and then without (see Table 26). All three had quality of delivery total score as the dependent. All the assumptions for linear regression were met. One participant included in the thesis study was missing all their baseline demographic and psychosocial data, but none were missing values for either quantity of delivery measure. This results in the total number included in all regressions being $n=46$.

Table 26: A table showing the regression statistics for regression models WITH all relevant baseline variables INDEPENDENTS with THEN without quantity (sessions OR time) AND quality of delivery total score as the DEPENDANT in all three.

	Quality WITH quantity (Sessions)	Quality WITH quantity (Time)	Quality: NO quantity
Overall regression stats	F(7, 38) =3.791 p=.003 R2=0.411 R2Adj=0.303	F(7, 38) =3.716 p=.004 R2=0.406 R2Adj=0.297	F(6, 39) =3.649 p=.006 R2=0.360 R2Adj=0.261
Age of caregiver,	B=.185 t=1.339 p=.188	B=.163 t=1.166 p=.251	B=.190 t=1.340 p=.188
Highest grade of education achieved	B=.070 t=0.454 p=.653	B=.132 t=0.857 p=.397	B=.097 t=0.619 p=.539
Parental ADHD	B=-.227 t=-1.598 p=.118	B=-.229 t=-1.611 p=.115	B=-.253 Δ t=-1.742 p=.089
Weekly disposable household income	B=.264 Δ t=1.866 p=.070	B=.231 t=1.532 p=.134	B=.354* t=2.589 p=.013
Baseline symptom count/severity (ADHD)	B=-.081 t=-0.572 p=.571	B=-.124 t=-0.878 p=.386	B=-.119 t=-0.824 p=.415
Baseline symptom count/severity (ODD)	B=.069 t=0.507 p=.615	B=.106 t=0.765 p=.449	B=.073 t=0.519 p=.607
Quantity of delivery; Number of sessions	B=.259 Δ t=1.825 p=.076		
Quantity of delivery; Time programme delivered over		B=.255 Δ t=1.731 p=.092	

ADHD - Attention Deficit/Hyperactivity Disorder; ODD - Oppositional/Defiant Disorder;

Δ p<0.1, * p<0.05, ** p<0.01, ***p<0.001,

5.4.6.1 Including quantity (sessions):

The overall regression model predicted a significant proportion of the variance in the quality of delivery score ($F[7, 38]=3.791, p=.003, R^2=0.411, R^2_{Adj}=0.303$). Weekly disposable income trended towards significantly predicting quality of delivery score in the model but did not reach significance ($Beta=0.264, t=1.866, p=.070$) as did quantity of delivery (sessions - $Beta=0.259, t=1.825, p=.076$). Both these had positive associations i.e. greater income and greater number of sessions attended trended towards/predicted higher quality of delivery.

5.4.6.2 Including quantity (time):

Repeating the model with time over which the programme was delivered as the quantity variable did not change the findings.

5.4.6.3 Not including quantity:

Repeating this model without a measure of quantity amongst the dependents worsened the model fit as shown by a lower adjusted R^2 ($F[6, 39]=3.649, p=.006, R^2=0.360, R^2_{Adj}=0.261$). However, it did change the pattern and the size/significance of the independent variable Beta coefficients: Weekly disposable income significantly predicted quality of delivery score in the model in a positive direction ($Beta=0.354, t=2.589, p=.013$). In addition, parental ADHD tended towards a negative predictive association with quality of delivery ($Beta=-0.253, t=-1.742, p=.089$), with higher levels of parental ADHD

5.4.7 Quality of Delivery and Child Outcomes:

Table 25 shows the correlation coefficients and significance levels for the total Quality of Delivery score against all four outcome measures (two EB types - ADHD and ODD, and two separate time intervals - T1 to T2 and T1 to T3). The same are also shown for each of the 10 individual targets for change.

The total Quality of Delivery score as quantified using the measure designed for this trial was not significantly correlated with any of the four change scores.

There were two targets for change that showed either significant associations with change scores or associations that approached significance.

Firstly, effective communication trended towards a significant negative association with ODD Time 1 to Time 2 change score ($r=-0.244$, $p=0.098$, $n=47$): Better quality of Effective Communication delivery being associated with greater reductions in ODD symptoms between T1 and T2.

Secondly Scaffolding and [ADHD targeted] play also had a significant negative association with ODD T1 to T2 change score ($r=-.330$, $p=0.023$, $n=47$): Better quality of Scaffolding delivery being associated with greater reductions in ODD symptoms between T1 and T2. In addition, Scaffolding also had a trend towards a significant negative association with ODD T1 to T3 ($r=-0.269$, $p=0.068$, $n=47$).

Table 27: A table showing the regression statistics FOR the final full linear regression analysis: Baseline variables & Quantity of delivery: sessions & Quality of delivery [INDEPENDENTS] predicting ADHD/ODD behavioural change between T1 to T2 or T1 to T3 DEPENDENT]

	ADHD T1 to T2		ADHD T1 to T3		ODD T1 to T2		ODD T1 to T3	
	Sessions	Time	Sessions	Time	Sessions	Time	Sessions	Time
Overall regression stats	F(7, 38) =0.598	F(7, 38) =0.570	F(7, 38) =0.479	F(7, 38) =0.819	F(7, 38) =0.846	F(7, 38) =0.672	F(7, 38) =0.758	F(7, 38) =0.873
	<i>p</i> =.753	<i>p</i> =.776	<i>p</i> =.844	<i>p</i> =.577	<i>p</i> =.557	<i>p</i> =.695	<i>p</i> =.625	<i>p</i> =.537
	R2=0.099	R2=0.308	R2=0.081	R2=0.362	R2=0.135	R2=.332	R2=0.123	R2=.372
	R2Adj=-0.067	R2Adj=0.095	R2Adj=-0.088	R2Adj=0.131	R2Adj=-0.025	R2Adj=0.110	R2Adj=-0.039	R2Adj=0.138
Age of caregiver,	B=.034	B=.037	B=-.061	B=.185	B=.184	B=-.039	B=.093	B=.110
	<i>t</i> =.193 <i>p</i> =.848	<i>t</i> =.212 <i>p</i> =.833	<i>t</i> =-0.346 <i>p</i> =.732	<i>t</i> =1.072 <i>p</i> =.291	<i>t</i> =1.075 <i>p</i> =.289	<i>t</i> =-0.222 <i>p</i> =.825	<i>t</i> =.538 <i>p</i> =.594	<i>t</i> =.640 <i>p</i> =.526
Highest grade of education achieved	B=-.043	B=-.050	B=-.024	B=-.141	B=-.135	B=-.038	B=-.148	B=-.158
	<i>t</i> =-0.229 <i>p</i> =.820	<i>t</i> =-0.263 <i>p</i> =.794	<i>t</i> =-0.124 <i>p</i> =.902	<i>t</i> =-0.784 <i>p</i> =.438	<i>t</i> =-0.755 <i>p</i> =.455	<i>t</i> =-0.201 <i>p</i> =.842	<i>t</i> =-0.821 <i>p</i> =.417	<i>t</i> =-0.883 <i>p</i> =.383
Parental ADHD	B=.193	B=.196	B=.189	B=.045	B=.046	B=.201	B=.093	B=.108
	<i>t</i> =1.084 <i>p</i> =.285	<i>t</i> =1.093 <i>p</i> =.281	<i>t</i> =1.051 <i>p</i> =.300	<i>t</i> =.257 <i>p</i> =.799	<i>t</i> =.265 <i>p</i> =.793	<i>t</i> =1.131 <i>p</i> =.265	<i>t</i> =.529 <i>p</i> =.600	<i>t</i> =.616 <i>p</i> =.541
Weekly disposable household income	B=.102	B=.081	B=.014	B=.100	B=.112	B=-.020	B=.149	B=.127
	<i>t</i> =.556 <i>p</i> =.581	<i>t</i> =.441 <i>p</i> =.662	<i>t</i> =.074 <i>p</i> =.941	<i>t</i> =.552 <i>p</i> =.584	<i>t</i> =.624 <i>p</i> =.537	<i>t</i> =-0.111 <i>p</i> =.912	<i>t</i> =.829 <i>p</i> =.412	<i>t</i> =.707 <i>p</i> =.484
Baseline symptom count/severity (ADHD/ODD)	B=-.196	B=-.187	B=-.181	B=-.226	B=-.231	B=-.192	B=-.217	B=-.241
	<i>t</i> =-1.164 <i>p</i> =.252	<i>t</i> =-1.117 <i>p</i> =.271	<i>t</i> =-1.069 <i>p</i> =.292	<i>t</i> =-1.428 <i>p</i> =.161	<i>t</i> =-1.466 <i>p</i> =.151	<i>t</i> =-1.158 <i>p</i> =.254	<i>t</i> =-1.364 <i>p</i> =.181	<i>t</i> =-1.526 <i>p</i> =.135
Quantity of delivery; Number of sessions	B=-.078		B=.127		B=-.074		B=.155	
	<i>t</i> =-0.428 <i>p</i> =.671		<i>t</i> =.690 <i>p</i> =.494		<i>t</i> =-0.417 <i>p</i> =.679		<i>t</i> =.862 <i>p</i> =.394	
Quantity of delivery; Time programme delivered over		B=.007		B=-.021		B=.243		B=.220
		<i>t</i> =.037 <i>p</i> =.971		<i>t</i> =-0.116 <i>p</i> =.908		<i>t</i> =1.317 <i>p</i> =.196		<i>t</i> =1.209 <i>p</i> =.234
Quality of Delivery	B=-.110	B=-.137	B=-.066	B=-.237	B=-.220	B=-.107	B=-.228	B=-.249
	<i>t</i> =-0.551 <i>p</i> =.585	<i>t</i> =-0.678 <i>p</i> =.502	<i>t</i> =-0.329 <i>p</i> =.744	<i>t</i> =-1.206 <i>p</i> =.235	<i>t</i> =-1.122 <i>p</i> =.269	<i>t</i> =-0.534 <i>p</i> =.596	<i>t</i> =-1.157 <i>p</i> =.255	<i>t</i> =-1.274 <i>p</i> =.210

ADHD - Attention Deficit/Hyperactivity Disorder; , ODD - Oppositional/Defiant Disorder; T1 – Time 1 (pre-intervention) ; T2 – Time 2 (immediately post intervention); T3 – Time 3 (6months post intervention end)

5.4.8 Full Regression Analysis with Baseline Variables, Quantity and Quality Of Delivery (INDEPENDENTS) and Child Behavioural Outcomes (DEPENDENT. n=47)

(See above) The final analysis of thesis study was to input all the baseline variables of significance/importance in the exploratory data analysis with quantity of delivery (sessions) and quality of delivery and model these against both EB behavioural outcomes across both time periods. The results of this are shown in Table 27.

None of the 8 full models were significant in predicting observed values any better than chance and none of the independent variables (including quantity and quality of delivery) were significantly predictive of outcome in their own right (see Table 27).

Repeating this regression analysis using only Income and child severity of EB at baseline (as indicated by the significant Beta values in the regression using quality of delivery as the dependent variable earlier in the results section) did not change these findings (See Appendix [Page 21](#)).

5.4.9 Regression With Individual Target for Change Quality of Delivery Scores

The full linear regression above was repeated with the two sub scale scores that were most correlated with outcome measures: Effective Communication and Scaffolding and play.

5.4.9.1 Effective Communication quality of delivery:

None of the 8 full regression model statistics were significant in explaining the variance of change in child EB behaviour in this population/study (see Table 28).

Effective Communication quality of delivery as an independent variable trended towards predicting child EB change using 3 of the 8 models: ADHD T1 to T3 change score model with time as the quantity measure (Beta=-0.302, $t=-1.717$, $p=.094$) and ODD T1 to T3 models for both quantity measures ([sessions] Beta=-0.319, $t=-1.746$, $p=0.089$. [time] Beta=-0.349, $t=-1.921$, $p=.062$). Better quality of delivery of this target for change resulted in a greater decrease in child symptoms in these models when the other independent variables were held constant.

Baseline child ODD significantly predicted change in child ODD between Time 1 and Time 3 but only when time was the quantity of delivery measure ([time] Beta=-0.292, $t=-1.828$, $p=0.075$). The higher the child's baseline severity the greater the decrease in child ODD symptoms. This also trended in the following models: ODD T1toT2 [sessions] (Beta=-0.292 Δ , $t=-1.817$, $p=.077$), ODD T1toT2 [time] (Beta=-0.296 Δ , $t=-1.806$, $p=.079$) and ODD T1toT3 [sessions] (Beta=-0.292 Δ , $t=-1.828$, $p=.075$).

Quantity of delivery measured through time trended towards predicted change in child ADHD between Time 1 and Time 3 (Beta=0.313, $t=1.742$, $p=.090$). This was the only result close to significant for quantity of delivery in all eight complete regression models that included Effective Communication as the quality measure.

Repeating this regression analysis using only Income and child severity of EB at baseline for Target for Change 3, did not change these findings (See Appendix [Page 22](#)).

Table 28: A table showing the regression statistics FOR a full linear regression analysis USING Target for Change 3 Quality of delivery only (Effective Communication): Relevant baseline variables & Quantity of delivery (sessions OR time) & Quality of delivery TforC3 [INDEPENDENTS] predicting child behavioural change scores [DEPENDENT]

	ADHD T1 to T2		ODD T1 to T2		ADHD T1 to T3		ODD T1 to T3	
	Sessions	Time	Sessions	Time	Sessions	Time	Sessions	Time
Overall regression stats	F(7, 38) =0.660	F(7, 38) =0.649	F(7, 38) =0.938	F(7, 38) =0.925	F(7, 38) =0.807	F(7, 38) =1.096	F(7, 38) =1.027	F(7, 38) =1.201
	$p=.704$ R2=0.108 R2Adj=-0.056	$p=.713$ R2=0.107 R2Adj=-0.058	$p=.489$ R2=0.147 R2Adj=-0.010	$p=.498$ R2=0.146 R2Adj=-0.012	$p=.587$ R2=0.129 R2Adj=-0.031	$p=.385$ R2=0.168 R2Adj=0.015	$p=.429$ R2=0.159 R2Adj=0.004	$p=.326$ R2=0.181 R2Adj=0.030
Age of caregiver,	B=.034	B=.038	B=.176	B=.179	B=-.036	B=-.012	B=.093	B=.113
	$t=0.200$ $p=.843$	$t=0.222$ $p=.825$	$t=1.051$ $p=.300$	$t=1.058$ $p=.297$	$t=-0.214$ $p=.832$	$t=-0.073$ $p=.943$	$t=0.556$ $p=.581$	$t=0.686$ $p=.497$
Highest grade of education achieved	B=-.020	B=-.023	B=-.117	B=-.122	B=.026	B=.015	B=-.12	B=-.129
	$t=-0.103$ $p=.919$	$t=-0.118$ $p=.907$	$t=-0.654$ $p=.517$	$t=-0.681$ $p=.500$	$t=0.139$ $p=.890$	$t=0.080$ $p=.936$	$t=-0.675$ $p=.504$	$t=-0.735$ $p=.467$
Parental ADHD	B=.225	B=.234	B=.112	B=.119	B=.217	B=.241	B=.166	B=.192
	$t=1.302$ $p=.201$	$t=1.350$ $p=.185$	$t=0.662$ $p=.512$	$t=0.692$ $p=.493$	$t=1.273$ $p=.211$	$t=1.438$ $p=.159$	$t=0.986$ $p=.330$	$t=1.143$ $p=.260$
Weekly disposable household income	B=.092	B=.069	B=.088	B=.072	B=.031	B=-.010	B=.133	B=.106
	$t=0.525$ $p=.603$	$t=0.388$ $p=.700$	$t=0.513$ $p=.611$	$t=0.415$ $p=.680$	$t=0.178$ $p=.860$	$t=-0.060$ $p=.953$	$t=0.78$ $p=.44$	$t=0.621$ $p=.538$
Baseline symptom count/severity (ADHD/ODD)	B=-.187	B=-.179	B=-.292Δ	B=-.296 Δ	B=-.175	B=-.190	B=-.292Δ	B=-.330*
	$t=-1.124$ $p=.268$	$t=-1.085$ $p=.285$	$t=-1.817$ $p=.077$	$t=-1.806$ $p=.079$	$t=-1.06$ $p=.296$	$t=-1.190$ $p=.241$	$t=-1.828$ $p=.075$	$t=-2.058$ $p=.046$
Quantity of delivery; Number of sessions	B=-.055		B=-.051		B=.202		B=.198	
	$t=-0.297$ $p=.768$		$t=-0.284$ $p=.778$		$t=1.104$ $p=.277$		$t=1.115$ $p=.272$	
Quantity of delivery; Time programme delivered over		B=.028		B=.009		B=.313Δ		B=.275
		$t=0.151$ $p=.881$		$t=0.049$ $p=.962$		$t=1.742$ $p=.090$		$t=1.517$ $p=.137$
TfoC3 Effective Communication Quality of Delivery score	B=-.153	B=-.180	B=-.25	B=-.271	B=-.27	B=-.302Δ	B=-.319Δ	B=-.349Δ
	$t=-0.833$ $p=.410$	$t=-0.985$ $p=.331$	$t=-1.356$ $p=.183$	$t=-1.457$ $p=.153$	$t=-1.493$ $p=.144$	$t=-1.717$ $p=.094$	$t=-1.746$ $p=.089$	$t=-1.921$ $p=.062$

ADHD - Attention Deficit/Hyperactivity Disorder; ODD - Oppositional/Defiant Disorder; TforC - Target for Change

Δ $p<0.1$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$,

5.4.9.2 Scaffolding through play quality of delivery:

None of the 8 full regression models including TforC6 as the quality measure were significant in explaining the variance of change in child EB behaviour in this population/study (see Table 29).

Scaffolding through play quality of delivery as an independent variable either significantly or trended close to predicting change in child EB change in all the models with change in child ODD as the EB type. This was the case for both quantity measures and for both time intervals: ODD T1toT2 [sessions] (Beta=-0.327, $t=-2.023$, $p=.050$); ODD T1toT2 [time] (Beta=-0.333, $t=-2.108$, $p=.042$), ODD T1toT3 [sessions] (Beta=-0.336, $t=-2.069$, $p=.045$); ODD T1toT3 [time] (Beta=-0.319, $t=-2.011$, $p=.051$). These beta values were in the expected direction; more quality in delivery of the Scaffolding through Play Target for Change resulted in a greater decrease in child ODD symptoms between the time points. This was not the case for any of the ADHD change score regression models.

No other independent variables significantly predicted outcomes in any of the models.

Repeating the regression models with selective baseline variables only for Target for Change 6, did not improve the fit of any of the models nor change the independent variables that were significant in their own right (see Appendix [Page 23](#)).

Table 29: A table showing the regression statistics FOR a full linear regression analysis USING Target for Change 6 Quality of delivery only (Scaffolding through play): Relevant baseline variables & Quantity of delivery (sessions OR time) & Quality of delivery TforC6 [INDEPENDENTS] predicting child behavioural change scores [DEPENDENT]

	ADHD T1 to T2		ODD T1 to T2		ADHD T1 to T3		ODD T1 to T3	
	Sessions	Time	Sessions	Time	Sessions	Time	Sessions	Time
Overall regression stats	F(7, 38) =0.930 <i>p</i> =.495 R2=0.146 R2Adj=-0.011	F(7, 38) =0.918 <i>p</i> =.504 R2=0.145 R2Adj=-0.013	F(7, 38) =1.298 <i>p</i> =.278 R2=0.193 R2Adj=0.044	F(7, 38) =1.293 <i>p</i> =.280 R2=0.192 R2Adj=0.044	F(7, 38) =0.880 <i>p</i> =.531 R2=0.139 R2Adj=-0.019	F(7, 38) =1.075 <i>p</i> =.398 R2=0.165 R2Adj=0.011	F(7, 38) =1.221 <i>p</i> =.315 R2=0.184 R2Adj=0.033	F(7, 38) =1.258 <i>p</i> =.297 R2=0.188 R2Adj=0.039
Age of caregiver,	B=-.029 <i>t</i> =-0.173 <i>p</i> =.863	B=-.032 <i>t</i> =-0.188 <i>p</i> =.852	B=.090 <i>t</i> =0.552 <i>p</i> =.585	B=.086 <i>t</i> =0.528 <i>p</i> =.600	B=-.118 <i>t</i> =-0.700 <i>p</i> =.488	B=-.102 <i>t</i> =-0.613 <i>p</i> =.543	B=-.004 <i>t</i> =-0.024 <i>p</i> =.981	B=.011 <i>t</i> =0.069 <i>p</i> =.946
Highest grade of education achieved	B=-.048 <i>t</i> =-0.262 <i>p</i> =.795	B=-.054 <i>t</i> =-0.293 <i>p</i> =.771	B=-.126 <i>t</i> =-0.726 <i>p</i> =.472	B=-.126 <i>t</i> =-0.724 <i>p</i> =.474	B=-.026 <i>t</i> =-0.139 <i>p</i> =.890	B=-.040 <i>t</i> =-0.221 <i>p</i> =.827	B=-.138 <i>t</i> =-0.795 <i>p</i> =.431	B=-.146 <i>t</i> =-0.837 <i>p</i> =.408
Parental ADHD	B=.189 <i>t</i> =1.113 <i>p</i> =.273	B=.193 <i>t</i> =1.133 <i>p</i> =.264	B=.057 <i>t</i> =0.346 <i>p</i> =.731	B=2.213 <i>t</i> =0.327 <i>p</i> =.746	B=.174 <i>t</i> =1.020 <i>p</i> =.314	B=.192 <i>t</i> =1.140 <i>p</i> =.262	B=.105 <i>t</i> =0.631 <i>p</i> =.532	B=.121 <i>t</i> =0.726 <i>p</i> =.472
Weekly disposable household income	B=.115 <i>t</i> =0.665 <i>p</i> =.510	B=.098 <i>t</i> =0.555 <i>p</i> =.582	B=.104 <i>t</i> =0.620 <i>p</i> =.539	B=.103 <i>t</i> =0.606 <i>p</i> =.548	B=.041 <i>t</i> =0.236 <i>p</i> =.815	B=2.322 <i>t</i> =0.021 <i>p</i> =.983	B=.141 <i>t</i> =0.837 <i>p</i> =.408	B=.125 <i>t</i> =0.731 <i>p</i> =.469
Baseline symptom count/severity (ADHD/ODD)	B=-.229 <i>t</i> =-1.386 <i>p</i> =.174	B=-.224 <i>t</i> =-1.361 <i>p</i> =.181	B=-.194 <i>t</i> =-1.263 <i>p</i> =.214	B=-.188 <i>t</i> =-1.221 <i>p</i> =.230	B=-.220 <i>t</i> =-1.326 <i>p</i> =.193	B=-.232 <i>t</i> =-1.429 <i>p</i> =.161	B=-.179 <i>t</i> =-1.155 <i>p</i> =.255	B=-.205 <i>t</i> =-1.325 <i>p</i> =.193
Quantity of delivery; Number of sessions	B=-.048 <i>t</i> =-0.276 <i>p</i> =.784		B=-.050 <i>t</i> =-0.295 <i>p</i> =.769		B=.172 <i>t</i> =0.982 <i>p</i> =.332		B=.179 <i>t</i> =1.051 <i>p</i> =.300	
Quantity of delivery; Time programme delivered over		B=.008 <i>t</i> =0.048 <i>p</i> =.962		B=-.041 <i>t</i> =-0.239 <i>p</i> =.812		B=.253 <i>t</i> =1.472 <i>p</i> =.149		B=.195 <i>t</i> =1.149 <i>p</i> =.258
TforC6 (scaffolding through play) QofD score	B=-.258 <i>t</i> =-1.553 <i>p</i> =.129	B=-.269 <i>t</i> =-1.641 <i>p</i> =.109	B=-.327Δ <i>t</i> =-2.023 <i>p</i> =.050	B=-.333* <i>t</i> =-2.108 <i>p</i> =.042	B=-.274 <i>t</i> =-1.642 <i>p</i> =.109	B=-.272 <i>t</i> =-1.677 <i>p</i> =.102	B=-.336* <i>t</i> =-2.069 <i>p</i> =.045	B=-.319Δ <i>t</i> =-2.011 <i>p</i> =.051

ADHD - Attention Deficit/Hyperactivity Disorder; ODD - Oppositional/Defiant Disorder; TforC – Target for Change

Δ *p*<0.1, * *p*<0.05, ** *p*<0.01, ****p*<0.001,

5.5 Discussion

5.5.1 Summary of Thesis Findings

Parents who received a poorer quality of delivery were younger, more likely to be single parents, have a lower weekly disposable household income and had higher levels of ADHD symptoms.

