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USING TEXT MESSAGING TO INCREASE ACCESS TO PSYCHOLOGICAL INTERVENTION IN ADOLESCENCE. AN EXPLORATION OF THE FEASIBILITY AND EFFECTIVENESS OF THE APPROACH WITH YOUNG PEOPLE IN CONTACT WITH THE YOUTH JUSTICE SYSTEM.

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ACADEMIC THESIS

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ABSTRACT

Introduction: This thesis seeks to explore the feasibility and effectiveness of using text messages (SMS) to improve psychological wellbeing amongst young people involved in the Youth Justice System. As this group are likely to be exposed to risk factors impacting on their psychological health, yet unlikely to access mainstream health services, the provision of alternative and accessible interventions for this group should be a key priority for service providers, commissioners and academics alike.

Method: A systematic review of the literature and meta analyses to explore current findings in relation to the use of text message interventions to improve psychological wellbeing in the broader adolescent population is presented in Chapter Two. In total 2,496 studies were identified, ten of which met full inclusion criteria. No significant pooled differences were evident between intervention and control groups. Reported effects and the feasibility of the approach are discussed. Findings indicate that, to date, there is no available research in relation to the use of an SMS approach to promote wellbeing amongst young people in the YJS. In preparation for a feasibility study to explore this, the psychometric properties of the KIDSCREEN questionnaires are considered in Chapter Three. Here the reliability and the validity of the tool is evidenced indicating its appropriateness for the use in the proceeding empirical research. The rationale and development of an SMS intervention to encourage self-determination and improve psychological wellbeing, co-designed with service users, are discussed in Chapter Four. In Chapter Five, the findings of the mixed methods feasibility study are presented.

Conclusion: No significant differences in wellbeing were found between participants' pre and post KIDSCREEN scores. Significant findings indicate that the intervention may be more acceptable for those with poorer wellbeing and for those subject to diversionary intervention as VAS scores (assessing acceptability of the approach) correlated with lower KIDSCREEN scores (pre intervention) and type of intervention (diversionary or statutory) respectively. Five themes emerged from the semi- structured interviews highlighting important factors to consider when designing or implementing an intervention of this nature for this hard to reach population. A synthesis of the findings is presented in the concluding chapter where recommendations for future enquiry are considered.

Keywords: Adolescent, text messaging, wellbeing, mobile Health

CHAPTER ONE.

INTRODUCTION

The importance of providing accessible psychological interventions for young people who offend. Exploring the use of text messaging.

Word count: 1,471

Adolescence

Adolescence marks a crucial developmental stage where changes in young people's behaviour and complexity of presentation may be understood by the significant biological, neurological and psychosocial changes that occur during this transition to adulthood. It is a time when young people are likely to be faced with a number of conflicts within their internal and external world which can be a source of real stress. It is perhaps, therefore, not surprising that over 50 % of mental ill health begins before the age of 14 and 75% before the age of 18 (Murphy & Fonagy 2012). The long term impact of mental health problems during such a critical period can be profound given the potential disruption to neurological, social and emotional development (British Psychological Society, 2009, Heim & Binder, 2012, Isohanni, Jones, Jarvelin, Nieminen, Rantakallio, Jokelainen, Crondice & Isohanni, 2001, Mercy & Saul, 2009).

Adolescent offending

Adolescence also marks a time of increased risk, where unintentional injuries are the largest source of morbidity and mortality amongst 10-19 year olds (Steinberg, 2010), a peak in offending behaviour is observed (Agnew, 2003) and individuals are at increased risk of becoming a victim of crime (Lowry, Sleet, Duncan, Powell & Kolbe, 1995).