The regression analysis including baseline ADHD factors and Quantity of delivery as independents with Quality of Delivery total score as the dependent variable explained a significant proportion of the variance in Quality of Delivery. However no individual factors independently predicted Quality of Delivery within the regression equation.

Once quality of delivery total score was taken into account, no baseline factors significantly predicted child behavioural outcomes for ADHD nor ODD over any time interval.

Total Quality of delivery score did not independently predict outcome. There were some significant and trending results for two subscales of the measure suggesting improved quality of delivery in these, effective communication and Scaffolding learning through play, may lead to greater symptom reduction post intervention.

5.5.2 Other Relevant Findings

Parents received on average 7.8 sessions out of a possible 13 sessions of the NFPP with this being delivered over an average of 653 minutes and each session lasting an average of 81.4 minutes. Parents who had a higher disposable income received more sessions and received more minutes of intervention over time. Older parents also received more intervention time. Parents with diagnostic levels of ADHD received fewer sessions and less time. Average length of session was significantly lower when men were the primary parent receiving the

intervention. When average session length was the quantity variable applied, diagnostic levels of parental ADHD and lower disposable income were no longer significantly associated with this.

Quantity of delivery had no association with child ADHD behavioural outcomes, although quantity by number of sessions predicting change in ADHD from time 1 to time 2 just failed to reach significance ($p=0.05$). In final regression models, number of sessions received independently predicted change in child ODD symptoms from pre- to immediately post-intervention with more sessions leading to a greater reduction in symptoms.

The only other factor to explain individual variation in all child outcomes was baseline severity of the child's behaviour pre-intervention: higher initial severity led to greater change for all outcomes.

5.5.3 Findings in the Context of Previous Research

5.5.3.1 Do barriers to PLI availability and recruitment leading to population bias prior to randomisation?

In order to assess whether quantity or quality of delivery influence effectiveness of parent led interventions (PLI) to treat ADHD in children participants need to be recruited and engage with the programme by attending a first session. In the COPPI trial only 6 out of 10 of the participants identified as suitable were randomized which is similar to the 66% found in a recent review (Chacko et al., 2016). Over half of those eligible for inclusion but not randomised actively refused participation, with another third being unreachable to include after screening. As in most trials of this type, no comparison between those able to be included and those refusing/lost to recruitment was given. This is due to ethical difficulties in asking participants who do not wish to proceed their reasons behind this. This is one

example of difficulties in prioritising and pre-planning during trial conceptualising and funding bids for heterogeneous conditions such as ADHD (Peters-Corbett et al., 2023).

From the literature and experience, the ADHD service provision in the UK at least is fully aware of the accessibility issues around provision of care and the importance of potential inequality in geographical and societal terms. What we do not do well though is to standardise how we monitor and screen for any treatment inequality clinically and what we measure and publish routinely to understand this area more in the future.

5.5.3.2 What factors influence attendance once randomized?

Studies by groups such as Plueck et al., (2010; as discussed in Chapter One) and Chacko et al., (2017; see later) seem to imply that baseline factors may affect recruitment more than attendance/engagement. In the COPPI trial, once randomized, those failing to attend a single session or dropping out prematurely were not significantly different from those retained in baseline social-economic, demographic and ADHD specific baseline variables, according to the trial report (Sonuga-Barke et al., 2018). Chacko and colleagues (2016), found that only programme format affected rates of attendance, with individual programmes having higher attendance than group. Socioeconomic status and child age did not, although those studies with a higher proportion of lower SES had greater attrition rates (defined as those who did not complete a “whole course of treatment”). This is reflected in the COPPI trial with those being randomized but not attending any sessions being 4 times as high for IY (a group programme) versus the NFPP (individual in participants home), attrition was roughly the same but completion was about 50% greater for the NFPP.

Similar to the IPD MA analysis discussed in Chapter One (Berry et al., 2023), initial thesis analysis of the NFPP arm of the COPPI trial showed the following baseline variables were

associated with levels of attendance (n=133): Higher age in years as a continuous measure) (with more sessions, more total time and greater average session time). Male parental gender (with shorter average session length only). Parents who had a significant number of ADHD symptoms for diagnosis as a binary measure (with a lower number of sessions and less total time) and lower disposable income as an ordinate variable (with less sessions and total time). For the thesis analysis sample (n=47). Quantity of delivery was not significantly correlated with baseline child symptom severity of ADHD or ODD nor outcome child change scores.

Although this thesis analysis of the COPPI NFPP arm data did show an association between attendance and outcomes on regression analysis, this was very selective. It was significant for number of sessions attended but not for total time over which those sessions were delivered. It was only significant for number of sessions and ODD from time 1 to time 2 (although ADHD time 1 to time 2 and ODD time 1 to time 3 trended towards significance). This suggests quantity of delivery in terms of number of sessions still needs to be monitored, measured, analysed and reported for studies of this type.

5.5.3.3 Once attendance is maximized, do differences in the populations even out and how do these influence outcomes?

Having controlled for attendance and engagement/attrition (by only including subjects with >7 sessions and minimal missing data), those included in the quality of delivery part of the analysis did not differ significantly in the demographic and condition-specific variables that were associated with quantity above (income, parental ADHD and parental age). Apart from ADHD time 1 to time 2 for sessions, quantity of delivery was not correlated with outcomes in the thesis study participants. On regression analysis. baseline SES and parental factors did

not independently predict outcome and neither did quantity (apart from ODD time 1 to time 2). This may suggest baseline population differences influence outcome through attendance: therefore if attendance is targeted and maintained for those at higher risk, the likelihood of successful symptom change outcome from PLIs could be universally improved.

A follow on study from the engagement review previously cited (Chacko et al., 2016) used a tool specifically developed for behavioural parent training, the barriers to treatment scale (Kazdin et al., 1997), to further explore the potential reasons behind poor attendance and sustained engagement at parent training to treat ADHD in children. Although a small study it presents some interesting findings: That clinical or more direct markers of parental mental health or visual struggles (depression and stress) along with physical or stress related barriers to attending BPT were not significantly different across those who never attended, dropped out or completed the BPT in this study. Instead parents were more likely to never attend and drop out if they felt their own ability to change their child's behaviour was very low (those with low parental self-efficacy and those who felt their child's behaviour was attributable to internal, global and stable/unchangeable factors). In addition parents that attended but dropped out before completion were more likely to report perceptions that BPT was not relevant to them or would not meet their needs. Group comparisons of participants who never attended dropped out and completed showed no difference in baseline variables including; maternal education, ethnicity, levels of ODD or CD diagnosis and proportion medicated. Symptom severity at baseline was not presented. For this thesis study, those who were included in the quality analysis versus those who were not (i.e. good attendance/completion) had children with higher baseline symptom severity: a finding consistent with other literature of this type and it could be consistent with increases parental need or perceived need for help.

5.5.3.4 What factors may be influencing effectiveness once quantity of delivery is maximized? Level of variation in programme content delivery at the therapist level.

This study and some of the body of literature to date would suggest we can use baseline family, parental and child characteristics to predict those who are more likely to have access to PLIs to treat ADHD and those parents that can overcome barriers to adequately attend. However after this there is a lack of understanding of the factors that predict whom PLIs are more likely to be effective.

Most studies do not look at the difference in effectiveness across studies using therapist alone as a factor; either by putting this in outright, for example by using therapist as a variable within multi-level modelling systems or using proxy variables. Ideas for these may be; time spent in supervision, relative number of families treated, years of experience, levels of relevant qualifications etc. This is probably due to; (i) the difficulty and subjective nature of measuring these (ii) methodological factors that may add further variation/bias (such as small sample size and too-large a number of therapists, natural attrition of therapists mid-trial changing the format/delivery of programme training, variation in accessibility to supervision due to geography and some programmes requiring two therapists per group and the combination of these changing weekly/per treatment period) and (iii) the need to project confidence in the therapists within the present trial itself and for future recruitment in similar trials of its type.

Programme fidelity and therapeutic behaviour during delivery have been shown to be related to outcome in specific parenting interventions using measures created by the programme groups. Examples include the Leader Observation Tool (Eames et al., 2009) and for a recent systematic review with meta synthesis of results see Martin et al. (2023).

This thesis study showed no association of quality of delivery with child outcomes either at a correlation level nor in the regression findings. Baseline association of quality delivery with some factors that are associated with attendance and engagement also may suggest more complex and nuanced relationships that may be clearer in studies with greater power. These factors were: Parental age (higher age associated with greater quality of delivery), single parent status (with lower quality), parental ADHD symptoms (binary diagnostic significance and continuous, both associated with lower quality), lower disposable income (with lower quality), quantity (sessions and total time not average session length; less quantity less quality – see Table 24).

Variation in individual therapist effectiveness for patient outcomes, the “therapist effect”, has been extensively researched in the sphere of psychotherapy more generally. Similar problems arise in comparing studies in this field as they do in behavioural interventions specifically designed for ADHD: variation in the statistical approach adopted to isolate the therapist effects (i.e. separating therapist level-effects from patient-level equivalents using multi-level methods), sample size and designing the study from the start to isolate therapist effects accurately, so called “case-mix” variables (e.g. initial severity of patient symptoms, number of sessions attended, presenting diagnosis) and clinical setting, trial methodology and programme/therapy variations (e.g. tertiary populations versus community samples, different theoretical approaches/orientations, length of intervention being brief vs. prolonged and therapist experience level and training-type and complexity of feedback and outcome measures). However unlike in PLIs for ADHD, the main focus of success or otherwise in psychotherapies is seen as the therapist themselves instead of the programme being delivered or the trial methodology (Johns et al., 2019)..

Briefly important findings from this industry are the following: That they have developed standardized outcome questionnaires and feedback software/systems that have been consistently used over the last two decades (e.g. the Outcome Questionnaire-45 used with associated analysis software; Lambert, 2012). That the finding of therapist effects explaining significant variation in outcomes remains despite accounting for all the factors outlined above. That the effect size of the therapist factor is small relative to patient variability factors (5%) and that this varies greatly depending on the other factors above (0.2% to 29%). That despite increased understanding and industry awareness, lack of improvements in study design and methodological consistency across studies in this area makes the true estimate of therapist factors hard to ascertain (Johns et al., 2019). Finally, therapist feedback and alert systems (highlighting for a therapist when a client is “not on track” using both individual changes and comparing to clinical norms) result in significantly improved outcomes on meta-analysis.

A recent meta-analysis (de Jong et al., 2021) found that in trials comparing treatment groups involving feed-back with non-feedback controls the feedback group had significantly greater improvement in outcomes with an effect size of 0.15 (Cohen’s ‘*d*’ - 95%CI: 0.10 to 0.20). Another meta-analysis for trials only using the original outcome measure tool and feedback system mentioned above, found that feedback reduced variation in outcomes attributable to therapist effects by 18.2% (Delgadillo et al., 2022). It could well be that contemporaneous feedback of markers and measures of programme delivery fidelity along with other aspects of the therapist-parent relationship may be the key to standardising and optimising delivery to individuals.

5.5.3.5 Aspects of therapist-parent interaction that may effect change independently from fidelity to programme content and effective delivery

Despite findings of ADHD behavioural intervention effectiveness from parental report at the meta-analytical level, we are still struggling to explain a large proportion in variation in outcomes. One possibility could be that it is not the active programme components inducing change, instead it is other aspects of the parent-therapist relationship (e.g. time, support, validation of problems, increasing confidence and generally supporting the parent through change) that are producing the effects.

Trials looking at comparing parent led behavioural interventions with “sham” placebo-like interventions have been conducted to see if aspects of the generic therapeutic-parent relationship may result in the ability for the parent to make self-led changes that significantly reduce the level of their child’s symptoms. A very recent example of this was a RCT using one of the same programmes with which NFPP was compared head to head:

Helping the Non-compliant Child This group of authors aimed to compare the efficacy and effect sizes for both ADHD medication versus placebo and for parent-led interventions [PLI] vs a sham intervention for preschool children (Sugaya et al., 2022). This sham intervention was designed to appear to the participants as if it could well be a specific form of treatment, thus maximizing the chances that reporters masked to all treatment options when reporting outcomes. It involved factual information around child development but no ADHD content and was delivered over the same length and number of sessions. Both were individual, 1:1 programmes delivered by facilitators of the same level of experience. The study showed that medication plus sham intervention was superior to controls (placebo plus sham intervention) for both reducing ADHD symptoms in the child (from averaged parent and teacher ratings) and for changes in the impact/functioning status of the child. PLI/placebo

was superior to controls for impact/functioning but not for ADHD symptom reduction (although this trended towards significance). When parental reports of child symptoms were analysed separately, PLI/placebo became superior to the control arm.

Medication/sham was not superior to PLI/placebo in child ADHD symptoms nor for impact/functioning. Medication/sham was superior to PLI/placebo and control in objective measures of ADHD neurocognitive deficits. However PLI/placebo was superior to control in lowering measures related to oppositionality, compliance and temper control whereas medication was not (Sugaya et al., 2022).

Another source of support that PLI interventions have content validity over-and-above generic therapeutic factors is that self-led interventions with no- or limited- therapist input also produce significant change over-and-above controls. For example, a recent meta-analysis (McAloon & Armstrong, 2024) found that between group effects for online delivery of PLIs to treat non-specific EB were significant and showed an effect size similar to that for face-to-face behavioural interventions. An equivalent meta-analysis that analysed ADHD outcomes for online interventions found a larger effect size for ADHD reduction using online interventions versus controls and no heterogeneity. In addition, they did not find that studies with specialist support were more effective than those with technical support only for EB outcomes (Flores et al., 2020).

From the COPPI study, putting therapist in as a factor did not affect outcome for the whole NFPP treatment arm. This variable was handled following discussions from the literature, including only those therapists that delivered the programme to 5 or more families, pooling the others together (Johns et al., 2019). In addition, there was no variation in outcome with later recruitment dates/periods (reflecting that therapists may improve their delivery over

successive recruitment/delivery periods or “tranches””, although not allowing for therapist attrition) nor was there a difference across site. The latter is important given the founders of the NFPP programme that delivered training and supervision were based in Southampton which was only one of three localities in which the trial was delivered. There were measures relating to delivery fidelity and quality factors that could have been explored in the COPPI trial analysis and could’ve been used to explore the validity of the quality measure. These were not published, however. In addition, on exploratory data analysis the level of missing data and lack of internal consistency across repeated measures over time suggested the data was not of good enough quality to apply. One factor in this was that one of the measures, therapist-parent alliance, was collected by the therapists themselves. This was not originally meant to be the case, however it was felt that the number of measures being collected by the research trial team was too onerous and so some were collected unblinded in a protocol change (McCann et al., 2014).

5.5.3.6 Do NFPP content, training and delivery processes appear to be leading to change versus generic therapeutic factors alone?

Outcomes in the NFPP arm of COPPI trial were not affected by tranche, site or therapist suggesting a standardization/prevention of drift of programme training, content and delivery. In addition, from published criteria and reviews the NFPP is seen as a “probably efficacious” programme along with other behavioural parent training by independent, non-programme developer sources (Evans et al., 2018). The only evidence against the validity of the NFPP in terms of its original conception is that it does not seem to be more efficacious than other generic programmes in addressing ADHD behaviour specifically in the child: The NFPP was no more effective than Incredible Years in the COPPI trial (Sonuga-Barke et al., 2018) nor when compared to Helping the Non-compliant Child in another trial (Abikoff et

al., 2015). It may be that it is a relatively complex programme to deliver: for example when delivered as part of routine care in the community by a larger number of non-ADHD specialist therapists who saw a smaller number of families over-all, there were non-significant findings for parent reported ADHD and ODD behaviours (Sonuga-Barke et al., 2004). This was rectified in the third NFPP trial when the number of therapists was limited and the level of ADHD awareness and clinical experience raised again (Thompson et al., 2009).

Whether this provides enough support for the content of the programme being effective and to what degree therapist factors are causing variation is unclear. Programmes such as Incredible Years are delivered more often in community settings by family support workers. Whether these programmes are easier to deliver or have better defined processes is an important debate. An interesting finding in the psychotherapy literature is that manualized programmes tend to result in standardization of delivery: “good” therapists show lower results than expected and less good therapists improve (Johns et al., 2019).

The findings from this thesis study could reflect this variation some therapists ability to deliver more complex concepts or less clearly presented aspects of the programme (Fearon & Sonuga-Barke, 2022). Although the total score from the quality measure was not able to predict individual variation in outcome, scores for sub-components did show some findings. For effective communication and scaffolding/play programme components, quality of delivery score independently predicted outcome with progressive levels of levels of trending/full significance depending on programme component, EB type and length of follow up. This was most evident for quality of delivery of scaffolding learning through play over effective communication, for ODD symptoms over ADHD and for short term versus

long term follow up. This pattern of change is found in all studies of this type adding validity that the finding may be more than chance alone. In addition scaffolding learning and effective communication are more specific to ADHD symptoms than to externalising or oppositional behaviour alone. This finding adds weight to pursuing methods, reporting and analysis of the components of individual PLIs that may be effective for all participants or for individual sub groups (Dekkers et al., 2022). Finally it may be that ADHD specific parent-led interventions may be more effective if they include processes/targets for change that adapt traditional social learning and classic-behavioural theory based methods to ADHD specific aspects of behavioural modification (Van der Oord & Tripp, 2020).

5.5.4 Strengths And Weaknesses

A major strength of this study was the availability of video-recorded (or audio if not) data covering the whole delivery of the parent led intervention for a participant. This allowed for complete data sampling versus episodic sampling, added non-verbal indicators of therapist effectiveness and participant receptiveness and meant the chances of missing the delivery of a certain component (for example during unrecorded/lost therapy time) by a therapist was eliminated. In addition, the assessment session was also available and used as part of the data for quality assessment: this was vital as some of the groundwork for NFPP components was laid during this time. Good examples of this were; baseline parental attributions around their child's behaviour and level of ADHD knowledge and understanding, parent-child and parent-co-parent relationships, routines, household atmosphere/chaos and consistency between co-parents.

Having one of the main NFPP project leads involved with the project as well as primary author experience of the programme maximized the chance of developing a quality of delivery that reflected programme content and fidelity.

Finally the dedication and recording of the primary research team in the COPPI trial provided accurate and complete measures of the quantity of delivery for all the NFPP arm of the study.

The main limitation of the study was that only 47 (35%) of participants could be included in the quality analysis. This was necessary order to isolate quality of delivery from quantity but this limited the power of the study. Participants in thesis study were reasonably well matched to missing participants, except that missing participants had children with slightly lower levels of ADHD symptoms at baseline. They had also received fewer sessions of intervention, The fact that some participants had missing tapes may suggest that their therapists may have had less commitment to delivering the intervention or felt less confident in their delivery to those participants. There may also have been other unmeasured differences between the groups. Small sample size could have resulted in there being an effect of quality on outcome that could not be demonstrated in this study: a type II error. It also would influence the ability to look at the relative effect of socio-demographic and condition specific variables also, although the pattern of findings are consistent with theory and other studies of this type.