As adolescents become more independent with their use of time and in their decision making they are likely to spend more time with their developing peers which may impact on their choices and increase the likelihood of engaging in "risky" behaviour. In recent years advances in neuroimaging techniques have contributed to understanding the neurological mechanisms underlying this concerning aspect of adolescence. We now know that although fully developed in size by the age of 12, adolescence is a significant period of brain maturation, where the front of the brain, responsible for higher order functions such as planning, organising, judgement and impulse control is the last part to develop (Blackmore & Choudry, 2006). At the same time it would appear that the reward centre is hypersensitive in adolescents (Galvan, 2010) resulting in a somewhat

problematic combination that may contribute to behaviour that places themselves or others at risk. This goes some way to explaining why a peak in offending is observed at this time and why for the vast majority anti-social and offending behaviour will not persist in adulthood (Moffit, 2015). However, ill-considered responses to juvenile offending holds potential for longer term detrimental consequences if juvenile justice services are not appropriately adapted for this developing group. This population is therefore a key interest in the field of forensic psychology, where the long term benefits of policies underpinned by developmentally appropriate theoretical frameworks and evidence based practice is likely to pay dividends for individuals, the wider society and the economic purse.

Mental health & youth offending

Concerns regarding the high prevalence of mental health needs amongst the young offender population is well documented in the literature (Bailey, 2003, Fazel, Doll & Langstrom, 2008, Lader, Singleton, Meltzer, 2000) and remains a particular cause for concern. Young people within the Criminal Justice System (CJS) are three times more likely to present with mental health problems compared to their non offending comparables (Chitsabesan, Kroll, Bailey, Kenning, Sneider, MacDonald & Theodosion, 2006). Until recently attention has largely focussed on those within the secure and custodial estate despite the fact that this only accounts for a small proportion of young people within the CJS (Youth Justice Board, 2015). Understanding and addressing the needs of any forensic population within community settings presents particular challenges given environmental factors that can compromise engagement. This may explain why community samples are underrepresented within the empirical literature but also highlights the importance of providing services that are matched according to need and accessible across the system.

The interplay between mental health and offending is complex but does not necessarily imply a causal relationship. The overlap between predisposition for mental health difficulties and risk factors for adolescent offending may contribute to our understanding about why poor mental health is so prevalent amongst this group. These risk factors include parental criminality, drug and alcohol abuse, early onset conduct difficulties, family breakdown and conflict, harsh,

inconsistent parenting, socio-economic disadvantage and exposure to traumatic incidents (Callaghan, Pace, Young & Vostanis, 2003). Risk taking, offending behaviour and the associated consequences are likely to expose this vulnerable group to additional stressors that has the potential to compromise mental health and emotional wellbeing further. It is important to note that mental health and wellbeing refers to more than the mere absence of mental illness (Patalay & Fitzsimons, 2016). Indeed the WHO (2003) define mental health and wellbeing as "subjective wellbeing, perceived self-efficacy, autonomy, competence, inter-generational dependence and recognition of the ability to realise one's intellectual and emotional potential". Whilst mental health needs do not appear to be predictive of risk of re-offending (Harrington, Bailey, Chitsabesan, Kroll, MacDonald, Sneider, Kenning, Taylor, Byford & Barrett, 2005), positive mental health has been associated with important criminogenic factors including improved educational attainment and employment, reduced risk taking behaviour, increased resilience and reduced risk of developing mental illness (Seymour, 2010). It is therefore important that services go beyond the offer of interventions to address mental illness. Prioritising the promotion of positive mental health and wellbeing should be at the heart of any criminal justice assessment or intervention. This will ensure that an individual's ability to engage with interventions to reduce their risk of harm or offending is not compromised by their mental health.

The underutilisation of mental health provision amongst those within the Juvenile Justice System remains a particular cause for concern .There is evidence to suggest that young people in this group are reluctant to access services until they reach a point of crisis, which is likely to co-occur when they are required to engage with other services (MacDonald, 2006) and at a time when poor mental health may in itself impact on this. Difficulties with non engagement also limits the availability of research involving this group from which to draw conclusions to ensure that the design of services are responsive to their needs. However, studies of help seeking behaviour amongst the more general adolescent population may provide some insight about approaches that have potential to overcome barriers and increase accessibility.