If all sessions had been recorded and the same quantity-based inclusion criteria applied (7 or more sessions including the assessment) the sample size would have been approaching double what it was. Thirty-four participants had enough sessions to be included but not enough recordings. This included one therapist for whom all recordings were lost: the total

number of participants assigned to therapist was 27 with 21 receiving enough sessions to have been potentially included. This is probably reflective the challenges associated with additional demands over-and-above normal clinical commitments to the family given that therapists were, on the most part, primarily clinical service deliverers. For them often the priority is good provision of care and there are issues such as privacy and relationship difficulties in pushing session recording and other less immediately palatable aspects of research methodology. On a positive note the availability of recordings did not significantly vary across site, therapist and tranche/time and outcomes were not related to any of these methodological variables either.

Another limitation of the study is the lack of a validated quality measure with established reliability either to use as a primary measure or to give concurrent validity to the developed measure. This is due to the lack of a generic tool being available in the industry. However, steps were taken to minimize the impact of this: existing literature of ADHD theory and parenting intervention processes were extensively reviewed along with the NFPP content and methods. This was partially based on work done by the primary author using externally sourced grants and involved all the original NFPP developers and members of the primary COPPI trial team. Extensive notes were made throughout with examples of delivery that met the threshold for each Target for Change level logged along with those that did not. These were labelled allowing for referral back in any doubt was felt. Although this was not reflected in test-re-test reliability of the sub-scales of the measure it was in the total score. . Face validity of the Quality of delivery measure applied in this study is given by the comprehensive development process and its content reflecting important factors thought to influence programme fidelity (Bellg et al., 2004). Intra-rater reliability for the total score was good and this was despite collection occurring over a prolonged period of time (over 2

years). Unfortunately inter-rater reliability for the measure was not carried out and this is a major limitation for the future use of this tool and for the future translation of this thesis study's findings.

The capacity for exploring construct validity of the quality of delivery measure used in this study was limited. This was due to data collection problems rather than lack of methodological planning. The concordance, overlap and independent variance explaining power of other aspects of dosage, fidelity and quality could've been explored using proxy measures if the missingness and reliability of measured values did not exclude this. Parental motivation for change, parent-therapist relationship and therapist content checklist for session-by-session delivery were examples. This was in the original analysis plan.

Finally as this was an exploratory study rather than hypothesis driven research, multiple analyses were conducted. This increases the chance of a type one error.

5.5.5 Clinical Implications

This study and others show that quantity and quality of delivery may indeed be linked to socio-economic status and neurodiversity of the parent. Therefore it is important to ensure that the effort and strategies applied for recruitment and retention then result in these treatments being available and accessible to all. In addition it is important to measure programme content delivery and therapist-parent relationship and interaction contemporaneously and bring potential issues to supervision. This will allow improved understanding at the individual and population level as to when and why optimal delivery of the programme breaks down. Quantity of delivery and quality of delivery were related in this study and so shorter sessions or missed appointments in themselves should trigger

increased effort and time spent with a family, if possible of course. Once quantity and quality are controlled for other factors that consistently predict outcome (mainly higher initial symptom severity leading to greater improvement) do not. This could imply that quality of delivery by this measure is a factor in levelling out the effectiveness of these programmes for those who are hard to recruit and difficult to treat. This should further encourage developing and applying contemporaneous measures of programme delivery factors in the translation of research into clinical practice.

Chapter 6: General Discussion

6.1 Summary of Results

The overall aim of this thesis was to explore whether quality of delivery using a bespoke measure specific to the content and methods behind the New Forest Parenting programme explained individual variation in effectiveness of programme delivery. Having initially explored the relationship of attendance with outcome in parent-led behavioural treatments for externalising behaviour within existing published studies, no significant relationship was found.

As presented in Chapter Two, the relationship between attendance and outcome of behavioural intervention for ADHD remains unclear. The systematic review showed no relationship between attendance and outcome of behavioural intervention. The number of available studies for this review was low. The most recent individual patient data meta-analysis exploring mechanisms of change related to behavioural interventions for ADHD (Psyllou et al., 2025) was not able to explore attendance, due to the low number of studies reporting on attendance. The most recent meta-analysis of behavioural intervention for ADHD (Fan et al., 2025) removed participants from their analysis with low attendance. Both of these recent studies highlight the future challenges associated with gaining a better understanding of how attendance might influence outcome of behavioural interventions for children with ADHD.

Chapter One and Chapter Three presented the theory and change methods behind the parent led intervention being applied, the NFPP, and the quality of delivery measure content was presented in Chapter Four. In the original trial associated with this thesis study

(the Comparison of Parenting Program Interventions, COPPI, trial), the New Forrest Parenting Programme was effective at reducing child ADHD symptoms from parent report immediately post intervention compared with controls (Sonuga-Barke et al., 2018). Apart from a trend towards child symptom severity at baseline, no demographic, psychosocial or ADHD specific variables predicted outcome (ADHD /ODD symptom reduction).

Key factors did affect both the quantity and the quality of delivery in this thesis study. These were parental age, levels of ADHD symptoms and household disposable income. Once these variables, quantity and quality of delivery were considered, the only variable that predicted outcome significantly was baseline severity of behaviour.

Important questions that need to be addressed in future research will be discussed here. How do we define and measure quality of delivery/care versus fidelity? From this, have we identified what the markers of delivery with adequate fidelity and quality of delivery are and how do we measure these? Are observational methods of data collection for this condition and type of treatment suitable to distinguish programme delivery factors from more generic therapist skill or inter-relational factors? Are therapists clear as to what and how programmes are making changes before they embark on delivering them? Finally how digital intervention technologies may improve fidelity and quality of delivery or otherwise is discussed. These will be explored in the context of developing the measure used for this study and collection of the data.

6.2 Fidelity Versus Quality of Care

The point of developing the quality measure for this study was to go beyond fidelity to potentially explain more of the individual variation in outcomes. “Quality” is a term most often used in the context of delivering healthcare at both a population and individual level.

A seminal paper by Campbell et al., (2000) suggested a framework for exploring/defining quality of care. First, they defined care citing Donabedian's work (e.g. Donabedian, 1988), as involving the structure required to deliver care along with the process of delivering this. The structure section is broken down into the physical elements of care delivery and staff characteristics. The process part is broken down into the clinical care aspect and the interpersonal care. This latter section (process) involves understanding the difference between the clinician's perspective and the client's perspective regarding the problems that exist, and which problems need management at that time. Importantly the first element, structure of care quality, outlines the capacity of a service to deliver good quality of care but does not guarantee it. Aspects of process should therefore aim to achieve agreement between clinician's assessment of the problem and treatment needs and the client's expectations around this. If this is achieved and structure processes contain programmes that in principle are fit for purpose, individual treatments should therefore have the maximum chance of being effective at this point in the timeline (S. B. Campbell et al., 2000).

Applying this quality of delivery framework to trial scenarios where PLIs are being used to treat ADHD, the following concepts can be thought to come in: (i) Structure - Physical characteristics; (a) programme choice, development and validity. (Endpoint - prior evidence of programme validity and effectiveness given the target population, e.g. Groenman et al., (2022) and (b) trial accessibility, recruitment and (endpoint) how representative the final sample is given the target population. (Other endpoints: linking quantity of delivery of key intervention components to outcomes e.g. Dekkers et al., 2022). (ii) Structure - Staff characteristics; (a) therapist recruitment for (perceived and actual) (1) skill level given the programme being used (2) generic therapeutic skills and (3) investment/perceptions of the programmes use in that setting (endpoint - influence of therapist recruitment and training

evaluation from previous trials +/- fidelity measures of overall therapist competence and treatment adherence to be included in the final analysis of a trial. Other proxy measures may include - number of years' experience, time in supervision, number of participants treated; Leitão et al., (2021). (iii) Process - Clinical care (a) appropriateness of trial inclusion for the individual child, parent and family at that time (b) appropriateness of the treatment being given for the participant (including the influence of being randomised to one arm versus another: endpoints: ensuring alternative treatments during the trial period are documented along with documenting reasoning behind clinicians' and patients' decisions around inclusion and participation; Zwarenstein et al., (2008) . Exploring the interaction between known variables reflecting barriers to programme attendance, completion and effectiveness AND individual variation in outcomes; Nock et al., 2007). (c) (see above also) discussion of the trial inclusion and effect of different treatment possibilities of randomisation with the participant by trial personal before the individual commits. (Endpoints: Dropout before randomisation and failure to attend first session and how these differ between randomisation arms. Also important in this is treatment differentiation fidelity if two treatments are being compared; Abikoff et al., 2015). (iv) Process - interpersonal care: translation of therapist's (perceived and actual) programme specific and generic skills in terms of (a) developing a good therapeutic space, (b) developing good therapeutic alliance, (c) fidelity of delivery of the programme and (d) [as much as theoretically possible] identifying the individual participant family's needs and adapting the programme to maximise its effectiveness. (Endpoints: therapeutic relationship/alliance, programme fidelity measures at the individual participant level and the interaction between measurements of these and outcome; Schoenwald et al., 2010).

As can be seen with the citations included in this section, many of these measures denoting quality of delivery have been explored in the context of parent-led interventions to treat ADHD in children. However they are not included consistently in all clinical studies understandably given the power this would need. This is even more of an issue given the heterogeneity and multifactorial nature of ADHD as a condition. Also if these measures are included, the conceptual definition and validity/choice of the measurement tool applied often varies. In summary, most of these measures do not need to be included in the statistical analysis stage of any study. However, they need to be controlled for in the methodology and planning stage of the studies. If the industry could standardise several factors in their process methods behind programme selection, target audience and the type and level of knowledge and skills required for therapists delivering programmes, many of these measures would become obsolete. Selective use and presentation of these in published reports of studies probably, reflects lack of expectations in this regard along with variation in the degree to which the data is collected contemporaneously and accurately. It is unlikely to represent lack of awareness and application of this by the trial groups in terms of integrity in their methods and understanding.

In terms of standardising and measuring quality of care in the context of delivery parent-led behavioural interventions to treat ADHD, the next area of consideration after trial planning, sample selection and therapist selection, is programme choice and the fidelity with which this is delivered.

6.3 Existing Studies Assessing Fidelity Of Programme Delivery and Relating These To Outcomes

As discussed in Chapter 2, a recent review found the association between fidelity and outcome on Synthesis Without Meta-analysis (Campbell et al., 2020; S. M. Campbell et al., 2000) analysis of included studies showed mixed results. Better fidelity to outcome was not affected by outcome type, perhaps suggesting softer or interim targets for change are not easier to achieve nor that that these may occur earlier in the process of change before child behaviour following PLI intervention. The authors felt it was likely that there may be a relationship between fidelity and outcome in theory. However that variation in fidelity measures applied along with general methodological variation and risk of bias in studies might affect the ability to compare results across trials (Martin et al., 2023).

One of the groups in this paper evaluating fidelity against outcome did so for the Incredible Years programme (Eames et al., 2009): This was the programme used for the comparison arm of the COPPI trial (McCann et al., 2014). Their paper separated aspects of fidelity measurement into content-based methods (e.g. delivery checklists) and process-based fidelity. The authors, in setting up the measure and applying it, seemed to suggest content fidelity was more important in determining standardisation of delivery at the overall trial/population level and preventing differences across sites, dilution/"augmentation" with non-intended methods or drift over time. This is what they refer to as quality of intervention delivery. They found that that exposure to higher levels (with this being split into three groups of high, medium or low) of therapists behaviours in all five categories (these summarizing the 18 total skills) were predictive of greater change in observed positive parenting behaviour. This was only the case for the "positive behaviour" category when looking at parent reported changes in parenting style. For this category the authors report

that higher levels of positive behaviour shown by the therapist predicted improvement in observed parenting positive behaviour ($b = 0.28$, $P < 0.01$; $R^2 = 0.08$) with change in parenting positive behaviour then predicting change in observed child behaviour also ($b = 0.60$, $P < 0.01$; $R^2 = 0.36$; Eames et al., 2009). They, as in this thesis study, did not find a relationship between their measure of quality of programme delivery and change in child behaviour outcomes.

Given these findings, as reflected on at the end of Chapter Five, it could be that better Quality of Delivery of parent-led interventions to treat externalising behaviour is associated with change in interim outcome measures such as parenting self-efficacy and parenting behaviours as shown in the LOT studies above. The interesting thing to take from these studies is if and how observational data collection determines if factual and conceptual content have been delivered effectively. How much does this observational data reflect actual programme delivery versus generic therapist skills and therapist-participant relationship? In addition, how much should confirmation of endpoints of measure checklists be dependent upon parental response to therapist behaviour. In other words, is it enough just to deliver material and to assume recipients have understood it, versus looking for confirmation of this in their verbal or non-verbal responses. Furthermore is effective or “quality” of delivery dependent upon treatment recipients being able to operationalise the change methods or not? Below is a presentation of the experiences of this thesis author on observing data in the context of evaluating “quality of delivery”.

6.4 Observational Data Collection Reflections

The method used in measures such as the LOT above involves identifying particular behaviours or statements that occur regularly and using the count or frequency of these to

reflect the fidelity of programme content or process methods. This quantitative approach to evaluating conversational data may, at least on the surface, appear most accurate, easy to replicate and clear to translate. The alternative is referred to as more “qualitative” coding schemes: looking for complex interactions or iterations of behaviours and conversational interchanges between a dyad to then decide whether a threshold of behaviour has been met. Applying the quality measure developed for this thesis study involved a mixture of both: first using clear identifying words/statements that indicated a period of potential coding and assigning this too a certain target for change or a choice of a few of these. This then involved exploring the context in which something was being said and whether ensuing discussion and responses from the parent suggested an overall fact or concept had been delivered. Two things appeared to be fundamental in determining a period of delivery effective; Whether the therapist was able to give some time/pause after delivering something to allow the parent to develop a reaction/response and then, the nature of a parent’s body language and facial expressions in reflecting interest, comprehension and processing of delivered material. During this thesis, having used key words/statements to navigate to the area of coding on the measure currently being considered, a decision was made as to whether the thresholds for that level had been reached within that target for change. This was aided by colour coding on the measure, the overall data collection sheet and on the individual “plates” used to keep track of an individual’s progress. These latter forms had selective highlighting producing effectively a bar-chart denoting the level of each target for participant the subject had reached.

Underlying themes emerged that were relevant to more than one target for change and codes/reference methods were developed to allow for review of previous examples of that area to be re-called (via the “find” function). These were summarized on a continuous notes

document with the aim of making coding more standardized and objective as more was done. One of these ongoing themes was the role of attributions of the child's behaviour and how that affected functional analysis, parental consistency and support and parental reactions/handling of episodes of unwanted behaviour. This was managed in terms of firstly the depth of discussion and where it occurred in the timeline of overall delivery for that participant (earlier or more surface discussion; resulting in coding in target for change 1 or later more in depth attributions being relevant to TforC 4b for example) and/or the context of the parent's attributions made them relevant to a particular area; For example earlier, more surface discussions were coded for in target for change 1 ADHD understanding, this moved onto the impact of the parents attributions on how they functionally analyse the antecedents of the child's behaviour (TforC4b) and later discussions around the impact of attributions and co-parent differences in these on the parental response and modelling of emotional/behavioural self-regulation (TforC5) during unwanted behavioural episodes.

Anecdotally the above appeared to make the process of coding subsequent participant's data reliable and this was partially reflected in the intra-rater reliability on re-collection for the total measure score: however this did not extend to all the individual targets for change sub-scores. In addition we do not know if the measure is able to give the same result across different raters as there was not the time for this. In the appendix can be seen examples of notes for coding the Quality of delivery measure in this thesis study for the separate targets for change (see Appendix Page - 25 -).

The formal COPPI fidelity process involved therapists using the initial checklist for therapist session delivery requirements from the manual and assessing whether this had been delivered well, delivered adequately or not delivered. This was compared with the therapist

reports of material delivered using the same checklist and scoring system (see Appendix Page - 17 -). Unfortunately the data is not available easily for detailed analysis as it was not processed digitally by the trial team. This would've been an excellent source of evaluation of the validity of the measure. Unfortunately, although available, the fidelity and checklist data were not thought of as a necessary addition to this thesis early on. This was because it was thought that other associated barriers, fidelity and therapist effect measures (such as parental motivation and therapist-parent alliance) would be available along with outcome measures that could be associated with relevant sections of the measure (for example expressed emotion for parent child relationship). This data was only available in its raw form and needed to be processed and evaluated for reliability and internal validity by the thesis author. Unfortunately missing data and internal inconsistencies suggested it was not reliable enough to be used. At a much later point using checklist and fidelity data against individual Targets for Change was considered, but the onus of data collection made this an impracticality in the time remaining.

In order to try and accommodate differences in generic and NFPP specific therapist effects on an individual level a visual analogue scale was created to evaluate the environment, relationship and stage of change of the patient. This was not available for all subjects so could not be included in the analysis. However it did aid in differentiating between the quality of delivery for a therapist overall in the trial and how they were able to deliver programme content for the individual participant.

Ideally some of these COPPI collected measures could have been used to explore the relationship of fidelity, quality of delivery and other therapist delivery factors as explored in the earlier section. However the reliability of these measures within the data set also

explains why exploring these concepts in individual trials is so hard: having too many measures means the importance of collecting them with accuracy gets diluted especially when the responsibility is put with the therapist. The ethos of a therapist is often with delivery of the programme to the individual in front of them at the time. It takes awareness and experience to combine this with the importance of long-term trial data to make changes for all individuals and families living with ADHD. This can be the difference between a therapist remembering and insisting upon completion of measures in an accurate and timely way. Some of these measures, such as therapist-parent relationship should have been collected impartially by research staff. Other measures may have needed to have been not included in order to make staff and parents alike, have a lower burden of data collection throughout the trial. These are difficult decision to make however given we still do not know which variables and concepts are important in this area.

6.5. Quality versus Fidelity

The original definitions of fidelity were mainly aiming to ensure that the treatment being delivered was done as intended (Bellg et al., 2004). Additional concepts of treatment receipt and enactment are often seen as outcomes/consequences of an efficacious programme delivery with fidelity as opposed to being part of the fidelity process (Borrelli et al., 2005). Quality of care outcomes, as per the above cited review, can be summarised by an individual receiving the treatment they need and want and this being effective to treat the condition/elements of the condition they wish to have treated (S. M. Campbell et al., 2000). Research practices in terms of methodological and statistical pre-planning can be seen as replacing the structural aspects of care quality assessment highlighted earlier. Fidelity at the therapist and group level overlaps with the concept of process in quality-of-care

assessment. There is no use of quality of delivery consistently in the PLI literature. However intentions and perceptions of therapists and supervisors having delivered a programme with fidelity is unlikely to be enough to explain for whom PLIs to treat ADHD behaviour is successful and for whom it is not (Hogue et al., 2015). Quality of delivery may therefore be a concept that represents this proportion of theoretical variation: If a participant has... (i) been thought to have had enough content delivered over an adequate period of therapist time, (ii) that this “dose” has been delivered competently and adhered to treatment intentions according to therapist and independent report and that (iii) all factors affecting barriers to treatment absorption and enactment have been controlled for (parent, child, family and therapist factors)...then all remaining variation of effectiveness at the therapist-participant level may be due to the interaction of these factors. This can results in sub-optimal therapist delivery and sub-optimal parent readiness/capacity for change, meaning the full change potential of the intervention is not realised (S. M. Campbell et al., 2000).

In order to begin to separate out variation in the effectiveness of an intervention due to delivery factors around quality the following need to be routinely measured and accounted for in PLI trials for ADHD: (i) at the trial level (a) relative effectiveness of an PLI for the current trial versus others of its type (b) relative recruitment proportion compared to previous/similar trials (as a reflection of minimising barriers to treatment) and differences in baseline variables for those recruited versus the target population (at a minimum; parental education and family income, child age and symptom severity, parental age, single parent status, parental ADHD and wellbeing). (c) (If more than one...) treatment differentiation obtained as expected, (d) parental expectations/preconceptions re treatment[s] (to assess how this influences retention in the trial). (ii) At the therapist level - (a) variation in effectiveness for all the trial individuals they deliver to and (b) therapist preconceptions,

self-efficacy and investment in the trial process. (iii) At the individual participant level (a) readiness for change and capacity for change and (b) influence of parent, family and child characteristics on attendance, engagement and completion. (iv) Elements of therapist-parent interaction (a) (therapist and blinded reports) has treatment content been delivered, adherence to concepts specific to the programme maintained and do therapists perceive they have delivered this effectively. (b) (Parents and blinded report) have parents actually received what has been delivered; do they understand it and feel they will be able to put strategies into practice.

These last two points are probably where fidelity moves on to overall quality of delivery for the individual participant. If measuring these variables and [reliable and valid] proxy measures for the concepts involved does not help us better understand for whom the programmes work, it may be that we need to focus on honing/changing the programme content. This could be at the overall level of population programme delivery or targeting certain components to individuals according to actual or perceived need (Kolko et al., 2009).

6.5.1 Are Therapists Clear as to How Programmes Are Making Changes Before They Embark on Delivering Them?

As mentioned earlier, treatment receipt and treatment enactment are later additions to the fidelity concept that are sometimes considered to be consequences of good fidelity and/or outcome measures of this (Borrelli et al., 2005). In practice the following two questions are important in programme development, training and supervision: Firstly, does a therapist need to know what a certain strategy is changing and how it is doing this in order to then deliver it effectively? Secondly is it enough just to deliver the strategy as per the manualized programme or should they be clear endpoints that a therapist must look for before marking

something down as being definitively “delivered”? In current practice (for the NFPP and other PLIs), self-reports of material delivery by therapists are either physically documented e.g. on a delivery/fidelity checklist or simply mentally “checked off” by the therapist: a therapist feeling that unwanted behaviours in this area are no longer affecting a child’s long term ADHD prognosis (Hogue et al., 2015). Either way, would end points for different areas of a programme be a positive for therapists or a barrier to volunteer/start in the first place? Examples of possible end points for each target for change in the NFPP are shown in the Appendix (See Page 30).

Whether these or any additional markers of therapist delivery or parental absorption would make a difference to in-the-moment delivery is hard to say. The most important factor in this authors opinion will be removing any concern on the therapist’s part around their confidence in delivery. This would either be over-all in terms of delivering the programme in question, delivering it under the auspices of the trial in question or current clinical environment or for an individual parent, child and family (see fidelity versus quality section). There needs to be a balance between therapists feeling they have the confidence of trial leaders to deliver the programme versus them having the awareness, humility and access to support if they feel they are struggling with some aspect.

One of the problems with a programme such as the NFPP is its complexity. It is specifically trying to embody the aetiology behind ADHD and adapt known parenting principles to motivate parents and children with ADHD to change. The problems with living with ADHD are two-fold; firstly the impact on the child in terms of a sense of failure or failure anxiety in their self-regulation, general life skills and social interactions. This leads the child to develop a see-saw lifestyle of being hyper-vigilant and increasing their effort to prevent doing

something “wrong” versus times of giving up altogether. This latter reaction manifests either as physically or emotionally losing control (often labelled as “tantrums” unconstructively) or as an outward expression of not caring what they do or the effects it has on others. The point at which a child switches from trying to behave constructively to not, is often seemingly completely unpredictable from the outside. Whether a tantrum is easier to cope with compared with the blank, non-caring appearance of the switched off child is dependent on the timing, situation and individuals.

The second is, of course, the impact on the parent: When living with ADHD both the emotional investment of the parent in their child fluctuates as does their capacity, skills and belief in their parenting and drive to change. Anecdotally in terms of emotional relationship and the attachment of parent and the child, ADHD tends to not destroy this altogether. It is rare to hear parents talk about their child with ADHD at the start of a programme delivery in a way that shows no hope: qualitative studies into parental stress reveal conflicting feelings of empathy, frustration and stigma around parents experiences but do seem to shown retention of love in most (Leitch et al., 2019). The exception to this is often a child who tends towards the second of the above reactions to their perceived or actual inability to behave acceptability; a blank external appearance of not caring. (See Frick, 2024 for a review into callous-unemotional traits and treatment in young children with ADHD). Often one or other or both parents of a child with ADHD will have traits themselves and/or experience of living with ADHD or other related conditions (oppositonality or Autistic Spectrum Disorder for example - This may give more room for empathy and an ability to tap into experiences: for example when a parent may be reacting to a child who is behaving in a way that they themselves have done many a time before (although the psychology and findings behind this are complex; see Psychogiou et al., 2008).

The complexity of ADHD aetiology, the heterogeneity of its expression and the individual variation in expression is what results in the programmes that treat it being so complex (Fearon & Sonuga-Barke, 2022). However, it also means that any therapist who volunteers or ends up delivering the programme should know they have an uphill battle. Removing any “too-high” expectations or condemnations around therapists attempts and styles needs to be the aim. One does not want therapists to feel they need to say they have achieved a certain target of the programme when they feel they cannot for some reason (Hogue et al., 2015). In addition, trainers, supervisors and therefore therapists themselves need to know what they are trying to achieve with what they are delivering. If this is clear in the programme materials then having clear stepwise targets for change and endpoints, such as the measure used in this study should improve delivery fidelity. From this, if a given programme is indeed fit for purpose, effective change in child behaviour should ensue (see Chapter 5 section around the use of therapist feedback during intervention delivery).

6.6 Digital Technologies and their application to Parent Led Interventions and ADHD

Currently research studies exploring the effectiveness of parent led interventions tend to either use traditional face-to-face Parent Led Interventions (PLIs) or utilize behaviour intervention technologies (BIT). It may well be that using online methods as a complement to face-to-face components may make it easier for therapists to deliver the more complex material and aid parental receipt: for example being didactic about the delivery of factual and conceptual information to parents by requiring them to read/view this before or between sessions. Current technological systems allow clear measures that would determine how much effort was given, for example how long a parent spends on the page in question. This can be further corroborated and enactment improved by interactive

elements of programme delivery also being included in some online methods; for example videos demonstrating targeted behaviour and change strategies.

The term behaviour intervention technologies “BIT” (Bausback & Bunge, 2021) is used for all health related interventions that use material (written, recorded or interactive based on questions and responses) delivered via any modality that is not face-to-face (through internet/using web platforms, downloaded or mail-sent material). This does include teletherapy, which can be traditional PLI delivered live via video-conferencing technology. It also included the use of wearable devices used to collect data, either by prompting questions and answers to be completed or by collecting physiological, environmental and location-based data to aid other delivery components.

A recent meta-analysis (Bausback & Bunge, 2021) found 24 studies between 2000 and 2020 that involved interventions that were mainly delivered through parents, primarily treating externalising behaviour and targeting children up to 18 years of age (with all but having an age range with 15 years or less as the upper limit and 17 having individuals 12 years or less). They found that interventions that were fully automated produced significantly greater effects when compared to a waitlist non treatment control. Interventions were even more effective if they had an element of human support or were interactive. However, BIT interventions (either fully automated or with some human/interactive elements) were not significantly more effective when compared to traditional face to face PLI.

Despite this paper not finding behaviour intervention technologies (BIT) based interventions to be more effective than face-to face; The effect sizes for BIT interventions versus controls for non-specific externalising behaviour, are greater than those found for face-to-face treatment versus controls for non-specific EB (Mingebach et al., 2018) and for ADHD

behaviours by parent report (Groenman et al., 2022). There is no meta-analysis of the effectiveness of PLIs utilizing BIT to date for ADHD (although see Shou et al., 2022, for a meta-analysis into BIT interventions for ADHD with a range of targets - child, parent and teachers). One small RCT (Franke et al., 2020) of the online Triple-P intervention (n=27) compared with a delayed treatment control group (n=26) found that the online interactive programme was significantly more effective at reducing ADHD symptoms by parent report immediately post intervention. Finally, online human assisted BIT PLI versus face-to-face PLI in a single study RCT (DuPaul et al., 2017) found that online interventions were not superior to face to face on that occasion, although the sample size was modest (n=43).

6.6.1 How Can Behavioural Intervention Technologies Improve Delivery and Effectiveness Through Both Therapists and Parents

The above findings provide support for the delivery of online material being an effective method of inducing behavioural change in children with externalising behaviour and for ADHD. There are mixed reviews about whether parents are as satisfied with online delivery versus face to face. This is probably dependent on individual wishes and barriers associated with different delivery factors (Shou et al., 2022). Either way the ability to both standardize content and individual delivery of some content to participants (for example differences in presentation and impact for girls vs boys (Young et al., 2020) and those of different cultures (Slobodin & Masalha, 2020) has to be a possible way to improve treatment fidelity and delivery quality for the future. Given the complexity of the NFPP and the heterogeneity in ADHD aetiology and individual expression, technology could also be used to improve delivery by the therapists and prevent therapeutic drift. For example, a podcast could be produced that summarises the aims for the session they are about to deliver. If this is kept

short and comes up as a priority on the top of a delivery app individual to that therapist (i.e. it is easy to find and displayed in a timely manner relative to the individual participant's session) then it can be reviewed in the car or generally as part of pre-session preparation time. If this is linked to parental and therapist electronic/app-based feedback as to the targets for change and progress on these, other relevant materials can be available for strategies that may need to be re-addressed from previous sessions. Finally, if this can be linked to whatever method a therapist uses to make their reflective notes from a session it should not add to the burden of delivery of the programme. Combine this with simplifying and prioritizing the programme elements that are most important/effective and with removing any blame- or comparison- culture from supervision and collegial discussion, we could be on the way to individualizing and optimizing the effectiveness of ADHD treatment.

6.7 Conclusion

Quality of delivery as per this bespoke measure did not independently predict any outcome (although some patterns of outcome for two sub-scales – effective communication and scaffolding through play, gave some promising findings). Some findings from this study are slightly contradictory to existing evidence and may give more motivation for studies to included process method variables in their trial planning procedure early on. This study showed that some baseline factors do predict attendance/quantity of delivery at PLIs to treat ADHD and in addition attendance in this study did predict outcome. However once quantity of delivery is controlled for (through inclusion criteria and using the measure applied in this study), neither quantity (number of sessions nor time in treatment) nor quality predicted outcome. Only those with children with higher baseline levels of ADHD/ODD have greater change scores at both immediate and delayed follow-up.

Through discussion, findings from both the PLI and other talking-therapy literature have presented options for future trials of this type; Strict and contemporaneous monitoring of delivery quantity and delivery factors (those evaluating therapist and parent capacity and ability to produce/operationalise change) should be standard and these should be quantitatively incorporated into analysis where significant variation is found. Furthermore, once the components of a programme have been successfully identified and their change methods clearly communicated, the amount and quality of their delivery may become more standard, reducing the need for inclusion in outcome analysis. Using this to feed back to therapists (and/or) parents contemporaneously during delivery may further-improve quality and can be applied in the future development and understanding of programmes to treat this common and potentially manageable entity. Let's move ADHD from a "condition" to a "characteristic" or "trait" and thus be able to bring forward in society all the positive elements we know it brings.

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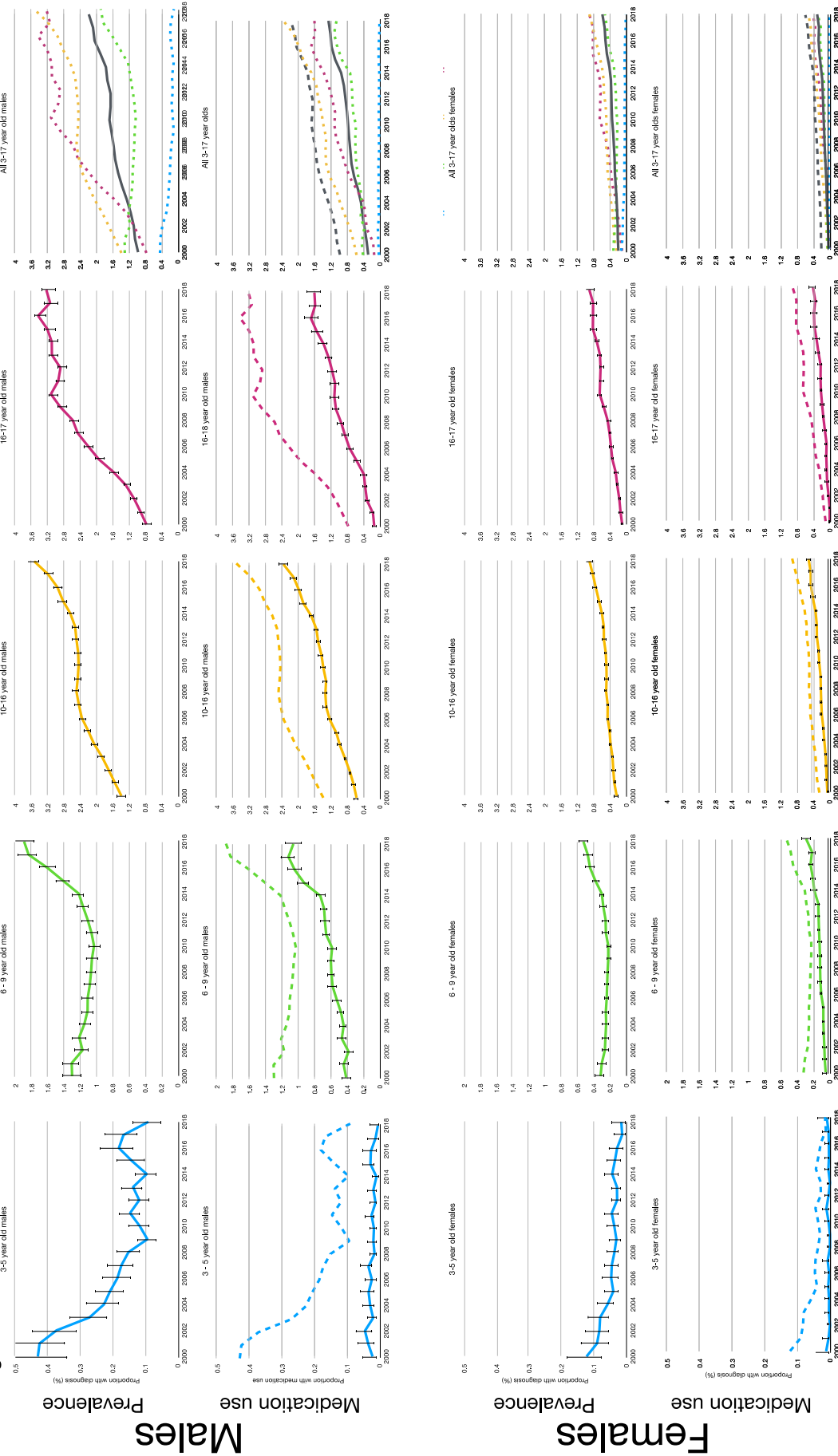
Administrative Prevalence and Medication Use for Children in the UK

A figure showing the prevalence and medication use for children in the UK from 2000 to 2018,. This is broken down into...

3-5 6-9 10-16 ...year-old age groups

and 16-17

AND gender...



Data from; McKechnie, D. G., O'Nions, E., Dunsmuir, S., & Petersen, I. (2023). Attention-deficit hyperactivity disorder diagnoses and prescriptions in UK primary care, 2000–2018: population-based cohort study. *BJPsych Open*, 9(4), e121. Chicago

Quality of Delivery Measure

Target for change	Mentioning			Exploring/Explaining				Changing		
	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3	Level 4	Level 1	Level 2	Level 3
1. Psychoeducation: What are the unwanted behaviours my child shows and what [more] do I need to know to change these?	Therapist mentions ADHD "Triad": Hyperactivity, Impulsivity and Inattention	Therapist explains about ADHD subtypes AND that some children have neurocognitive deficits	Therapist explains that ADHD is different for each individual AND brings in the effect of different environments	Therapist/ parent discuss ADHD symptoms of the individual child	Therapist uses individual child behaviour examples to show parent what is hyperactivity, impulsivity and inattention.	Therapist uses individual child examples to begin to identify what if any neurocognitive deficits the child may have.	Therapist begins to work with parent to explore what environmental factors are significant for their child	Parent shows understanding of when their child's behaviours are or are not ADHD and begins to separate inattention, over-activity and impulsivity	Parent begins to show using examples that they know when other things outside their child's control causes behaviours.	Parent reaches the stage where they appear to accept their child's behaviour and work out why it happened instead, i.e. remove blame and emotional consequences
2. Parent child emotional relationship: That a child needs to feel safe, believed in and supported so that they can try, learn and succeed at new things.	Therapist mentions that living with ADHD can make the parent and the child feel differently about each other AND that this is normal AND mentions early influence of infant ADHD behaviours and temperament were relevant	Therapist mentions that the way the parent and child feel about each other can affect the way they work together from day to day. This is often due to lack of parental self-efficacy OR child self-esteem	Therapist mentions the principle that stress, low parental self-efficacy, child self-esteem etc. can all mean we see more negatives than positives and the cyclical nature of this. Introduced the use of praise to start noticing the positives (and seeing less negatives implied)	Therapist uses parent or child examples to explain the type of things that a good p-c relationship needs: Warmth, availability, meeting the child's needs AND child "giving back" so parent has self-efficacy and why	Therapist is able to get parent to talk about how the child's ADHD has affected them, their child and the PC relationship in terms of: Family, school behaviour & learning, child's life skills, self-concept and social skills and risky activities	Therapist and parent explores how the parent feels about their ability to parent their child AND how this affects their behavioural management Includes parents experience of their parenting as a child and/or with other children they have had.	Therapist uses parent examples to explore how much praise the parent is using and how to use praise successfully in turn: 1. as much as you can, as soon as you can. 2. labelled praise 3. in front of others 4. doing this WITH the matching body language AND effort	Parent is able to give example where the impact of ADHD has changed the way they respond to their child's behaviour AND when their child's behaviour affects the way they feel about the child. Therapist may bring Perspex shield in here also.	Parent is able to give an example where their reactions and feelings towards their child have been affected by: (a) Parental self-efficacy (b) Improved child behaviour/family chaos (c) They are noticing positives in child	Parent gives examples about when they could or have used praise and earshotting in the correct way with their child and makes it clear that they know why they "should" be doing it.
3. Effective communication Making sure that you know what, how and why you are telling your child something or what you want them to hear/do SO THAT you can "know" any negative behaviour is not due to this AND so they learn how to do this too.	Therapist mentions that ADHD may have affected the ability of the parent and child to tell each other what they need or how they feel	Therapist mentions that ADHD means the child is less able to listen, hear and act upon things the parent tells them	Therapist mentions that the parent might not be helping the child understand what they are saying in the first place because of a breakdown in effective communication steps	Therapist explores using parent examples whether the parent knows if and how they are getting their message through and checks parent has ways of monitoring this. e.g. examples parent gives when they ask their child to do something and it doesn't happen	Therapist begins to breakdown steps of EF using examples the parent brings Do they know what they want the child to do, will the child be able to do this do they know how to achieve this ie short sentences. AND recruit the child's attention and remove distractors	From the child's perspective is the child listening, do they hear what the parent says, do they understand and remember it (repeating back) AND do they need more support to carry it out. I.e. countdowns, reminders, etc.	Therapist with the parent uses examples to link episodes of good and poor effective communication WITH positive or negative behaviour the child shows and explores the signs parents use to recognize this. I.e. parent has the skills to monitor effective communication and has the motivation to change this	Parent is able to realise when they or their child have or have not communicated effectively and show this consistently with examples they give.	Parent is able to realise at what point in the communication attempt the situation broke down and indicates from their examples that they know both they and their child might need to make changes to improve this.	Parent begins to mention how she could change with specific examples using WPEP strategies: 1. short, simple sentences 2. not "setting your child up to fail" 3. Recruit attention 4. Repeating back 5. (optional) motivation, prompting and support to complete tasks)

4. Lowering the number/severity of behavioural episodes: prevention and de-escalation: That you can use quick, easy ways to lower the amount of UB your child shows and that this will lower the amount of stress from day to day. Routines	Therapist explains that all children but especially those with ADHD need routines in their life: Mentions: predictability and control, early warning about change I.e. that routines need to be in place for behavioural improvement to occur	...[what might need changing] and that parents might need to improve routines (1) plan ahead (2) change their habits e.g. shopping times, efforts to help child do more for themselves. (3) seek support e.g. childcare for weekly shop if child cannot cope	Therapist explains that setting routines and giving clear behavioural boundaries is even more important in ADHD and that without boundaries and predictability anxiety and pushing limits can result	Therapist finds examples with the parent when; (i) the child's day is more or less predictable with good of poor/no routine in place AND shows	AND THEN (i) links lack of routine TO the positive and negative behaviour the child then shows	Therapist uses parent examples to explain the way routines are used and why: (A) for a set period of the day e.g. getting ready for school (B) Has the parent broken the steps down and checked their child can achieve these (+/- timings) (C) That it has to be clear, consistent and communicated effectively	Therapist moves on to explain to parent how they would do this: (a) Functional Analysis: pick the best/most troublesome example and links this to child's behaviour PLUS how routine will improve this (b) Does the parent need to help the child with: (i) schedules (ii) prompting/counselling (iii) motivation and more support	Parent is able to give examples for themselves when their child's positive and negative behaviour was due to their own good or less good routines they have (or have not got) in place AND can identify the point in the example where the organisation/planning broke down	The parent is able to state their own role in terms of successful and unsuccessful routines AND link/acknowledge their actions to the behaviour their child showed	Parent is able to give examples when and how they would change their routines and planning ahead and suggests they realise why this would improve their child's behaviour E.g. A. provide the child the support and resources they need for this e.g. schedules, reward charts, countdowns B. That there is/will be consistency between carers and with parent over time/place C. That the parent realised this applies to all aspects of organisation and planning ahead
Behavioural boundaries	Therapist explains that all children but especially those with ADHD need (i)...clear behavioural boundaries. Mentions: needing BB to feel safe/not push boundaries. AND that the first step to managing behaviour might be to avoid conflict in the first place	(ii) And in order to set clear achievable boundaries parents may need to: (i) Do things differently that they than they would with non-ADHD children (e.g. "let the child off" more) (ii) Work together and not let the child play off two or more carers House rules	Therapist explores examples with the parent when; (1) the parent does or does not make it clear when the child's behaviour is OK and when it's not OR (2) when they are not inconsistent in this e.g. over time, between carers, in different situations AND links this to the positive or negative behaviour the child shows	Therapist helps/checks the parent: knows how and when boundary setting will and will not work: (i) What is the behaviour parent is addressing? (ii) What is the replacement behaviour/strategy (iii) Does the child know what they are doing is wrong AND (iv) Are they able to stop it by themselves OR do they need support	Therapist explores with parent their understanding of why their child does what they do and whether the parent is fair/consistent in their attributions: (i) Is this a fair/consistent behaviour the parent needs to address (or is ignoring better) (ii) Does the child know what they are doing is wrong AND (iii) Does the child know what they are doing is wrong AND (iv) Are they able to stop it by themselves OR do they need support	Therapist is consistent in the way they explore boundary setting: (i) Child's awareness of rule: e.g. "does the child know that is not what they are meant to be doing" (ii) Opportunities for prevention: "did you know child's was going to do that?" (iii) Consistency: "what do you normally do in that situation" (iv) Effectiveness "does that normally work" (v) collaboration: "have you discussed this with child before hand?"	Parent is able to give examples for themselves when.... ..their child's positive and negative behaviour was due to their own good or less home Parent demonstrates that they know when and how they can avoid conflict at times when this is the best choice (but doesn't always manage this)	The parent is able to state their own role in terms of... successful and unsuccessful boundary setting AND link/acknowledge their actions to the behaviour their child showed	Parent is able to give examples where they would correctly and consistently use behavioural boundaries WITH rewards and consequences appropriated to positively reinforce positive behaviour and lower negative behaviour	