As mobile phone ownership is high amongst the adolescent population across socio-economic and demographic groups, there is an opportunity to promote

positive behaviour through mobile devices and overcome some of the barriers that may hinder engagement with face to face services for those in greatest need (Riley, Rivera, Atienza, Nilsen, Allison & Mermelstein, 2011 & Leena, Tomi, Arja, 2005). Text messages offer a particularly inclusive approach to engage with a range of young people as, unlike mobile applications, costly smartphone technology or data subscription is not required.

This thesis seeks to explore the feasibility and effectiveness of using mobile phones, specifically SMS messaging, to engage even those hardest to reach adolescents. Throughout, the terms mental health and psychological wellbeing are used interchangeably.

The preliminary chapter explores the current literature in relation to the use of SMS messages to promote positive mental health amongst the more general adolescent population. The systematic review presents the search strategy and the criteria for including or excluding based on the type of study, participants, intervention and outcomes. The results of the study quality assessment and data synthesis (both narrative and quantitative) are presented and the findings discussed. Results suggest that only limited research focussing on this topic is currently available. Therefore, further enquiry is recommended to contribute to understanding what works and for whom.

To date, there is no available research in relation to the use of an SMS approach to promote wellbeing amongst young people in the CJS. As accessibility for mental health services remains a particular concern amongst this group and based on some of the emergent positive effects and feasibility of an SMS intervention presented in the systematic review, further enquiry with this hard to reach group was facilitated. In preparation for this, and in order to measure effectiveness alongside feasibility, the KIDSCREEN questionnaires were identified as an age appropriate measure to assess changes in wellbeing. The psychometric properties of this measure are considered in Chapter Three.

The rationale and findings from the developmental phase of the research, where young people were involved in the design of an SMS intervention to improve psychological wellbeing amongst young people who have offended, are discussed in Chapter Four. The subsequent mixed methods feasibility study is presented in

Chapter Five. Here, the effectiveness of the approach is explored alongside the young people's perceptions of the usefulness of the intervention.

Finally a discussion of the overall findings from this exploration of the use of SMS to improve psychological wellbeing amongst adolescents, a population that should remain of interest in the field of forensic psychology, is presented in the concluding chapter. Recommendations for ongoing enquiry are discussed.

CHAPTER TWO
SYSTEMATIC REVIEW

The use of SMS interventions to promote psychological wellbeing in adolescents: A systematic review and meta analyses.

Word Count: 7,416

(excluding abstract, tables, references and appendices)

CONTENT

- 1. Abstract**
- 2. Introduction**
- 3. Method**
- 4. Results**
- 5. Discussion**
- 6. Concluding remarks**

ABSTRACT

Background: Interest into the use of SMS (text message) interventions has burgeoned in the last decade. Until recently, in both the paediatric and adult literature, there has been greater enquiry into the use of SMS intervention in relation to physical health with less known about the effect on mental health outcomes. As adolescence marks a time when mental health difficulties begin to emerge and young people become more independent in their decision making, it is particularly important that services are responsive to the needs and preferences of this unique population group. Increased mobile phone ownership with SMS functionality amongst children and young people, combined with their preference for using technology to obtain health information, may make SMS a particularly favourable method to engage this group with positive health behaviour. This review seeks to explore the impact of SMS interventions in promoting positive mental health and wellbeing amongst adolescents specifically.

Method: An electronic database search of PsychInfo, Allied and Contemporary Medicine Database (AMED), Embase, Medline and SCOPUS, Google Scholar and a targeted hand search was conducted in July 2017 to identify Randomised Controlled Trials investigating the use of SMS messages to promote psychological wellbeing in adolescence published between 2010 and 2017.

Results: In total 2,496 studies were identified, ten of which met full inclusion criteria. Seven of these were included in two separate meta analyses using a random effects estimation model; one pooling effect estimates for studies measuring psychological health and the other quality of life. No significant differences were found between intervention and control group scores at the end of SMS intervention. Despite this there was evidence of positive effects and feasibility of the approach with even those hard to reach. Therefore, further enquiry is necessary to add to the limited sample currently available, requiring careful consideration for specific characteristics that may contribute to whether the approach is a success or not.

Introduction

Adolescence is the transitional period from childhood to adulthood, a time of tremendous potential, growth and change (WHO, 2016) but also a time of considerable risk. In preparation for an individual's attainment of a stable independent role in society a combination of physical, psychological and neurological changes occur during this important life stage. These significant developments might assist in understanding why many mental health disorders emerge in mid to late adolescence (Kessler, Amminger, Aguilar-Gaxiola, Alonso, Lee, & Ustun, 2007) when an increase in risk taking behaviour is also observed. Whilst participation in risk taking behaviour may impact on an individual's mental health (for example, the impact of substance use on the developing adolescent brain, Giedd, Keshavan & Paus, 2008), emerging difficulties may in themselves increase the likelihood of engaging in risk taking behaviour as symptoms begin to manifest (e.g. substance use in attempt to minimise symptoms). It is, therefore, unsurprising that poor mental health is associated with other health and development concerns in young people that can have long term negative consequences for an individual, their families and the wider society. The availability of effective and accessible interventions is therefore essential to support adolescent health and wellbeing to enable the development of healthy, resilient adults.

As adolescence marks a time when young people become more independent in their decision making, it is particularly important that services are responsive to the needs and preferences of this unique population group. The issue of accessibility is a particular concern amongst this hard to reach group who are less likely to access preventative services, relying instead on the provision of specialist health care at the point of crisis (Macdonald, 2006). Despite their underutilisation of services, there is evidence to suggest that young people want to discuss their health care issues (Klein & Wilson, 2002). Studies of help seeking behaviour are therefore important in understanding the barriers that prevent young people from accessing services. Findings suggest that this includes lack of emotional competence, embarrassment, negative attitudes about professional help and a preference for self-help and use of technology to access health related information (Gray, Klein, Noyce, Sessleberg & Cantrill, 2005). Increased access to different modes of technology and growing empirical

evidence to support the efficacy of using this medium to promote health related behaviour, therefore, provides an opportunity to adapt and develop services that are accessible and responsive to the needs of the adolescent population (Portnoy, Scott-Sheldon, Johnson & Caery, 2008).

Whilst particular forms of technology require access to the internet and Smartphone technology, Short Message Service (SMS) messages are widely accessible on any mobile phone device likely to be owned by 9 out of 10 teenagers in the UK (eMarketer, 2013, Childalert, 2015), which spans across socioeconomic status (Silke, Sabine, Anja & Katja, 2009). Thus providing an opportunity to extend real time health interventions to marginalised populations who are potentially in greatest need of support to influence positive health behaviour. Indeed, there is some evidence to suggest that this is a preferred source of communication for adolescents of lower socio economic status, who spend longer periods of time on their mobile phones as do individuals with lower levels of self-rated health and those engaging in health compromising behaviours (Fjedsoe et al, 2009, Silke, Sabine, Anja & Katja, 2009).

Increased mobile phone ownership with SMS functionality amongst children and young people, combined with a preference for using technology to obtain health information and their expressed importance of confidentiality and anonymity in adolescent health programmes (Whittaker, Stasiak, McDowell, Doherty, Shepherd, Chua, Dorey, Parag, Ameratunga, Rodgers & Merry, 2017) may make this method particularly favourable to this group. In comparison to face to face approaches, text message interventions offer a particularly appealing and convenient method of communication amongst adolescents. In line with developmental progression SMS interventions provide a more autonomous approach; messages can be read at a time of convenience, targeted for relevance and may be particularly enticing for the developing brain when the reward centre is particularly sensitive. It has been suggested that the receipt of messages may invoke the release of dopamine, which may make this type of intervention unconsciously pleasurable and favourable (Hall, Cole-Lewis & Bernhardt, 2015).