Delay aversion/ Managing time	Therapist explains that children with ADHD have much more difficulty judging and following time AND that children with ADHD have a problem waiting for things especially if they cannot "see" a reward being close by/good enough to wait for	Therapist mentions that this can affect: 1. the child's ability to use countdowns effectively e.g. "we will be leaving in five minutes can you put your shoes on please?" - if the child does not know how to judge this is they will not be successful (without a further prompt) 2. Their ability to wait for things once they have them in their mind: they need to learn to wait.	The therapist mentions to the parent the steps they might have to go through to help their child learn to use time and to wait: 1. Does the child tell the time/aware of how long a certain period of time is? 2. Does the child understand a digital or analogue clock? 3. Can the child do something/wait within a period of time if it is salient/motivating enough?	Therapist explores with the parent how they use: 1. timers/clocks 2. countdowns 3. prompts ...within their household	Therapist tries to separate the use of countdowns for behavioural purposes FROM those used to support the child and work with them on aspects of managing time, planning and task execution and learning to wait/use long term rewards	Therapist explores with the parent how they can use NPPP strategies to teach the child how to understand time so they can learn to plan and comply with parental requests (and avoid negative consequences of not doing what's asked of them within the time frame given).	Therapist explores with the parent how they can use NPPP strategies to teach the child how to understand time so they can learn to plan and comply with parental requests (and avoid negative consequences of not doing what's asked of them within the time frame given).	Parent has begun to use timer/clock, countdowns and prompts in a supportive way separately from behavioural countdowns (more punitive uses) AND that the parent has begun to support the child to wait especially when the child first comes into the room. AND child is showing from what the parent says that they are beginning to follow time and/or engage with the use of timers/ countdowns in the context of daily routines and task execution.	The parent and child are able to, from examples, work together in terms of time management and parents understand the steps they wish to achieve and why: 1. child is able to understand a digital or analog timer and "knows" how to use it 2. parent is consistent about prompts and uses timer in a set way to help child realise why they are using it e.g. morning routine/lower stress 3. parent is able to give examples about when they have used time management well or not and why	Parent understands the steps they need to go through and why to help their child learn to wait: 1. The child needs to "check the room" before they speak/act 2. The child needs to know they have been seen and heard and that they will be listened to as soon as the parent can 3. That the parent is regularly trying to help the child wait for salient non-stressful things e.g. snacks or computer time 4. That the child knows the parent is helping them do this and trusts the parent when they do so.
5. Lowering the number/severity of behavioural episodes: Modelling self-regulation, positivity. That the behaviour you and others show around your child will affect the way they manage similar situations.	Therapist mentions that children do not just learn by "doing" they learn by watching what other people do. Therapist names this emotional control e.g. if they shout at the child the child thinks shouting is ok.	Therapist explains that the way the parent reacts to things their child does is modelling the child's emotional control e.g. if they shout at the child the child thinks shouting is ok.	The therapist mentions that the parent can learn about how they feel when their child shows neg behaviour and try not to react. By finding out how to do this they can support their child to do this too.	Therapist uses parent example to identify the parent reacts negatively to their child's behaviour and helps the parent think about why this might be.	Therapist uses parent examples to explore whether the parent's negative reactions are due to... lack of support and/or feeling overwhelmed	Therapist explores with the parent how they can use NPPP strategies to teach the child how to understand time so they can learn to plan and comply with parental requests (and avoid negative consequences of not doing what's asked of them within the time frame given).	Therapist explores with the parent how they can use NPPP strategies to teach the child how to understand time so they can learn to plan and comply with parental requests (and avoid negative consequences of not doing what's asked of them within the time frame given).	Parent begins to be able to notice at the time when they are reacting to their child's behaviour in a constructive way and when they are not.	Parent begins to voice examples how they think their child's behaviour is different when they respond constructively and when they don't	Parent begins to suggest ways they can improve their child's behaviour BY changing their own behaviour AND using NPPP strategies: 1. keeping calm e.g. Perspex shield 2. Mirror image: stopping negative feelings affecting the way your face and body looks 3. Mutual respect 4. Support from others/looking after yourself to be able to look after your child

6. Parent child working relationship: That the parent needs to be able to understand their child's abilities and areas where they need more support and use scaffolding methods to help them manage for themselves.	Therapist mentions that the parent needs to understand what the child can and cannot do for themselves AND how ADHD behaviours and the ADHD brain affect this	Therapist mentions scoping and explains a simple example of scoping Reiterates message that ADHD means their child needs more help and that more effort might be needed at first for gains later: Parent to become child's "guide and trainer"	Therapist prepares the parent for "attention training": giving the parent the key things they need to scope their child's behaviour in the context of ADHD: (i) concentration and attention, (ii) listening, following commands + role of oppositionality, (iii) highlighting differences in behaviour across context (e.g. salient versus non salient activities)	Therapist explores examples and time spent with child and parent to explore how parental factors and child factors affect their ability to work together.	Therapist uses parent examples and time with P+C to point out to the parent these different points and how they affect the way they work with their child.	Therapist begins to scope the child's ability in set scenarios or using play examples to model this for the parent. Therapist begins to add in concepts of practicing, re-scoping and consolidating.	Therapist explores with the parent how they can use rewards or positive support in the future to change a behaviour they may currently be needing to using time out for.	Parent is able to state using examples when their child's behaviour was purposeful/more controlled VS. times when it was due to poor emotional or behavioural self-regulation AND that they can comfort their child/ managing their emotions effectively in most "tantrum" situations when at home (see TiorC8)	Parent is able to show that they know when their child: 1. is about to show negative behaviour and how quiet time could be used 2. Know when their child can be talked down vs when they are beyond this 3. That time out should be used only when their child is emotionally able to benefit from it AND when this would be	Parent begins to use the words (or their own label) for "scoping" (not necessarily the others) and is able to demonstrate their own successful scoping of their child in a certain situation and area of change (behaviour, learning or life skill). Parent is also able to demonstrate understanding of other relevant factors needed for successful learning e.g. PC emotional relationship factors, Eff Com, motivation and reward)	Parent begins to be able to move on from scoping to how they would practice, extend, rescope and consolidate for their child in a certain named area. Parent is also able to demonstrate understanding of other relevant factors needed for successful learning e.g. PC emotional relationship factors, Eff Com, motivation and reward)
7. Lowering the number/severity of behavioural episodes: Lowering behaviour that is aggressive or is leading to coercive cycles of behaviour between parent and child. That the parent is able to identify times the point in a behavioural episode where things "went wrong": Help the parent help their child to reach their goals in more positive ways. Use PUJ methods to change this.	Therapist mentions that: 1. rewards work better than punishments/ sanctions in ADHD 2. That harsh/corporal punishment is not constructive long term 3. That punishments should be a last resort	Therapist mentions the different points in a behavioural episode where TiorC 7 strategies might be used: 1. When child needs emotional or physical support before beh is shown (talk down, distraction, quiet time) 2. When the child has reached the point where they will not respond to verbal or physical support. 3. When the child shows behaviour [in non-emotional situations] that is not-acceptable	Therapist states clearly the difference between quiet time and time out AND Mentions the concept of "we vs I" so that parent knows that all these strategies should be used in a supportive way so the child knows the parent is doing it for their own good long term.	Therapist explores with the parent using examples when time out will and will not work SO THAT parent knows the difference between punishing the child and supporting them to manage their emotions and behaviour	Therapist works with the parent to look at: 1. if they are able to recognize when their child is emotionally or physically overloaded 2. if their child "knows" the parent is helping them SO THAT the parent is able to distract or use quiet time 3. How well the parent is able to calm their child when they are past the point of reason	Therapist explores with the parent if "knows" what they did was wrong. From this does the therapist and parent explore when time out might be used in those situations VS. the parent "ignoring" or "setting aside" the behaviour in order to manage the situation.	Therapist explores how they can use rewards or positive support in the future to change a behaviour they may currently be needing to using time out for.	Parent is able to state using examples when their child's behaviour was purposeful/more controlled VS. times when it was due to poor emotional or behavioural self-regulation AND that they can comfort their child/ managing their emotions effectively in most "tantrum" situations when at home (see TiorC8)	Parent is able to show that they know when their child: 1. is about to show negative behaviour and how quiet time could be used 2. Know when their child can be talked down vs when they are beyond this 3. That time out should be used only when their child is emotionally able to benefit from it AND when this would be	Parent is able to think about their child's behaviour objectively most of the time and does not talk about "fault". From what they say during sessions it is clear the parent is working with/for the child's best interests and that they know how to use NPPP TiorC 7 strategies (including reward instead of punishment/sanctions such as time out) to achieve this in the future.	Parent begins to be able to move on from scoping to how they would practice, extend, rescope and consolidate for their child in a certain named area. Parent is also able to demonstrate understanding of other relevant factors needed for successful learning e.g. PC emotional relationship factors, Eff Com, motivation and reward)

8. Generalizing, extending, sustaining and transferring the PU methods after the course is finished. Helping the parent develop strategies and communicate with others around having a consistent approach to their child's life, social and behavioural management. Help them understand how the PU strategies can be used by the child as they mature.	Therapist mentions the importance of consistency in the way the parent handles behaviour of a similar type...: 1. themselves over time 2. themselves in "safe" places (like home) and in other places/situations 3. between parents/carers	Therapist mentions that the NFPF strategies are being used so that in the future the child use can use strategies for themselves as they grow older and more independent	Therapist mentions that the following are important for the parent, child and others to use the NFPF long term 1. understand for what, why, when and how the strategies are used 2. to keep using them after the programme has ended 3. to be aware that things might change and come back to the NFPF materials or seek further support if needed	Therapist and parent re-explore the original aims to the parent and discuss whether these have been met	Therapist and parent discuss any shortfalls in the parent's expectations or aims and whether the parent feels they have the skills to address these themselves.	Therapist and parent discuss how the parent thinks they are doing in terms of consistency: 1. times and situations (generalization) - AND 2. between parents/carers (extending) They also think about whether the parent is able to continue: 1. making the changes they have already started to make 2. making changes they know how to do in principle but having yet started 3. help the child manage these for themselves as they develop	Therapist and parent discuss whether the parent thinks they need more therapeutic support or instruction (e.g. repeating some parts of the NFPF) in order to meet the goals in the last section	Parent understands, from successful examples they give OR by recognising the need to change something in less successful example, that they and others need to be consistent enough for their child to respond to changes they make and for these to last long term.	Parent is aware that the NFPF strategies being used with their child at the age they are now may need to change as their child develops AND have shown that they know the aim is to teach their child to manage their behaviour on their own in the future.	Parent shows insight into the amount of skills they had and the level they have got to now. Parent shows that they know if and where they still have work to do. Parent clearly expressed that they either need more help or that they would know when they did and have the will and resources to seek that help.

Data Collection Methods - All Participants

[illegible]

Data Collection Methods - Individual Participants

TftrC	MenLev1	MenLev2	MenLev3	ExpLev1	ExpLev2	ExpLev3	ExpLev4	ChgLev1	ChgLev2	ChgLev3	
TftrC1PsychEd	Reached	1	1	1	1	1	1	1	1	1	Session 3: Not mentioned that ADHD is different in different situations. Not mentioned child's reactions or how anxious it was. Session 6 (7:00) from father directly mentioned in context of
TftrC2EmoRel	NoteNo	3670	3673	3727	3702	3713	3714	3724	3725	3726	Session 3: not specifically asked mum if she feels she's doing better. Hinted at it, mums body language suggests this, not sure how positive. Session 6, child responded specifically asked but
TftrC3EmCom	NoteNo	3674	3675	3679	3686	3687	3704	3708	3720	3746	Session 3: Not discussed child's receptive language in specific behavioural scenarios Session 7: still not visible
TftrC4Routines	NoteNo	3669	3690	3691	3700						Session 3: Not mentioned at all Session 7: still not broken down a set routine (apart from me times but then he has been using the timer as made at home. Therapist suggested a visual schedule in
TftrC4Behbounds	Reached	3705	3706	3710	3711	3712	3739	3740	3754	3756	Session 3: Not discussed use of rewards at all Session 7: still no structured use or discussion of rewards and consequences for this child
TftrC4Time	NoteNo	3676	3677	3678	3684	3698	3707	3721	3741	3742	Session 3: Not mentioned the use of timers to help child understand time. Examples used by
TftrC5ModPos	Reached	3692	3693	3694	3695	3709	3718	3722			Therapist and MPPP. (a) not saying "later" but saying after X or when you've done Y. (b) using a situation of behaviour Session 7: conversation has none use none specific. I am not sure how time
TftrC6WorkRel	NoteNo	3680	3681	3682	3683	3685	3723	3732	3747	3749	Session 3: Doing zone of proximal development as we speak (50:15) BUT all been theoretical. Good BUT need to talk about content of their home time
TftrC7CycBeh	Reached	3672	3688	3696	3699	3703	3715	3728	3733	3734	Session 3: covered very well the aspect of any sanction needing to be supportive. Specifically in
TftrC8Future	NoteNo	3751	3697	3716	3701	3717	3735	3736	3745	3752	Describing to the parent that children with ADHD may need them to be "present" during time or if
	Reached	1	1	1	1	1	1	1	1	1	Session 7: not addressed original aims at all yet. Although hitting and throwing behaviour is one of
	NoteNo	3671	3729	3730	3737	3738	3750	3757	3758	3760	those that therapist is doing most
	Length		VA1		Parent-Therapist working relationship				Words added 5/7/21		
Tape 1	11/10/21 1:07				2	3	4	5			Is this good enough for the therapist to listen to the parent and the parent to fully inform the therapist
Tape 2	11/10/21 1:32				Therapist adaptation of programme to individual family						e.g. therapist tries to deliver a strategy or concept and parent does not want to do this AND therapist does not try and adapt the conc
Tape 3	11/15/21 0:25				2	3	4	5			
Tape 4	11/15/21 0:53				Parent engagement, stage of change and operationalizing potential						e.g. parent nods and smiles but is not making the changes underneath this
Tape 5	11/18/21 1:03				2	3	4	5			
Tape 6	11/18/21 0:17				Fidelity and quality of delivery						Delivering the context, concepts and strategies correctly
Tape 7	11/18/21 0:32				2	3	4	5			
Tape 8	11/18/21 0:28				Not at all very poor						Total number of check marks
Tape 9	11/18/21 1:29										91
Tape 10	11/19/21 1:15										
Tape 11	11/19/21 1:00										
Tape 12	11/22/21 1:15										
Total time											



National Research Ethics Service

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20 October 2011

Prof. Edmund Sonuga-Barke
Professor of Developmental Psychology
University of Southampton
Psychology
Shackleton Building (44)
Southampton
SO17 1BJ

Dear Prof. Sonuga-Barke

Study title: A multicentre randomised controlled trial comparing the efficacy of a specialist and a generic parenting programme for the treatment of preschool ADHD.
REC reference: 11/SC/0391
Protocol number: 8276

Thank you for your letter of 12 October 2011, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information was considered in correspondence by a sub-committee of the REC. A list of the sub-committee members is attached.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Full document available on request

11/SC/0391

Please quote this number on all correspondence

With the Committee's best wishes for the success of this project

Yours sincerely


Dr Chris Markham
Chair

Email: scsha.sehrec@nhs.net

Participant Consent Form - COPPI



PARENT INFORMED CONSENT FORM – RESEARCH FELLOW SCREEN

Comparison of Preschool Parenting Interventions (COPPI)

Name of Participant _____

Name of Researcher _____

Please initial boxes

1. I confirm that I have read and understood the information sheet about the screening interview and have had the opportunity to ask questions ☐
2. I agree to take part in this research. ☐
3. I agree to complete a telephone interview with a researcher about my child (5 minutes to 40 minutes duration) to determine if I am eligible for inclusion in the parenting programme. ☐
4. I agree for part of this interview to be audio-recorded for the purpose of scoring and researcher supervision purposes. ☐
5. I understand that, if I prefer, I can request to be interviewed by the researcher at my home or at some other location convenient to me. ☐
6. I understand that I am free to withdraw from this interview or the research at any time without giving a reason. This will not affect my rights to service use or any other treatment to which I may be entitled now or in the future. ☐
7. I agree to allow the researchers named on the information sheet to store anonymised data on a University computer for up to 15 years after the study has finished. ☐

Name of Participant

Date

Participant signature

Name of Researcher

Date

Researcher signature

(We will provide you with a copy of the completed form also signed by the Researcher who will carry out the interview.)

Programme for Early Detection and Intervention for ADHD

School of Psychology, University of Southampton, Highfield, Southampton SO17 1BJ.

Tel: +44 (0)23 8059 4519; Fax: +44 (0)23 8059 4597; dcm1@southampton.ac.uk

This study is funded by Solent NHS Trust and carried out in collaboration with Solent NHS Trust, Southern Health NHS Foundation Trust and Southampton City Council.



Solent NHS Trust and
Southern Health NHS Foundation Trust

Ethics - Thesis Study Ergo

University of Southampton

Submission View

<https://ergo2.soton.ac.uk/Submission/View/48454>

ERGO II

Ethics and Research Governance Online



48454 - Reanalysis of data from the COPPI trial ((A comparison of the clinical effectiveness and cost of specialised individually-delivered parent training for preschool attention-deficit/hyperactivity disorder and a generic, group-based programme: A multi-centre, randomised controlled trial of the New Forest Parenting Programme versus Incredible Years).

Details

Status

Approved

Category

Category B

Submitter's Faculty

Faculty of Environmental and Life Sciences (FELS)

The end date for this study is currently 31 December 2024

 [Request extension \(/ExtensionReq/ViewCreate?submissionId=48454&showSubmissionLink=False\)](/ExtensionReq/ViewCreate?submissionId=48454&showSubmissionLink=False)

If you are making any other changes to your study please create an amendment using the button below.

Latest Review Comments

23/05/2019 12:53:55 - Committee: Approved

No comments

17/05/2019 08:01:33 - Committee: Approved

No comments

Amendment History

 **Original Submission 48454** (Created 21/03/2019)

User Uploaded Documents

Title	Version Number	Document Date	Document Type	Size
1.  48454 Ethics Application Form for Secondary Data Analysis (/Document/DownloadSubmissionAttachment?submissionId=48454&docId=4062061) 	1	01/04/2019	Ethics Form	339 Kb
2.  48454 Ethics Application Form for Secondary Data Analysis_Rev1_02.05.2019 (/Document/DownloadSubmissionAttachment?submissionId=48454&docId=4065081) 	1	02/05/2019	Ethics Form	340 Kb
3.  48454_EmailMScStudentEthics (/Document/DownloadSubmissionAttachment?submissionId=48454&docId=4065082) 	1	02/05/2019	Ethics Form	143 Kb
4.  FORM 5219 - Request for Data Sharing v2 10 Dec 2018mjjt.reviseddocx (/Document/DownloadSubmissionAttachment?submissionId=48454&docId=4065736)  New	3	12/05/2019	Ethics Form	341 Kb

Checklist

Submission Questionnaire 

Attachments 

Coordinators

Margaret Thompson (mt1@soton.ac.uk)

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Samuele Cortese (sc6r14 Samuele.Cortese@soton.ac.uk)

Catherine Thompson (cet1c13@soton.ac.uk)

→ Create Amendment

 Abandon Study

NFPP Training - Timetable for the 3 days

New Forest Parenting Package

Wednesday 9th July 2008

0900 Coffee and Registration
09.30 Introductions and housekeeping
10.00 Behavioural dis-regulation ADHD, Temperament and ODD – Dr Margaret Thompson
11.00 Coffee
11.30 Psychological underpinnings of parenting and results of previous trials – Dr Margaret Thompson
12.30 Lunch
13.00 Brainstorm temperament ADHD, Genetics – group task – Cathy
14.00 Parenting Principles and Parenting Styles – Cathy
14.45 Tea
1500 View week 1 – parenting scaffolding, engagement and motivation – Cathy
1630 Discussion and close

New Forest Parenting Package

Thursday 10th July 2008

0900 Coffee
0930 Review of Day 1 – Recap
1000 Engaging difficult parents –
11.00 Role play of parenting scaffolding assessment, issues of week 1 diaries – Cathy
12.30 Lunch
13.00 Week 2 video excerpts, strategies – Margaret and Cathy
14.45 Tea
14.30 Week 3 video excerpts, principles of play and games – Cathy
15.30 Preparing parents for videoing on week 4 and excerpts of play feedback – how to feedback to parents- Cathy
16.15 Play games, snap, pairs, Simon says – Margaret
16.30 Endings

New Forest Parenting Package

Friday 11th July 2008

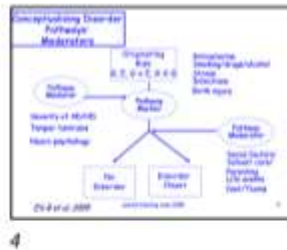
0900 Coffee and Registration
0930 Recap Weeks 1-3 – Margaret and Cathy
1000 Week 4-7 feedback videos re play and principles of each week – Cathy
1100 Coffee
1130 Group Discussion – holding through change
1200 Week 8 and endings – Cathy
1300 Lunch
1400 NFPP in group setting and use of self help manual
1500 Tea
1515 Evaluation, supervision, reflective diaries – Cathy and Margaret
16.30 Finish

NFPP Training Materials - What is ADHD?

Preschool hyperactive child

Margaret Thompson
Pediatrician/Consultant
Child and Adolescent Mental Health
Southampton University (2007)

1



Brain

The total brain volume is smaller in children with ADHD than children without ADHD. Specifically the four major lobes of the cortex: frontal, parietal, temporal, and occipital and the cerebellum, and the caudate nucleus.