Interest into the use of SMS interventions has burgeoned in the last decade providing promising evidence to support the acceptability and effectiveness of

this mode of intervention across different healthcare settings targeting a range of health behaviours. Subsequently, a number of published systematic reviews and meta analyses have synthesized findings from a range of studies in attempt to better understand “what works” and “what doesn’t” when using SMS as a method for health promotion and intervention.

The first systematic review to explore this was presented by Fjedsoe, Marshall & Miller in 2009. Whilst they reported positive behavioural changes in 13 of the 14 interventions included in their review, they suggested that, in order to fully explore the full potential of this type of intervention, the quality of studies needed to improve. In a later review and meta-analysis Free, Phillips, Watson, Galli, Felix, Edwards, Patel & Haines (2013) explored more broadly the effectiveness of mobile health technologies to improve health care service delivery. Free et al (2013) present similar challenges relating to poor quality of studies, undertaken predominantly in high income Countries. In their review of 42 controlled trials included in the qualitative synthesis and ten in the quantitative meta-analysis, Free et al (2013) indicate mixed effects of the use of SMS in improving healthcare outcomes. They report modest effects of SMS reminders in increasing clinic attendance suggesting that these effects were similar to other forms of reminders but found no evidence that SMS reminders impact on appointment cancellations. Since then the number of Randomised Controlled Trials (RCT) in this area has significantly increased allowing for more rigorous assessment of the efficacy of SMS health behaviour intervention. More recently Orr & King (2015) presented positive findings from their meta-analysis of 38 studies which included RCT’s only. They report positive significant effects on a broad range of health behaviours including appointment attendance and medication adherence. Greatest effects were observed in relation to relatively simple health behaviour (such as attending medical appointments and medication adherence) with reduced efficacy for more complex behaviour modification including smoking cessation, healthy diet and disease prevention.

At around the same time, in response to the rapidly growing body of empirical evidence, Hall et al (2015) conducted a review of reviews exploring mobile text messaging for health, synthesizing reviews assessed to be of high methodological quality only. Again, Hall et al (2015) report similar positive

findings specifically in relation to diabetes self-management, weight loss, physical activity, smoking cessation and medication adherence in adults but suggested that further evidence was required to determine the most effective intervention characteristics and the longer term effects amongst more diverse population groups. To our knowledge, there are only two reviews which focus specifically on the adolescent population (Preston, Walhart & O'Sullivan 2011 & Militello, Kelly & Melnyk, 2012). Both corroborate the findings from the adult literature supporting the use of SMS interventions to promote healthy lifestyle behaviours amongst the younger population. However, amongst their positive findings Preston et al (2011) suggest that uniformly significant results are not currently evident in the literature and Militello et al (2012) highlight uncertainty around the sustainability and long term impact of the intervention. The findings of Militello et al (2012) are, however, interpreted with caution due to their inclusion of published research only, which is more likely to include research with significant positive findings (Hopewell, Loudon, Clarke, Oxman & Dickersin, 2009).

As evident in both the paediatric and adult literature, until recently, there has been greater enquiry into the use of SMS intervention in relation to physical health with less known about the effect on mental health outcomes. Ease of access and perceived anonymity associated with mobile health interventions offers a particularly appealing approach when considering reported barriers to more traditional face to face mental health services (Wells, Forde & Forde, 2011). In light of emerging evidence, Berrouiguet, Baca-Garcia, Brandt, Walter & Courtet (2016) recently completed a systematic review of mobile phone and web- based text messaging in mental health, identifying 36 studies that met their inclusion criteria. The majority (56%) of which assessed feasibility and acceptability of SMS to serve as; reminders, provision of information, supportive messages and self-monitoring procedures for both adult and adolescents. 35 of the 36 studies reported positive perceptions of SMS on assessed outcomes, which included acceptability, and attendance and compliance with appointments and treatment.

In particular SMS interventions targeting mental health has potential for increasing access amongst the younger population, who may otherwise be

reliant on caregivers or reluctant to access face to face services. In a qualitative exploration of SMS intervention to promote positive wellbeing and resilience amongst young jobseekers participants reported a preference for SMS communication suggesting that engaging in text conversation felt more comfortable than talking in person (Orr, King, Hawke & Dalglish 2013). Chandra, Sowmya, Mehrotra & Duggal (2014) provide additional support for the acceptability and feasibility of this approach in the promotion of mental health amongst female adolescents where 62.5% of their participants actively engaged with the intervention, sending response messages in relation to their feelings and reporting that they felt supported by the messages sent. There is also evidence to suggest that text messages can be useful in assisting with the coordination of face to face meetings with mental health services (Furber, Crago, Meehan, Sheppard, Hooper, Abbot, Allison & Skene, 2011) and has potential to support the development and maintenance of therapeutic relationships with professionals (Kobak, Mundt & Kennard, 2015). Even in the aftermath of crisis, patients in a study by Chen, Mishara & Liu (2010) considered supportive messages to be acceptable upon discharge following attempted suicide indicating that they would be keen to continue to receive supportive messages even after the end of the study. Whilst promising, it would appear that further enquiry into the effectiveness of the approach in improving mental health outcomes in the younger population is now required to enhance knowledge and ensure that ongoing practice in this area is evidence based.

To broaden current understanding, this review seeks to explore the impact of SMS interventions in promoting positive mental health and wellbeing amongst adolescents specifically. To our knowledge no review has been published in relation to this to date.

Systematic review question

Can SMS interventions effectively promote psychological wellbeing in adolescents?

METHOD

Inclusion and exclusion criteria summary

Randomised controlled trials which evaluated a health intervention designed for the adolescent population (10-18 years) that included an SMS intervention were eligible for inclusion. Studies published between January 2010 and July 2017 were considered for inclusion if they included an outcome measuring psychological wellbeing.

Reviews, non randomised designed trials and case studies were excluded. Though reference lists for relevant reviews were checked as part of the grey literature search. Studies without a full text in English were also excluded.

Criteria for considering studies for review

A PICO strategy was devised to assist in the completion of a clear systematic review. This is summarised in Table 2.1.

Table 2.1. *PICO strategy*

PICO Criteria	Description
Population	Studies including young people aged between 10 and 18. Studies including participants outside of this age range were also included where the SMS intervention was designed with adolescent population in mind providing all other inclusion criteria met.
Intervention	Interventions including SMS prompts, reminders or supportive messages sent directly to adolescent participants.
Comparator	No SMS or placebo messages sent.
Outcome	Primary or secondary outcomes measuring psychological wellbeing (including psychological health, emotional wellbeing, quality of life, measurement of symptoms relating to mental health or reduction in psychological distress).

Types of study

In recent years there has been an increasing interest into the use of text messaging interventions amongst the younger population. This has contributed to the development of larger, more rigorous studies investigating the efficacy of

this type of intervention. Thus allowing for this review to limit included studies to Randomised Controlled Trials only, reducing risk of bias relating to study design.

Types of participants

The adolescent population was the focus for this review. According to the World Health Organization adolescence is a transitional period from childhood to adulthood that begins during the second decade of life (WHO, 2015), though there is emerging evidence to suggest that the age at which this developmental stage begins may be falling, particularly in westernised countries (Herman-Giddens, Steffes, Harris et al, 2012). There is also some debate about the age at which adolescence ends and adulthood begins and this is likely to be influenced by various factors including individual, cultural and societal factors. Despite this, within developed countries, changes in responsibilities, privileges and the structure of paediatric and youth services indicate that key developmental milestones have been achieved in the late teens and young people are expected to transition to adult services at the age of 18. Therefore, interventions designed for an adolescent population, between the ages of 10 and 18 were included in this review. Studies were also included where interventions were designed with this population in mind but also included participants outside of this age range providing all other inclusion criteria were met. Where possible, data relating to the adolescent age group was extracted. Interventions that were designed for a population of 18 years and older were excluded.