3

Genetics

Categorical viewpoint with a molecular viewpoint of genetic causation (but although single genes have been implicated the odds ratios are low)

4

Genetics

Dimensional viewpoint which suggests that the condition is caused by the quantitative extreme of the same genetic factors which are responsible for variation in the normal range as well as the disorder range, called quantitative trait loci (QTL) hypothesis (Plomin, Owen & McGuffin 1994; Chen and Taylor, 2006).

5

Genetics

Resulting trait is distributed quantitatively as a continuous dimension rather than qualitatively different as a discrete disorder.

Gene-gene interaction (epistasis) important

Gene-environment effect on the dimension of hyperactivity in all children including children at the lower end of the expression.

6

Genetics

There is a vast amount of research into the genetics of ADHD.

Genes implicated are involved in the dopamine, norepinephrine, and serotonin systems: DRD4, DRD5, SLC6A3, SNAP-25, and HTR1B.

7

Genetics

Both norepinephrine and dopamine are potent agonists of DRD4, DRD5, DRD2 and the D4 receptor is prevalent in frontal-subcortical networks implicated in the pathophysiology of ADHD.

8

Genetics

Dopamine transporter gene (DAT). The monoamine oxidase A (MAO-A) enzyme moderates levels of norepinephrine, dopamine, and serotonin. COMT catalyzes a major step in the degradation of dopamine, norepinephrine, and epinephrine. Not associated with ADHD but is with Conduct disorder.

9

Genetics

The norepinephrine transporter (SLC6A2) Serotonin receptors: HTR1B and HTR2A Serotonin transporter (5-HTT, SLC6A4) SNAP25 is a 206 amino acid protein found on chromosome 20p12.

10



12

13

14

NFPP Training Materials - Session delivery

Week 1

Implementing the New Forest Parenting Package
Week 1
Cathy Laver-Bradbury
Dr Margaret Thompson

1

Overview of the afternoon session

- Presentation - Aims of the first week broken down into 3 sections
 - Fact finding
 - Tasks
 - Skills
- Practising the assessment process – working in pairs
- Practising parent education – working in pairs

2

Overview of Week 1

- Family assessment and careful history
- Listening to the parents story
- Scaffolding the parents (mood, organisation, personality, relationship with the child, learning difficulties etc)



3

Week 1 -Tasks

- Discussion of the NFPP
- Parent Education about ADHD
- Parent Education about Temperamentally difficult children
- Motivation to change approach
- Working together
- New approach

4

Week 1- Skills taught

- Respecting each other
- Listening skills
- Eye contact
- Recruiting attention
- Catching the good
- Diary
- Handouts (inc mat, liner and stickers)



5



6

Practicing the assessment process
Cathy and Margaret

7

Assessment

- Why now – what has brought the parents to request help at this time
- Family Tree – who lives in the household
- "Developmental History"
- Family Background
- "Early Years History"
- Medical History
- "Educational History"
- What do the family hope to get from this appointment/project?

8

First Task

- In pairs
- Assessment sheet – using scenario start an assessment feel free to ad lib to the scenario

9

Week 2

Overview and Implementing the New Forest Parenting Package
Week 2
Cathy Laver-Bradbury
Dr Margaret Thompson

1

Overview of the morning session

- Presentation - Aims of the 2nd week broken down into 3 sections
 - Fact finding
 - Tasks
 - Skills
- Video excerpts –Discussion working in pairs

2

Overview of Week 2 - Tasks

- Review and recap with parents how the week has gone D&G
- Review Diary
- Review ADHD characteristics
- Identify Positives
- Identify Triggers
- Parent as Trainer
- Motivation – change rarely occurs overnight
- Consistency and working together
- Accept the child
- Routine and structure
- Clear boundaries
- Safety rules

3

Overview of Week 2 - Tasks

- Scaffolding
 - Zone of proximal development
 - Extending
 - Consolidating
 - Rescope
- Teachable moments
- Praise

4

Week 2 - Skills

- Countdowns
- Reminders
- Clocks/Timers
- Warnings
- KIS
- Choices
- Tone of voice
- Keeping Calm



5

Week 2 – Skills cont.

- How to present limits
- Rewards
- Avoiding confrontation and arguments
- Mirror image
- Games
 - One
 - I want to Market



6

Week 2- Endings

- Diary
- Handouts
 - Games
 - Week 2 overview to parents
 - Scaffolding handout
 - Keeping calm and focused
- Reflective Diary

7

Video Excerpts

- What did you notice
- What was important to note
- What could have been emphasised more
- Reflections

8

Recap and Endings

- Reflect on what you have learnt
- What you need to know more about
- The impact on you at the end of the morning

9

Further weeks available if required

NFPP Process Methods - Fidelity Checklist Example

Accreditation/Fidelity

Name of Therapist:
 Trial Details (if applicable)
 Participant no (if applicable) 3008
 No of Sessions viewed
 Name of Accreditor/fidelity checker:
 Result of Accreditation/Fidelity:
 Date:
 Review date:
 General comment:

(Adapted CET) Coding

Level	Result
0	Not done
1	Partially done
2	Completed

Session 2 Parent Only

Topic	Rating	Comment
Recap with the parents any thoughts that may have arisen following the first meeting	0 1 2	
Think through how the week has gone with the parent.	0 1 2	
Review PTAP characteristics to behaviour (watch DVD with parents)	0 1 2	
Encourage the parent to accept the child the parent has and recognise his temperament	0 1 2	
Go through the diaries	0 1 2	
Identify positive behaviour with the parent	0 1 2	
Identify triggers for difficult behaviour with parent	0 1 2	
She if she can reflect on what would she do differently next time	0 1 2	
Ask the parent if you keep all diaries and you will copy them and give it back next week	0 1 2	
Ask if the managed to discuss previous week with partner	0 1 2	
Eye contact	0 1 2	
Recruiting attention	0 1 2	
Communications skills-short sentences	0 1 2	
Listening skills	0 1 2	
Praise	0 1 2	
Noticing the good	0 1 2	
Rewards	0 1 2	
Warning of change	0 1 2	

Handouts

Page 6 of 22

Child's Name.....DOB.....Date.....

What went well?

What needed more thought/wasn't covered?

Afterthoughts

Adverse Events?

Plan for next week

Signed.....Date.....

Page 1 of 22

Diaries 2 copies of positive and 2 copies difficult diaries
 Week 2 overview for parents x 2
 DVD
 Timer
 Assessing your child's abilities
 Working alliance inventory
 Completed Reflective diary Yes/No

[Adapted CET] Additional reflective diary information for this session: NONE

Table - Missing Data Group Comparisons

A Table showing baseline group comparisons of those with and without outcome measures available at all three-time points.

Variable or factor	Totals/SNAP -IV Time 1 Available	SNAP-IV Time 2		SNAP-IV Time 3		
		Available	Not available	Available	Not available	
Characteristics of caregiver receiving intervention						
Age - mean (Standard Deviation - SD)	29.95 (6.51)	30.53 (6.56)	27.33* (5.71)	30.40 (6.66)	28.65 (5.95)	
Female gender - n (%)	128 (96.2%)	105 (96.3%)	23 (95.8%)	95 (96.0%)	33 (97.1%)	
Single parent status - n (%)	41 (30.8%)	36 (33.0%)	5 (20.8%)	33 (33.3%)	8 (23.5%)	
Graduate level education - n (%)	15 (11.3%)	14 (12.8%)	1 (4.2%)	14 (14.1%)	1 (2.9%)	
School to 16 no qualifications	23 (17.3%)	16 (14.7%)	7 (29.2%)	16 (16.2%)	7 (20.6%)	
School to 16 GCSE's/ 'O'levels	38 (28.6%)	35 (32.1%)	3 (12.5%)	29 (29.3%)	9 (26.5%)	
Highers Scotvec or NVQ's	32 (24.1%)	23 (21.1%)	9 (37.5%)	25 (25.3%)	7 (20.6%)	
Sixth form school or college 'A' levels	22 (16.5%)	18 (16.5%)	4 (16.7%)	13 (13.1%)	9 (26.5%)	
University degree	13 (9.8%)	12 (11.0%)	1 (4.2%)	12 (12.1%)	1 (2.9%)	
Professional or postgraduate degree	2 (1.5%)	2 (1.8%)	0 (0.0%)	2 (2.0%)	0 (0.0%)	
Parental ADHD - CSS total score - mean (SD)	12.76 (9.58)	12.47 (9.72)	14.04 (9.00)	12.62 (9.74)	13.15 (9.25)	
Parental mental health – GHQ-12 total score - mean (SD)	14.89 (5.71)	14.99 (5.81)	14.46 (5.35)	15.02 (6.17)	14.53 (4.19)	
Characteristics of individual child						
Age - mean (SD)	3.61 (0.58)	3.60 (0.61)	3.69 (0.46)	3.63 (0.61)	3.55 (0.50)	
Female gender - n (%)	32 (24.1%)	26 (23.9%)	6 (25.0%)	22 (22.2%)	10 (29.4%)	
ADHD symptom count/severity at baseline - SNAP parent reported average item score [AIS] - mean (SD)	2.06 (0.51)	2.06 (0.50)	2.06 (0.55)	2.10 (0.48)	1.97 (0.58)	
ODD symptom count/severity at baseline - SNAP parent reported AIS - mean (SD)	2.03 (0.69)	2.00 (0.70)	2.16 (0.66)	2.03 (0.70)	2.03 (0.67)	

A Table showing baseline group comparisons of those with and without outcome measures available at all three-time points.

Variable or factor	Totals/SNAP -IV Time 1 Available	SNAP-IV Time 2		SNAP-IV Time 3	
		Available	Not available	Available	Not available
Environmental factors					
Disposable income per week - n (%)					
£200 or below	37 (27.8%)	28 (25.7%)	9 (37.5%)	23 (23.2%)	14 (41.2%)
£201 - £250	24 (18.0%)	21 (19.3%)	3 (12.5%)	21 (21.2%)	3 (8.8%)
£251 - £300	22 (16.5%)	16 (14.7%)	6 (25.0%)	14 (14.1%)	8 (23.5%)
£301 or above	43 (32.3%)	38 (34.9%)	5 (20.8%)	36 (36.4%)	7 (20.6%) ^Δ
Programme Delivery Factors					
Number of sessions					
Mean (SD)	7.81 (3.50)	8.70 (2.77)	3.79 (3.71)	8.79 (3)	4.97 (3.82)
Median	8.0	9.0	3.5	9.0	5.5
Range	0 to 13	0 to 13	0 to 11	0 to 13	0 to 11
Total time of delivery in minutes (from timesheets)					
Mean (SD)	653 (301)	709 (262)	362 (328)	722 (256)	441 (333)
Median	685	716	340	723	430
Range	0 to 1605	0 to 1605	0 to 1050	0 to 1605	0 to 1050
Average session length in minutes					
Mean (SD)	53.84 (14.35)	54.14 (13.69)	51.24 (20.62)	53.61 (13.87)	55.46 (18.70)
Outcomes					
ADHD Change score T1 to T2	-0.31 (0.53)	-0.38 (0.56)	0.00 (0.00)	-0.34 (0.51)	-0.23 (0.59)
ODD Change score T1 to T2	-0.32 (0.56)	-0.38 (0.59)	-0.05 (0.21)	-0.35 (0.55)	-0.23 (0.59)
ADHD Change score T1 to T3	-0.37 (0.63)	-0.46 (0.66)	0.00 (0.00)	-0.43 (0.64)	-0.22 (0.58)
ODD Change score T1 to T3	-0.32 (0.68)	-0.38 (0.74)	-0.05 (0.15)	-0.36 (0.71)	-0.22 (0.58)

ADHD - Attention Deficit/Hyperactivity Disorder; CSS - [Barkley's] Current Symptom Scale GHQ - General Health Questionnaire; ODD -Oppositional/ Defiant Disorder; SNAP – Swanson Nolan And Pelham questionnaire; T1 to T2 - Time 1 (pre-intervention) to Time 2 (immediately post intervention); T1 to T3 - Time 1 to Time 3 (6-months post-intervention end)

Δ p< 0.1 *P<0.05

Tables - Selective Regressions

Total QofD WITH Selective Baseline Variables

A table showing the regression statistics for a selective linear regression analysis: Income and child severity of behaviour at baseline WITH Quantity and quality of delivery [INDEPENDENTS] predicting ADHD/ODD behavioural change [DEPENDENT]

Variables	ADHD T1 to T2		ADHD T1 to T3		ODD T1 to T2		ODD T1 to T3	
	Sessions	Time	Sessions	Time	Sessions	Time	Sessions	Time
Overall regression stats	F(4, 41) =0.631 p=.643 R2=0.058 R2Adj=-0.034	F(4, 41) =0.563 p=.691 R2=0.052 R2Adj=-0.040	F(4, 41) =1.029 p=.404 R2=0.091 R2Adj=0.003	F(4, 41) =0.987 p=.425 R2=0.088 R2Adj=-0.001	F(4, 41) =0.516 p=.725 R2=0.048 R2Adj=-0.045	F(4, 41) =0.792 p=.537 R2=0.072 R2Adj=-0.019	F(4, 41) =0.968 p=.435 R2=0.086 R2Adj=-0.003	F(4, 41) =1.067 p=.385 R2=0.094 R2Adj=0.006
Weekly disposable household income	B=.092 t=.515 p=.609	B=.077 t=.426 p=.672	B=.124 t=.708 p=.483	B=.119 t=.676 p=.503	B=-.007 t=-.038 p=.970	B=-.036 t=-.204 p=.839	B=.147 t=.836 p=.408	B=.133 t=.754 p=.455
Baseline symptom count/severity (ADHD/ODD)	B=-.192 t=-1.230 p=.226	B=-.181 t=-1.164 p=.251	B=-.203 t=-1.354 p=.183	B=-.193 t=-1.289 p=.205	B=-.176 t=-1.121 p=.269	B=-.184 t=-1.196 p=.238	B=-.173 t=-1.152 p=.256	B=-.190 t=-1.270 p=.211
Quantity of delivery; Number of sessions	B=2.309 t=-.534 p=.596		B=-.096, t=2.436 p=.583		B=.115, t=1.925 p=.526		B=.131 t=.750 p=.458	
Quantity of delivery; Time programme delivered over		B=2.330 t=-.168 p=.867		B=-.070 t=-.394 p=.696		B=.216, t=1.213 p=.232		B=.170 t=.963 p=.341
Quality of Delivery (Total Score)	B=-.166 t=-.897 p=.375	B=-.187, t=-1.001 p=.323	B=-.224 t=-1.236 p=.223	B=-.232, t=-1.278 p=.208	B=-.138 t=-.742 p=.463	B=-.176 t=-.949 p=.348	B=-.269 t=-1.482 p=.146	B=-.284 t=-1.565 p=.125

ADHD - Attention Deficit/Hyperactivity Disorder; B - Beta (β) test statistic; F - Fishers exact test statistic; ODD - Oppositional/Defiant Disorder; R2[Adj] - R2 [Adjusted]; TforC - Target for Change; T1 to T2 - Time 1 (pre-intervention) to Time 2 (immediately post intervention); T1 to T3 - Time 1 to Time 3 (6-months post-intervention end)

Selective Regression: Target for Change 3

A table showing the regression statistics a selective linear regression analysis USING (TforC3) Target for Change 3 Quality of delivery [QofD] only (Effective Communication): Relevant baseline variables & Quantity of delivery (sessions OR time) & Quality of delivery TforC3 [INDEPENDENTS] predicting child behavioural change scores [DEPENDENT]

	ADHD T1 to T2		ODD T1 to T2		ADHD T1 to T3		ODD T1 to T3	
	Sessions	Time	Sessions	Time	Sessions	Time	Sessions	Time
Overall regression stats	F(4, 41) =0.600 p=.665 R2=0.055 R2Adj=-0.037	F(4, 41) =0.539 p=.708 R2=0.050 R2Adj=-0.043	F(4, 41) =1.045 p=.396 R2=0.092 R2Adj=0.004	F(4, 41) =1.009 p=.414 R2=0.090 R2Adj=0.001	F(4, 41) =1.009 p=.414 R2=0.090 R2Adj=0.001	F(4, 41) =1.363 p=.263 R2=0.117 R2Adj=0.031	F(4, 41) =1.202 p=.325 R2=0.105 R2Adj=0.018	F(4, 41) =1.312 p=.282 R2=0.113 R2Adj=0.027
Weekly disposable household income	B=.060 t=0.355 p=.724	B=.045 t=0.259 p=.797	B=.086 t=0.515 p=.609	B=.080 t=0.477 p=.636	B=-.006 t=-0.038 p=.970	B=-.042 t=-0.252 p=.802	B=.108 t=0.654 p=.517	B=.091 t=0.549 p=.586
Baseline symptom count/severity (ADHD/ODD)	B=-.186 t=-1.192 p=.240	B=-.175 t=-1.129 p=.265	B=-.250 t=-1.608 p=.115	B=-.243 t=-1.546 p=.130	B=-.181 t=-1.181 p=.245	B=-.192 t=-1.289 p=.205	B=-.239 t=-1.550 p=.129	B=-.261 t=-1.682 p=.100
Quantity of delivery; Number of sessions	B=2.183 t=-0.517 p=.608		B=-.090 t=2.324 p=.612		B=2.585 t=2.585 p=.344		B=.154 t=0.881 p=.384	
Quantity of delivery; Time programme delivered over		B=2.162 t=-0.192 p=.849		B=-.065 t=-0.364 p=.718		B=.259 t=1.495 p=.143		B=.190 t=1.084 p=.285
TfoC3 Effective Communication Quality of Delivery score	B=-.144 t=-0.828 p=.412	B=2.162 t=-0.954 p=.346	B=-.222 t=-1.260 p=.215	B=-.232 t=-1.310 p=.198	B=-.268 t=-1.567 p=.125	B=-.292 Δ t=-1.751 p=.087	B=-.308Δ t=-1.760 p=.086	B=-.321Δ t=-1.841 p=.073

ADHD - Attention Deficit/Hyperactivity Disorder; B - Beta (β) test statistic; F - Fishers exact test statistic; ODD - Oppositional/Defiant Disorder; R2[Adj] - R2 [Adjusted]; TforC - Target for Change; T1 to T2 - Time 1 (pre-intervention) to Time 2 (immediately post intervention); T1 to T3 - Time 1 to Time 3 (6-months post-intervention end)

Δ p<0.1, * p<0.05, ** p<0.01, ***p<0.001,

Selective Regression: Target for Change 6

A table showing the regression statistics FOR a selective linear regression analysis USING Target for Change 6 Quality of delivery only (Scaffolding through Play): Relevant baseline variables & Quantity of delivery (sessions OR time) & Quality of delivery TforC6 [INDEPENDENTS] predicting child behavioural change scores [DEPENDENT]

	ADHD T1 to T2		ODD T1 to T2		ADHD T1 to T3		ODD T1 to T3	
	Sessions	Time	Sessions	Time	Sessions	Time	Sessions	Time
Overall regression stats	F(4, 41) =1.232 p=.312 R2=0.107 R2Adj=0.020	F(4, 41) =1.185 p=.332 R2=0.104 R2Adj=0.016	F(4, 41) =2.105Δ p=.098 R2=0.170 R2Adj=0.089	F(4, 41) =2.120Δ p=.096 R2=0.171 R2Adj=0.091	F(4, 41) =1.150 p=.347 R2=0.101 R2Adj=0.013	F(4, 41) =1.410 p=.248 R2=0.121 R2Adj=0.035	F(4, 41) =1.833 p=.141 R2=0.152 R2Adj=0.069	F(4, 41) =1.830 p=.142 R2=0.151 R2Adj=0.069
Weekly disposable household income	B=.076 t=0.462 p=.646	B=.063 t=0.378 p=.707	B=.101 t=0.638 p=.527	B=.108 t=0.670 p=.507	B=-.014 t=-0.085 p=.933	B=-.048 t=-0.291 p=.772	B=.108 t=0.678 p=.502	B=.102 t=0.625 p=.535
Baseline symptom count/severity (ADHD/ODD)	B=-.216 t=-1.411 p=.166	B=-.206 t=-1.362 p=.181	B=-.157 t=-1.090 p=.282	B=-.149 t=-1.041 p=.304	B=-.202 t=-1.315 p=.196	B=-.209 t=-1.394 p=.171	B=-.126 t=-0.865 p=.392	B=-.143 t=-0.991 p=.327
Quantity of delivery; Number of sessions	B=1.885 t=-0.468 p=.642		B=2.138 t=-0.416 p=.679		B=2.256 t=0.816 p=.419		B=2.394 t=2.394 p=.381	
Quantity of delivery; Time programme delivered over		B=1.858 t=-0.225 p=.823		B=2.138 t=-0.475 p=.638		B=2.185 t=1.271 p=.211		B=2.397 t=0.880 p=.384
TfoC3 Effective Communication Quality of Delivery score	B=-.282Δ t=-1.765 p=.085	B=-.292Δ t=-1.849 p=.072	B=-.362* t=-2.363 p=.023	B=-.366* t=-2.436 p=.019	B=-.277Δ t=-1.732 p=.091	B=-.282Δ t=-1.801 p=.079	B=-.365* t=-2.351 p=.024	B=-.353* t=-2.319 p=.025

ADHD - Attention Deficit/Hyperactivity Disorder; ODD - Oppositional/Defiant Disorder; TforC - Target for Change
Δ p<0.1, * p<0.05, ** p<0.01, ***p<0.001,