Types of intervention

Studies including SMS prompts as an active component of the intervention were included in the review. This included SMS prompts, reminders and supportive messages sent directly to adolescents. As this review was designed to explore the effectiveness of text messages amongst the adolescent population specifically, interventions using SMS to target others (parents, teachers, medical personnel etc.) were excluded. Studies comparing SMS intervention with control groups receiving either no SMS intervention or placebo messages were eligible for inclusion. Studies were excluded where no comparison group was incorporated into the study design.

Types of outcome measures

Primary or secondary outcomes measuring psychological wellbeing were included. More specifically, as indicated in the study protocol, this may have included: psychological health, emotional wellbeing, quality of life, measurement of symptoms relating to particular mental health conditions or a reduction in psychological distress. To reduce effects of publication bias, studies were not excluded based on the findings reported within the research.

Search methods for identification of studies

Electronic searches

An electronic database search was conducted in July 2017 for studies published between 2010 and 2017. This allowed for studies completed since Preston et al (2011) and Militello et al (2012) earlier reviews to be considered as well as any impact that advances in technology may have had on the relevance of SMS interventions. Databases searched included PsychInfo, Allied and Contemporary Medicine Database (AMED), Embase, Medline and SCOPUS. In addition a search was conducted in Google Scholar and relevant review articles and included studies references were hand searched. Relevant authors were contacted and asked to identify any unpublished work that would meet the selection criteria and conference abstracts were included in the electronic search to minimise the influence of publication bias. Medical Subject Headings (MESH) terms, subheadings, titles and abstracts were searched using a list of search terms (and synonyms) created around the domains of "text messaging", "adolescence", "intervention", "psychological wellbeing" and "randomised control trial". Boolean operators were employed to combine the terms listed in Appendix 1. To maximise the identification of potential studies, a combination of the search terms were explored as presented in Appendix 1 using relevant search rules for the databases accordingly (for example, double quotation marks to search phrases in all databases, and adj to search adjacent words in PsychInfo, AMED, Embase and Medline). For all databases, search delimiters were activated to include studies involving "humans" aged "0- 18" and "Randomised Control Trials" only.

Titles and abstracts of the subsequent search results were then scanned to identify potential eligible trials. Where necessary, full articles were retrieved to

ascertain whether studies met inclusion criteria. The study selection process is presented in Figure 2.1. Twenty percent of included articles were reviewed by a second assessor and a third assessor was available for consultation where discrepancies could not be resolved through discussion.

Study Quality Assessment

The quality of each review was assessed using The Cochrane Risk of Bias Tool, taking guidance from the Cochrane Handbook to determine judgements for each domain (Higgins & Green, 2011). A copy of this can be found in Appendix 2. Studies that met inclusion criteria were not excluded based on their assessed quality.

Data Extraction

Data were extracted for included studies using the template presented in Appendix 3. This is an adapted version of the Cochrane Data Extraction and Assessment template (Higgins & Green, 2011) and organised the extraction of; study and participant characteristics, intervention details including purpose, dose, duration and timing of SMS messages, comparison group details, outcome measures and results (mean and standard deviation for intervention and comparison groups). Missing data for quantitative analysis were dealt with on a case by case basis. Primarily, authors were contacted to obtain information, where information was not made available studies were excluded from quantitative analysis and included in the narrative review only.

Data synthesis

To calculate effect sizes and statistical analysis for the meta analyses Review Manager 5 (RevMan 5.3) was used. Based on the outcomes measured in included studies it was necessary to group studies into two groups measuring two different constructs: psychological health and quality of life. For each group the mean, standard deviation and the number of participants for intervention and control groups was inputted to calculate the standardised mean difference for the continuous outcome measured at the end of the intervention for each study. Where multiple outcomes in the same study were reported the measure most similar to other measures in the group was used.