QofD Measure Coding Examples

TforC1 - Target for Change 1 - Psychoeducation

change	Good delivery	Adequate delivery	Threshold Just met
uation: What are the unwanted behaviours my child shows and what [more] do I need to know to change these?			
Therapist mentions ADHD "Triad";	(DP 1400 Par 2130 Ses 1) Mentions triad using handout. FIRST TIME I'VE heard this done so well and maybe even at all!	(29 of 57 dps - 51%) DVD ADHD symptom triad	(DP 1151 Par 2061 Ses 2 - BUT missing ses 1 recording for this subject) Discussing child's symptoms Parent and therapist identify child's attention in the context of effective communication. Done as "mentioning" as its the first occurrence of these (See also 633 onwards. @
Hyperactivity Impulsivity and inattention			
Therapist explains about ADHD sub-types AND that some children have neurocognitive deficits	(DP 1695 Par 2086 Ses 1) Brain works differently in ADHD. Not specifically neurocognitive deficits yet. BUT the principle is there in that it is "not their fault" and "not mum's fault" [not therapists language]... moves on to discuss memory and organisation....#	(36 of 70 dps - 51%) DVD neurocognitive deficits of ADHD	(DP 1090 Par 1008 Ses 2) Therapist discussing anticipation in the context of parent understanding triggers in their child and child's behaviour. Therapist uses the term "children like [child]" in this scenario and I think this is linked enough...%
Therapist explains that ADHD is different for each individual AND brings in the effect of different environments	(DP 1157 Par 2062 Ses 2) Therapist exploring child's symptoms and addressing this around dad implying why should we give praise when what she is doing is "mundane". Therapist mentions role of distractibility stress etc. in the effort and energy is takes "these children" to manage change in this example.	(DP 2914 Par 3100 Ses 2) DVD and therapist-parent discussion e.g taking child to park	(DP 3964 Par 1083 Ses 3) Threshold met EXCEPT not about different places about different situations and saliency and change. This box was written for parents who say "school says she's fine" or "my mum says she doesn't do this with her". Therapist then...&
Therapist/ parent discuss ADHD symptoms of the individual child	(DP 2321 Par 3070 Ses 3) Therapist is trying to turn around mums negativity towards the child (he's very oppositional and negative and with very poor attention) by helping her think about things from his point of view.	(DP 1287 Par 3036 Ses 3) Discussing the Childs symptoms in the context of the DVD just watched	(DP 4375 Par 2023 Ses 4) Threshold reached: "that it's the ADHD traits not the child doing things on purpose"
Therapist uses individual child behaviour examples to show parent what is hyperactivity impulsivity and inattention.	(DP 1175 Par 2061 Ses 3) Therapist specifically labels inattention and distractibility clearly in the context of the individual child's behaviour and in context of an example [I think for the first time]...£	(DP1705 Par 2086 Ses 2)Childs' ADHD symptoms: in the context of listening and following instructions	(DP 2446 Par 3080 Ses 5) Talking about overactivity not fully delineated words for all triad but...
Therapist uses individual child examples to begin to identify what if any neurocognitive deficits the child may have.	(DP 3787 Par 1078 Ses 4) Parental attributions as to whether the child "has" PTAP/ADHD or not. Mum feels unsupported and to a degree disbelieved. Therapist discussed this very well.	(DP 1122 Par 1008 Ses 5) Discussing neurocognitive deficits in individual child visual working memory vs auditory	(DP 1728 Par 2086 Ses 4) Problem solving and other neurocognitive deficits have been discussed now and before this. Again not really getting through to mum but are in the context of child.
Therapist begins to work with parent to explore what environmental factors are significant for their child	(DP 3432 Par 3014 Ses 6) NOTE threshold reached: being able to discuss child's behaviour in neutral terms without attributions and in the context of using this change in thoughts/knowledge of ADHD to change their reactions to the child and improve their relationship.	(DP 3663 Par 1077 Ses 9) Therapist effect of Environment of child given ADHD Good delivery	(DP 4310 Par 3078 Ses 9) Threshold reached in terms of discussing attributions and better neutrality on functional analysis BUT neurocognitive deficits never discussed nor is ADHD symptoms versus other behavioural triggers/sources (e.g. oppositionality more purposeful or coercive cycles)

See over the page for footnotes

QofD coding – TforC1 - Psychoeducation.... Continued

footnotes

@ Early mentioning of symptoms as part of history taking NOT NECESSARILY NEEDING specific psychoeducation. BECAUSE putting it straight as exploring is even less valid. Could not code at all. Tricky one.

Very well done. Moving parent [hopefully] onto accepting this and using the NFPP to improve things.

% ... to ADHD to make it achieve TforC1 MenLev2 and Lev3. Mentioning triggers in different scenarios. This could be TforC4BehBounds ExpLev3 even. However given its so early in the parent's course of Rx I am not going to code that yet.

& ...reassures parents and say that children are different in different environments. Therefore this box is not necessary for all family's. Bringing in the effects of different environments situations activities carers etc. is equivalent I think. Around functional analysis not being the same each time.

£ ...child wanting to be a "Jimmy Jammer" and using this to improve and take pride in night-time routine. £ NOTE parent [especially mum] noticing the positives in child BUT therapist is not guiding her towards linking this to: (1) parent child emotion relationship (2) parents changes in behaviour/strategy use (3) Childs improved behaviour etc. DOES mention the role of brother fairly regularly. However therapist encourages keeping them separate rather than parent[s] being present to support both children working together and for each other. REMEMBER this may have been covered in unheard tapes [only 1 though]

QofD coding – TforC 2 - Parent-child emotional relationship

Table showing examples of good delivery, Adequate delivery and threshold just met for Target for Change 2 in the Quality of Delivery Measure.

Target for change	Good delivery	Adequate delivery	Threshold just met
2. Parent child emotional relationship: That a child needs to feel safe, believed in and supported so that they can try, learn and succeed at new things.			
Mentioning	Level 1 Therapist mentions that living with ADHD can make the parent and the child feel differently about each other.	(Data Point – DP 3940 Parent ID - Par 1083 Session number - Ses 2) Good delivery IF now is taken with previous discussions. Temperament has been well covered. Self esteem in child covered. Mums PSDC was mentioned in session 1; often around things she does to manage child and that others challenge her when she believes she is doing the right thing.	(DP 2763 Par 1093 Ses 2) Essence of whole session (34:00). Not sure if this is justified but there is no way this point will have got through somehow. 44:00 This is firmly and effectively and clearly reiterated at this point.
	Level 2 Therapist mentions that the way the parent and child feel about each other can affect the way they work together.	(45 of 60 dps blank/"DVD" - 75%) This is likely to be because this check-off comes from the same discussion as previous/ above and/or from watching the DVD	(DP 2647 Par 3065 Ses 2) There's no doubt this has been done BUT its completely led by the parent. I'm checking it of as, theoretically, the therapist preparing a safe and appropriate environment for the parent to bring these things is part of delivery anyhow. NOTE not checking of TforC2 Explev2 as therapist has not specifically explored how child's ADHD has affected things like mums socialising/isolation. Mum has mentioned the impact on her relationship with her mum but not enough yet I don't think.
	Level 3 Therapist mentions the principle that the impact of ADHD/life can mean we see more negatives than positives AND introduce "capture the good" CHeG.	(DP 1704 Par 2086 Ses 2) Parent-child emotional relationship and child self-esteem: Discussing this abstractly. No obvious concerns around child's self esteem in terms of ADHD and fear of failure. No signs of parent-child animosity or negativity. [However] Therapist does not mention ADHD and self-esteem in this conversation yet.	(DP 2183 Par 3078 Ses 3) Vaguely mentions "Capture the good" (DP 4042 Par 2131 Ses 1) Threshold reached NOT DONE "eye contact for positives only" (DONE 01:30:00) (DP 3392 Par 3014 Ses 2) (34:75) Eye contact for positives only BUT does not link this to the impact of ADHD on relationship and turning this around. However DVD has some of these elements here. (37:45) delivers "capture the good" again bland surface delivery without link to ADHD and impact BUT delivered correctly.
Exploring/Explaining	Level 1 Therapist uses parent or child examples to explain the type of things that a good p-c relationship needs.	(DP 2091 Par 1002 Ses 2) Mum and therapist mutually discussing and aware of the need to understand the child's emotional needs Mum "fits not the behaviour I worry about [so much] its the things [that might be] underlying it I worry about".	(DP 565 Par 3057 Ses 6 AND DP 1750 Par 3092 Ses 2) DVD separate naughty behaviour from child themselves (NOTE - CET included both as they are two examples separated in collection time - as shown by data point value - and session 6 being later than expected and session 2 more typical. This does not seem "enough" in terms of the level descriptor however I felt a warranted checking-off. This may be an example of DVD stimulating conversation OR that this finally topped the threshold in a sub adequate delivery in this area)
	Level 2 Therapist is able to get parent to talk about how the child's ADHD has affected them, their child and the PC relationship. Includes parental attributions around child's behaviour	(DP 1632 Par 3013 Ses 2) Discussing mums ability to praise and give affection to child. Mum distinctly says that she finds it hard to hug him after he's just done something to really upset her "I just can't bring myself to [show him affection or praise]"	(DP 4254 Par 2100 Ses 7 - note much later session than expected) Threshold met. Discussion around dad not finding unstructured play easy and being sad when child wasn't able to/didn't take to football. Therapist suggest using the play/sensory handout to try and build that structured "rough and tumble [mum said child doesn't probably get enough from dad as is ideal]
	Level 3 Therapist and parent explores how the parent feels about their ability to parent their child AND how this affects their behavioural management (plus past experiences of being parented, wishes & expectations)	(DP 1572 Par 3030 Ses 3 or 4) Exploring really candidly parental roles and expectations. Dad "this situation is driving us/our marriage apart". Mum "in the end dad doesn't need to stick around because [child's] not his". (DP 1859 Par 1013 Ses 3) Great discussion around parental reactions to behaviours, issues around partner coming into child's life and her different "bonding" with younger female sibling and awareness of child's different needs.	(DP 828 Par 2096 Ses 3) Dad comes in and almost immediately critiques mum "I told you not to use 'No' all the time didn't I" Abhhhhh (NOTE - CET used "abhhhh" either: (i) when I was either frustrated about a continuous issue that was significant for the family and/or (ii) updating to me and/or (iii) needed addressing in ADOTD terms and/or (iv) when a therapist was not aware of the importance and/or (v) acknowledging & contemporaneously and/or (vi) actively distracting away or indicating they were uncomfortable).
Level 4	Therapist uses parent examples to explore how much praise the parent is using and their ability to operationalise praise/CHeG	(DP 3976 Par 1083 Ses 4) Good delivery SCORED BECAUSE parents have operationalised capture the good WITH reported evidence of improved child self-esteem and parental (step dad's) mood and relationship improving. (NOTE - CET This highlights two difficulties throughout reading (i) parents demonstrating competence in something didn't feel confident about reading (ii) had been behaviour well enough for this journey it was more so an enabling recording). (3) When parents express they are able to do something or are doing it very deliberately, this is often a positive first operationalising response BUT can be reflective of a parent who things they are doing something "enough" but may not be	(DP 1352 Par 3102 Ses 10) RETROSPECTIVE CHECK therapist and parents have discussed praised. Not checked this before du to mums continuous use of "no" and inability to ignore negative behaviour and therefore, in my opinion, be negating the effect of praise and love mum does give to the child. However I think therapist has delivered this concept. (NOTE - CET occasionally retrospectively coded something at the end of a subject. I reviewed each TherC after a session whenever I was struggling with a subject and at the end for all subjects. This would occasionally result in me feeling a threshold had been reached despite reservations)

QofD coding – TforC 3 - Effective Communication

Table showing examples of good delivery. Adequate delivery and threshold just met for Target for Change 3 in the Quality of Delivery Measure.

Target for change	Good delivery	Adequate delivery	Threshold just met
3. Effective communication: Making sure that you know what, how and why you are telling your child something or what you want them to hear/do SO THAT you can "know" any negative behaviour is not due to this AND so they learn how to do this too.			
Mentioning	Level 1 Therapist mentions that ADHD may have affected the ability of the parent and child to tell each other what they need or how they feel	(Data Point - DP 3089 Parent ID - Par 1116 Session number - Ses 2) Threshold reached [but] NOT DONE that ADHD neurocognitive deficits make it harder for child to listen and pay attention and remember DONE as "I'm writing BRILLIANT 00:02:30 Good delivery	(DP 1364 Par 1069 Ses 2) Mentions eye contact for positive only Not clear if communication or positivity based. Went on to discuss effective communication so gone with that.
	Level 2 Therapist mentions that ADHD means the child is less able to listen, hear and act upon things the parent tells them	No examples	(DP 1826 Par 1013 Ses 2) Effective communication mainly in the context of simple clear instructions and ensuring child is able to follow them through. Not done well. Jumping across concepts: Eff Cam (this TforC), Routines, praise and scaffolding.
	Level 3 Therapist mentions that the parent might not be helping the child understand what they are saying in the first place because of a breakdown in effective communication steps	(DP XXXX Par XXXX Ses XXXX) Therapist effective communication steps and influence of ADHD on this (NOTE - CET: I used "therapist" in areas where the same facts or concepts was often/could be achieved with the DVD)	(DP 1895 Par 3020 Ses 2) Effective communication steps intro. Not mentioned in the context of ADHD SO MenLev1 and 2 not done.
	Level 1 Therapist explores using parent examples whether the parent knows if and how they are getting their message through and checks parent has ways of monitoring this.	(DP 2096 Par 1002 Ses 2) Lovely discussion with mum aware about if and how the child and her can both feel they have been heard and listened to. Both in context of EC and in terms of availability and sensitivity.	(DP 2493 Par 3002 Ses 2) Therapist Effective Communication BASC no mention of Why ADHD has affected this
Exploring/Explaining	Level 2 Therapist begins to breakdown steps of EF using examples the parent brings (i) what's the aim, (ii) can the child achieve it (iii) short, simple sentences (iv) recruiting attention	(DP 1174 Par 2061 Ses 3) During this example and a few times previous (especially dad) have described their understanding of how they "know" if and when their child has heard them. Therapist has mentioned being in the same room and mum specifically said [last tape] that "we need to do that for [child]" in the context of not needed so much for sibling. Dad mentions getting child to repeat back in last tape but therapist "shoots him down" (maybe because dad is slightly negative towards mum during this discussion and therapist does not want mum to feel this. However an opportunity not taken up to praise dad and promote this strategy) Conclusion Explv2 reached but not 3.	(DP 3085 Par 3031 Ses 2) Briefly discussed effective communication. Mum "sometimes I think he doesn't do what I say even if he does hear me" not picked up on by therapist BUT child not settled and wanting to end session.
	Level 3 From the child's perspective (i) are they listening? (ii) Do they hear (iii) understand and (iv) remember it (repeating back)? AND do they need help. E.g. repeating back, countdowns, prompting, etc.	(DP 3353 Par 1061 Ses 8) Effective communication and child's reception of this extensively discussed. NOT done "repeating back" however the principle of this delivered. (NOTE - CET: I need to be aware of this both as an active strategy and due to omission/lack of awareness of the correct nomenclature by the therapist. If a concept is delivered correctly and parents are clear when and why to operationalise it the correct labelling is not necessary. Some parents appear to find strategy names a barrier to engaging and some therapist confuse some strategies/elements of these).	(DP 155 Par 2140 Ses 6 - note much later session than expected) Going through parent checklist: Is parent recruiting child's attention before speaking to her? Yes BUT no specific confirmation received e.g. going through an example.
Level 4	Therapist with the parent uses examples to link episodes of good and poor effective communication WITH positive or negative behaviour the child shows and explores the signs parents use to recognize this.	(DP 1003 Par 2096 Ses 7) Effective communication steps...Child got reward from school for reaching 5 stickers/steps of effective communication via the system they have [there].	(DP 1935 Par 3020 Ses 6) Discussing extended aspects of effective communication BUT misses out "repeating back". Mum has said that child's communication is better and therapist (and mum together) have been thinking about the [child's] dummy in terms of speech...child has SALT input.
			(DP 3208 Par 1102 Ses 8) I think this has been achieved in principle. Trigger for reaching this level: discussion around house rule of not screaming/shouting and therapists suggestion of the thermometer for voice level. This would be a direct indicator of whether child has understood what mum wants child to do and why and for mum to know child has heard her. I do wish therapist went through the steps of communication and did it for specific episodes. However I think I have checked this off before with less evidence or effort by the therapist.

QofD coding - TforC 4 - Routines

Table showing examples of good delivery. Adequate delivery and threshold just met for Change 4-Routines in the Quality of Delivery Measure.

Target for change	Good delivery	Adequate delivery	Threshold just met
4. Lowering the number/severity of behavioural episodes: prevention and de-escalation: That you can use quick, easy ways to lower the amount of UB your child shows and that this will lower the amount of stress from day to day.			
Routines			
Mentioning	Level 1 Therapist explains that all children but especially those with ADHD need routines in their life. Mentions: predictability and control, early warning about change	(Data Point - DP 3221 Parent ID - Par 2073 Session number - Ses 2) Therapist emphasises the importance of planning and warning around change in the context of ADHD (DP 3307 Par 1061 Ses 3) [done in the context of an...] Episode [see data point 3292] discussing need for routines, planning ahead and ADHD aspects of managing routine and extraordinary situations	(DP 2930 Par 3100 Ses 3) Mentions that routines are important and cuing through change BUT no incorporation of ADHD and again dismissed functional analysis and full integration of the [NEPP strategy] of routines [in the context of ADHD/parenting] by saying "I think you've got these anyway" (NOTE - CET: There were some strategies that some therapists consistently failed to integrate. These varied across therapist and tended to be secondary to EITHER (i) the therapist feeling they were reiterating things the parent knew/had in place and/or (ii) being unsure about how to do this, on the context of ADHD or (iii) not appreciating the importance of delivering a strategy over and above normal parenting levels of use given ADHD behaviours, neurocognitive deficits and impacts.
	Level 2 ...[what might need changing] and that parents might need to improve routines (1) plan ahead (2) change their habits (3) seek support	(DP 3231 Par 2073 Ses 2) Mum [is able to] say herself she may be able to ask husband to get up with child a couple of mornings a week. Also mum feels safe/able to discuss the fact that dad does not support [her] in a way that allows the three of them to have quality time as a family.	(DP 4373 Par 2023 Ses 4 - note later session than expected) Threshold reached just: needing to do things differently and that this takes time.
Level 3	Therapist explains that setting routines and giving clear behavioural boundaries is even more important in ADHD and that without boundaries and predictability anxiety and pushing limits can result	(DP 1968 Par 1068 Ses 2) Routines in the context of time. That ADHD children need routines to be reiterated and put in the context of things the child knows. E.g. meals or playgroup.	(DP 2222 Par 1110 Ses 2) Children with ADHD need clear routines FROM previous discussions (NOTE - CET: This often means threshold has been met BUT that it is not done in a clear direct way. This often raised concerns for me that parents would not be able to easily use the role of routines in their functional analysis of behavioural events over the rest of the programme)
Exploring/Explaining	Level 1 Therapist finds examples with the parent when: FIRST the child's day is more or less predictable with good or poor/no routine in place AND Level 2 SECOND (i) links lack of routine TO the positive and negative behaviour the child then shows	(DP 4037 Par 2131 Ses 1) Good delivery Visual routines/schedules. Discussion around specific routines mainly putting to bed, impact of being at grandma's without good routines and no boundaries or challenges. (DP 2358 Par 3070 Ses 6) Good discussion around sleep and morning routine. Used therapists idea of "starting the day again" when he woke up too early. Mum mentioned (new thought or not I don't know) that he wakes up to go to the loo and then won't let himself go back to sleep. Mum then got his sleeping bag and he went back to sleep 'til later. Mum then says he's up later but is aware of advantages and disadvantages.	(DP 1377 Par 1069 Ses 4) Mum discussing sleep routine and linking her versus dad's methods to the positive and negative behaviours child shows BUT therapist is not working this through and giving strategies with her! (DP 2531 Par 3002 Ses 6) Discussing car routine and mum notes that child doesn't take his seatbelt off on the way to school only on the way back. Good opportunity for functional analysis, over-excited etc. opportunities for change. NOT taken.
Level 3	Therapist uses parent examples to explain the way routines are used and why. (a) for a set period of the day (b) Has the parent broken the steps down can child achieve these and (c) is it communicated effectively	(DP 3172 Par 1102 Ses 4) Therapist does this in a very interesting way. I thought she was going to [dismiss] the role of ADHD in routines because she assumed this mum's routines were good enough. However then goes into: (1) other options to improve things e.g. step by step breakdown of morning routine (2) planning ahead (3) supporting aspects of time understanding and management. Very good.	(DP 3739 Par 1116 Ses 8 - note much later session than expected) Episode diary and discussion around road safety. Threshold reached.
Level 4	Therapist moves on to explain to parent how they would do this using supportive methods (i) weekly planners (ii) specific activity schedules (iii) prompting/countdowns (iv) motivation and more support	(DP 3340 Par 1061 Ses 6) Routines in terms of: ADHD reasoning for supporting child with routines and the ADHD neurocognitive deficits around time that cause anxiety and potentially behaviour. Fully delivered and good delivery 3340 57 1061 6	(DP 4238 Par 2100 Ses 4) Threshold reached BUT not sure what's changed. Dad gets him ready upstairs now before coming down like mum has always done. Started a planner but not printed it out yet. (DP 4182 Par 3008 Ses 11) Threshold met BUT may be parent led SCORED BECAUSE parents have decided to instigate a visual schedule!

QofD coding - TforC 4 - Behavioural Boundaries

Table showing examples of good delivery. Adequate delivery and threshold just met for Target for Change 4 - Behavioural Boundaries in the Quality of Delivery Measure.

Target for change	Good delivery	Adequate delivery	Threshold just met
4. Lowering the number/severity of behavioural episodes: prevention and de-escalation: That you can use quick, easy ways to lower the amount of UB your child shows and that this will lower the amount of stress from day to day.			
Behavioural Boundaries			
Level 1	Therapist explains that all children but especially those with ADHD need clear behavioural boundaries. AND that the first step to managing behaviour might be to avoid conflict in the first place	Data Point - DP 2192 Parent ID - Par 3078 Session number - Ses 3) Heartbreaking but constructive conversation around "giving the child more allowances" [mum] while [therapist] "not unrealistic allowances" still need clear rules and boundaries.	[DP 3500 Par 3051 Ses 2] Therapist boundaries and ADHD and discussing the difference between management of behaviour between non-ADHD older sibling [versus] child with ADHD. [Next session 29:30 DVD avoiding conflict. Next session second tape 17:30 discussion and DVD re house rules...data point 3514]
Level 2	AND in order to set clear achievable boundaries parents may need to: (i) Do things differently that they than they would with non- ADHD children (ii) Work together and not let the child play off two or more carers	[DP 1337 Par 3102 Ses 6] Therapist gives a really good explanation and strategy ideas for how mum can break the cycle of multiple warnings and then large consequences when child has gone "past the point of no return". Really fundamental to this mum. She says herself she "gives him loads of warnings". However the consequences she puts in place are quite far in the future e.g. he can't have his story at bedtime and these are positive things that would be better as rewards I think. Therapist suggests smaller immediate consequences such as turning off the tv for 5 minutes before he gets to such high levels of unwanted behaviour and see how that goes.	[DP 4482 Par 3007 Ses 4] I think this is achieved: problem is mum is a single parent and biological father has not been mentioned. Mum is aware that she gives inconsistent instructions and application of the rules (e.g. [insisting] child telling her [wailing] before he goes upstairs VERSUS her telling/allowing him to go up alone when she's busy) 42:00 puts the hard point across. Mums got to put rule[s] in place despite the ensuing tantrum.
Level 3	That children with ADHD are told off a lot and often for things they didn't do SO parents need to support the child to make changes in a positive, supportive way e.g., avoid using "no" and house rules followed by all.	[DP 4227 Par 2100 Ses 3] Good delivery (children with ADHD spend a lot of time being told off and told no was said yesterday) "No" is often a trigger for children with ADHD and repeats that children hear the word no all the time.	[DP 827 Par 2096 Ses 3] Mentions parents not using No also. Again short unclear unlinked explanation that's very [on the] surface.
Level 1	Therapist explores examples with the parent when: (i) the parent is or is not clear when the child's behaviour is OK or not OR (ii) when they are not inconsistent in this e.g. over time, between carers, in different situations AND (iii) links this to the positive or negative behaviour the child shows	[DP 2557 Par 3088 Ses 2] Discussed episode/ongoing behaviour around child having toileting accidents at school. Good work by therapist around taking the pressure off the toileting and instead trying to focus on the positives. Mum reaches positive plan about approaching school nurse re policy of toileting worries and potentially offering to go up herself and clean him. Positive exchange. NOTE coded retrospectively BECAUSE the basic building blocks of psychoeducation around behavioural boundaries has not been laid. This makes it harder for me to code.	[DP 1513 Par 3110 Ses 6 - note later session than expected] Vaguely discusses trigger of child having small tantrum on tape. Child cannot get his own way. Have discussed some behavioural management episodes before with vague strategy delivery using episode diaries. Only just reaching this though.
Level 2	Therapist helps/checks the parent knows how and when boundary setting will and will not work: (i) What is the behaviour parent is addressing? (ii) What is the replacement behaviour/strategy (iii) Does the child know what they are doing is wrong AND (iv) Are they able to stop it by themselves OR do they need support	[DP 962 Par 2096 Ses 6] Dad brought around [during a discussion/episode diary with a difficult family around a specific behaviour that parents did not manage well] "what we want him to do is not throw the toy next time" great work by therapist.	[DP 579 Par 3057 Ses 6 - note later session than expected] Interesting discussion about how effective the Maternal Granddad is in terms of delivering boundaries in a calm but clear way. I've coded this as it does suggest parents know how they "should" do this and have someone to model off but at the moment are not there.
Level 3	Therapist explores with parent their understanding of why their child does what they do and whether the parent is fair/consistent in their attributions: AND Does the parent "label" the behaviour and link this with the reward or consequence consistently	[DP 2434 Par 3080 Ses 4] Using house rules to support child to change things. Labelling replacement positive behaviour with reward. Supportive nature of this and modelling positive alternative. Lovely discussion around rule of "not picking sibling up" and alternative of holding his hand to help him up the stairs so the rule is phrased in a positive way. Therapist mentions if child does not comply [with an important rule such as not picking sibling up especially at the top of the stairs] mum would need to put a consequence in place. This is not expanded on at this point. Will need some discussion around this to move on to TforC7 principles.	[DP 3888 Par 1072 Ses 5] Threshold reached. "Rewards system" instigated by mum in coordination with visual schedule being discussed in the context of sleeping in her own bed. STILL NEED more discussion around specific negative behaviours (for this TforC) and specifically time out versus quiet time or QT equivalent for TforC7. [1900 Mum then does perfect example of a natural consequence re child playing roughly with timer "then we won't have a timer". 19:30 discussing house rule of "no shouting which has been integrated with reward system for whole family also).
Level 4	Therapist is consistent in the way they explore boundary setting in terms of the following: (i) Child's awareness of rule (ii) Opportunities for prevention (iii) Consistency in setting and enforcing boundaries (iv) Effectiveness overall (v) Collaboration with child	[DP 3020 Par 3027 Ses 4] Dialog/system for establishing boundaries, rewards, sanctions, consistency seeing it through, avoiding no, using choices, collaboration, support (having rules on white board that child choose).	[DP 4181 Par 3008 Ses 10] Threshold met. SCORED BECAUSE parents mention child has responded to house rules AND parents using a smile face system to achieve this [not explored but parents and therapist have substituted this for a reward chart I think because they use it at school].

QofD coding - TforC 4 - Managing Time and Change

Table showing examples of good delivery, Adequate delivery and threshold just met for Target for Change XXXs in the Quality of Delivery Measure.

Target for change	Good delivery	Adequate delivery	Threshold just met
4. Lowering the number/severity of behavioural episodes: prevention and de-escalation: That you can use quick, easy ways to lower the amount of UB your child shows and that this will lower the amount of stress from day to day.			
Managing time and change with delay fading			
Level 1 Mentioning	Therapist explains that children with ADHD have much more difficulty judging and following time AND that children with ADHD have a problem waiting for things (+ reward saliency/timing)	Data Point - DP 2099 Parent ID - Par 1002 Session number - Ses 2) ADHD anxiety around change, countdowns, cuing into change and added not understanding concept of time. Mum confirms child doesn't have any concept of time.	(37 of 53 data points - dpts - 71%) DVD children with ADHD find change hard" or "DVD Timer use" or "DVD using countdowns to cue into change in ADHD context" (NOTE - CTT These versions in how I've documented the DVD action views are more varied than in other TforC this may reflect therapist using different points in the DVD to simulate further conversation around managing time and change OR for this TforC's somewhat difficulty represented and applied especially in the context of routines, to also somewhat less well demonstrated in the programme delivery in terms of the ADHD neurocognitive deficits and how these are reflected in observed behaviours. E.g. delay aversion vs reward saliency vs managing transitions/time)
Level 2	Therapist mentions that this can affect: (i) the child's ability to use countdowns effectively. If the child does not know how to judge time they will not be successful (without a further prompt) (ii) Their ability to wait for things once they have them in their mind: they need to learn to wait.	No examples	(DP 3773 Par 1078 Ses 3) Therapist timer use Threshold reached BUT not done problems around waiting NOR really in and ADHD context. (DP 4081 Par 2131 Ses 3) Threshold reached SCORED BECAUSE countdowns mentioned briefly AND parents have watched DVD. Missed delivery of reasons behind timers at end of last session not recorded (DP 3314 Par 1061 Ses 3) Timer use in the context of ADHD delivered BUT not strictly by the measure. Concepts covered though enough (compared to my coding threshold)
Level 3	The therapist mentions to the parent the steps they might have to go through to help their child learn to use time and to wait. (i) Can the child follow/use time (ii) Does the child understand a digital or analogue clock? (iii) The child's ability to wait and the effect of rewards on this	(DP 1437 Par 2130 Ses 2) Good breakdown of steps on child and mums side for child to learn time [01:14:30 mum shows she understands this].	(DP 2651 Par 3065 Ses 3) Very briefly discusses this. Very brief. Mum gains says "I've been using that over the past week even though it says not to [i.e. she's jumped the gun]". May have led to Explev1 BUT therapist did not explore this at all.
Level 1 Exploring/Explaining	Therapist explores with the parent how they use: (i) timers/clocks (ii) countdowns (iii) prompts ...within their household	(DP 2418 Par 3080 Ses 3) [Parent has] Tried timer But for a longer time than child can manage. [Therapist advises to] Lower the time she's waiting for and therapist explained how to use it and to engage child with timer.	(DP 1908 Par 3020 Ses 3) Therapist Timer use BUT no mention of ADHD reason for this strategy (DP XXXX Par XXXX Ses XXXX) FROM previous conversations WITH DVD and current conversation about using the timer with this family
Level 2	Therapist tries to separate the use of countdowns for behavioural purposes FROM those use to support the child and work with them on aspects of managing time, planning and task execution and learning to wait/use long term rewards	(DP 3656 Par 1077 Ses 4) Timer use Mum asks "so I shouldn't use the time for time out then [as child is wanting to]?" Therapist replies perfectly: [with kindness and understanding but clearly and correctly in NFPP terms] "I'd really try not too; tell him [child] that the timer is for positive fun things, like changing from one thing to another or playing games [not verbatim/correct but essence right]. Brilliant and compare[d] with previous subject who did not reach change levels for timer because this point was never challenged. Due to therapist lack of understanding of time issue with ADHD and timer use under the NFPP.	(DP 4573 Par 3039 Ses 3) Good use of verbal time prompts and using these to manage behaviour and waiting BUT not mentioned timer AND I think this child could do with a visual schedule
Level 3	Therapist explores with the parent how they can use NFPP strategies to teach the child how to understand time so they can learn to plan and comply with parental requests (and avoid negative consequences).	(DP 2796 Par 1093 Ses 4) Great delivery: Covers: use for learning to wait, for complying with requests, take turns and social rules and manage things for himself in the future. Brill (DP 3794 Par 1078 Ses 4) Even does delay fading!	(DP 1687 Par 3013 Ses 6) Timer: mum understands reasoning and the methods reiterated by therapist BUT not actively using and engaged with I don't think: no [further] Explore levels to be checked (NOTE - CTT This raises an important point discussed in chapter 6, is the therapists job in terms of delivering PUs to explain what and how parents can change only OR is it important to actively facilitate operationalising these changes?)
Level 4	Therapist explores with the parent how they can use NFPP strategies (i) to support the child to not interrupt and "read the room" (ii) To help the child learn to wait (iii) To gradually increase the time (iv) To link this to everyday situations	(DP 3352 Par 1061 Ses 7) Therapist models timer use to her child wait. Coding threshold reached. Only thing not specifically mentioned from this is the use of the timer socially to help child wait in terms of conversation and checking out the situation before they speak/interrupt when they come into a room. (DP 3545 Par 3051 Ses 7) Mum clearly describing the child being able to wait better when playing games as a family, I think, although not using timers per se the family has encompassed aspects of play and waiting to general behaviour and social learning. Best example of this I've heard. Would want more use of timers to check off change levels however principle of ADHD and time scaffolding delivered.	(DP 3425 Par 3014 Ses 4) Threshold reached. Query therapist delivered OR parental motivation.

QofD coding - TforC 5 - Modeling Positive Reciprocal Interaction

Table showing examples of good delivery, Adequate delivery and threshold just met for Change XXXs in the Quality of Delivery Measure.

Target for change	Good delivery	Adequate delivery	Threshold just met
5. Positive Parent Child Interaction and Modelling That the behaviour you and others show around your child will affect the way they manage similar situations.			
Mentioning Level 1 Therapist mentions that children do not just learn by "doing" they learn by watching what other people do. Therapist names this modelling at some point.	Data Point - DP 1577 Parent ID - Par 3030 Session number - Ses 3 or 4) Discussing this very well in context of modelling, social learning theory and child and parent calming	(24 of 52 data points - dps - 46%) DVD staying calm intro and modelling (DP 3310 Par 1061 Ses 3) Describes the reason behind parent staying calm is for modelling this to the child but does not use modelling term. Other examples "Children learn...from others" "...by watching" and "...by copying"	(DP 3417 Par 3014 Ses 3) Briefly mentions both these [points] BUT calls them "mirroring" NOT modelling. I think that's what the handout must say because [this therapist] does this each time. [NOTE - CET The NIPP CORPS manual states the following under keeping calm and "Mirror image": "...they have to work of keeping calm because if they about the only job about when he is angry or anxious and "mirror" their behaviour. Children copy what they see...". The concept is modelling but it's operationalized as being aware of your "mirror image"]
Level 2 Therapist explains that the way the parent reacts to things their child does is modelling the child's emotional control e.g. if they shout at the child the child thinks shouting is ok.	(DP 4273 Par 3020 Ses 9) Mum saying she is helping older sister model positive behaviour for her sister. This implies indirectly mum is aware of this in her own responses. This is consistent with what we heard mum say. 25-000 therapist starts discussing mums tone of voice at different times/circumstances. Good delivery.	(30 of 57 dps are blank/"DVD" - 53%) This is likely to be because this check-off comes from the same discussion as previous/above and/or from watching the DVD. (DP 4055 Par 2131 Ses 2) Good delivery Mentlev1 NOT checked off BECAUSE not mentioned the effect of parental shouting and poor emotional control on child's behaviour and calls it "modelling". Only doing it from mums point of view and how that's effected [her] ability to manage. Important but only half the story!	(DP 3963 Par 1083 Ses 4) Threshold reached EXCEPT not about parent interactions with each other and others when around child [NOTE CET - I'm not sure how I would've allowed myself to check this off with this explanation. I can only suggest it was that the important effects of self-regulation when with the child was discussed in terms of the direct effects it may have on the child's understanding of acceptable behaviour versus not. However the fact that parents and others could be modelling inappropriate behaviour for the child when they are not aware of it was not].
Level 3 The therapist mentions that the parent can learn about how they feel when their child shows neg behaviour and try not to react. By finding out how to do this they can support their child to do this too.	(DP 2235 Par 1110 Ses 3) From today and earlier. Mum "I've been much calmer" therapist have you used the perspex shield "yes, I used it yesterday. He was climbing all over me and he wouldn't stop. So I [mimics putting shield up] and eventually he stopped, sat next to me and held my hand"	(30 of 53 dps are blank/"DVD" - 55%) This is one of the only TforC for which the DVD covers all three "mentioning" levels (DP 2329 Par 3070 Ses 3) Thinking about what mums face and body language are like when she's reacting to the child	(DP 1526 Par 3110 Ses 7 note later session than expected) Mum and therapist discussing evening school run routine and how mum reacts when child shows negative behaviour. First time discussed when, how and why mum negatively reacts to child.
Exploring/Explaining Level 1 Therapist uses parent example to identify the parent reacts negatively to their child's behaviour and helps the parent think about why this might be.	(DP 2794 Par 1093 Ses 4) Quick recap of strategies by therapist: Keeping calm seems to be covered by mum BUT not yet discussed aspects of support (e.g. parents tag teaming off each other) or parental attributions around child behaviours spring set examples SO Explev2 and 3 not yet met	(DP 2580 Par 3088 Ses 4) Exploring child's tantrums when he comes out of school. Mum says again things are worse if Dad does the school run (normally talked in terms of drop off but this is pick up). Goes on to discuss that Dad's boundaries and reaction threshold/ extreme are not ideal. Not much discussion yet around parent modelling of behaviour and inter-parental differences (apart from in terms of religion). Not sure if should code for TforC4BenBounds Explev3 only or TforC5 Explev3 [NOTE - CET These often ended up being sequentially coded in terms of discussions around parental attributions to child's behaviour over delivery course]. Going for former PLUS [this] TforC5 Explev1 ALTHOUGH AGAIN therapist has not put the leg work in regarding psychoeducation and strategy reasoning clearly.	(DP 2041 Par 3005 Ses 3) Discussing family outings and seems like parents are feeling these things are ok at the moment. Don't quite know if they are better [more] recently or [i.e.] if its anything to do with programme or [perhaps only from] seeking help/ diagnosis or explanation.
Level 2 Therapist uses parent examples to explore whether the parent's negative reactions are due to ...lack of support and/or feeling over whelmed THEN...	(DP 4086 Par 2131 Ses 3) Good delivery AND layered up throughout from start and threshold reached despite early stage of programme. Partly due to the level of engagement of parents to programme and their dedication and love for the child. Amazing to see (DP 4428 Par 3103 Ses 7) Child spitting and mums ability to have a firmer tone and mirror image. Good delivery. Around mums confidence around her siblings and mum I think. Self-efficacy not yet discussed explicitly.	(DP 1797 Par 3092 Ses 3) Exploring mums support, dad and her tag teaming, what does she do if dad's not there. Doesn't seem to loose it. Coded both levels as mum has discussed her reaction to her child and feelings around attributions	(DP 3894 Par 1072 Ses 6) Threshold reached FROM dad listening to audio NIPP handouts CD, maternal grandmother taking ides on board, dad supporting mum in terms of reiterating bedtime routine and mums authority (albeit by phone) AND (from last session) mum saying she's a lot less worried/ afraid about "ie", implying her child's future and managing the ADHD in order to solve current worries around behaviour.
Level 3 ...cognitive factors (e.g. knowledge & understanding), fears, attributions, self-efficacy	(DP 3433 Par 3014 Ses 6) What's changed therapist asked. Parents staying calmer and implies improved self efficacy. Lots of discussion prior about parental attributions in past sessions especially dads. Always been on the side of neutral if not self-blamed parental attributions for not managing to help child with their behaviour but definitely now generally neutral and less reactive it seems.	(DP XXXX Par XXXX Ses XXXX) Mum has lost the baby. [pregnancy] Very sad. Dad implying he has feelings around blam[ing the] child for this and apparently said to mum [horrific but /and] not sure how it was taken by mum. "it's lucky baby wasn't born as it wouldn't have lasted long" [with the implication child would've killed it by his uncontrolled behaviour] [NOTE - CET This is an extreme thing to document and online me to be this personal. However I think in this case it really did reflect how poor the parents/dads relationship was with the child SO important to highlight]	(DP 2834 Par 1093 Ses 9) Missed some discussion between mum and dad with therapist after play session was recorded: I think this may have happened last play session too. Dad is able more to "stop and think" before he manages child's behaviour and this is making things more successful
Level 4 Between parent and therapist they have created a system by which the parent knows when they are modelling positive behaviour and when they are not most of the time	(DP 3732 Par 1116 Ses 8) Great discussion over the first part of this session. Has elements of Parental consistency and support [father being away a lot Mum "realising" she can't meet both children needs when out and on her own in a positive way and well affirmed and praised by therapist]. Involves and planning ahead [dad being away]. Sibling fairness/attribution around their joint behaviours and needs. Mums ability to keep calm in the context of single parenthood times.	(DP 4277 Par 3020 Ses 10) Threshold met: discussing person telling mum they handled tantrum well. AND session 7 terminology and approach and mums response during discussion around children going to for a medical following the CIN order being instigated shows the therapist and mum have developed a language and discussion principle around if and when mum is and is not responding positively to the children	

Possible endpoints for effective completion of each target for change in the NFPP given this thesis work

Target for change	Endpoint
1. Psychoeducation: What are the unwanted behaviours my child shows and what [more] do I need to know to change these?	That incorrect knowledge about ADHD causality and/or non-constructive behavioural attributions are no longer affecting the child's behaviour or parental response
2. Parent child emotional relationship: That a child needs to feel safe believed in and supported so that they can try to learn and succeed at new things.	That parent and child are able to interact with each other in a way that makes both feel positive about themselves (self-belief) that others think this too (self-esteem) and confident about their ability (self-efficacy)
3. Effective communication That both parties know what they are trying to get across to the other and maximise the chances that they have both got the same message and are able act on these.	That episodes of unwanted behaviour shown by the child are not regularly caused by either parent or child not being able to express their needs and expectations from the other.
4. Lowering the number/severity of behavioural episodes: prevention and de-escalation:	That through FAB the parent and therapist have identified and rectified any unwanted behaviours that are shown by a child secondary to specific times of day, types of activities and/or differences in these caused by lack of consistency between carers.
That you can use quick easy ways to lower the amount of UB your child shows and that this will lower the amount of stress from day to day.	That the child with ADHD does not consistently show any unwanted behaviours without the parents clearly stating when and why what they are doing is wrong.
Routines	That parents are actively managing their child's schedule so that they are not routinely showing unwanted behaviour during transitions from one activity to another
Behavioural boundaries	
Delay aversion/ Managing time	
5. Lowering the number/severity of behavioural episodes: Modelling self-regulation positivity. That the behaviour you and others show around your child will affect the way they manage similar situations.	That parents are responding to their child's behaviour in a positive and mutually respectful way to not worsen the initial event further
6. Parent child working relationship: That the parent needs to be able to understand their child's abilities and areas where they need more support and use scaffolding methods to help them manage for themselves.	That the parent is understanding what the child can and cannot do for themselves and are actively making changes to rectify this.

7. Lowering the number/severity of behavioural episodes: Lowering behaviour that is aggressive or is leading to coercive cycles of behaviour between parent and child.

That the parent is able to identify times the point in a behavioural episode where things "went wrong": Help the parent help their child to reach their goals in more positive ways. Use PLI methods to change this.

That parents are routinely and consistency using sanctions and/or time out to obliterate unwanted behaviours and are able to use positive reinforcement and emotional coping strategies (e.g. quiet time) to prevent these where possible.

8. Generalizing extending sustaining and transferring the PLI methods after the course is finished.

Helping the parent develop strategies and communicate with others around having a consistent approach to their child's life social and behavioural management. Help them understand how the PLI strategies can be used by the child as they mature.

That parents have embodied the need and ability to monitor their child's behavioural life-skills and social development and work together with them and others to maximise positive ADHD outcomes for the future