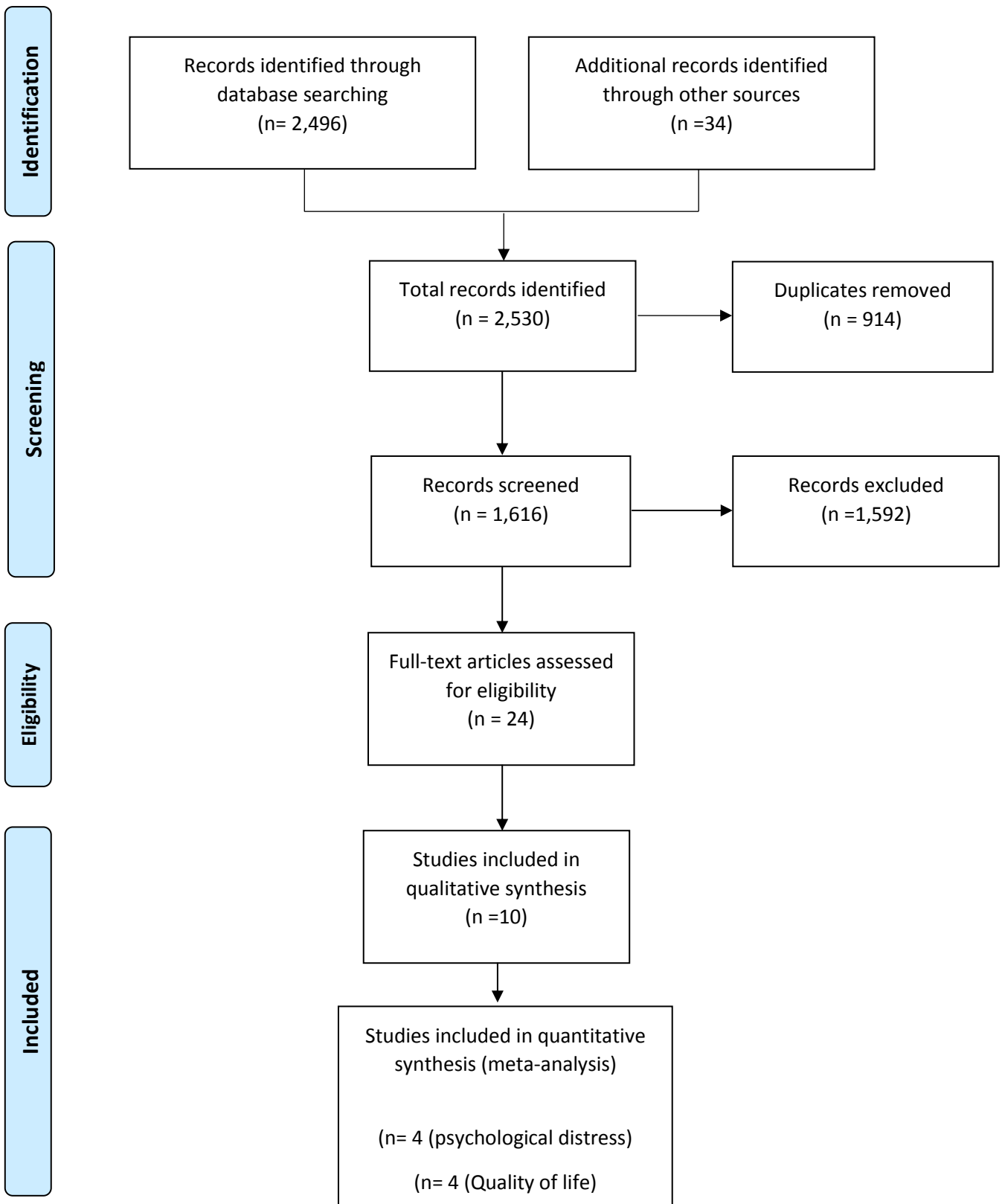


Figure 2.1 Prisma 2009 flow diagram

Effect sizes were interpreted in accordance with Cohen (1992) recommendation where effects were considered to be large (>0.80), medium (0.50) and small (<0.20) (Cohen, 1992). The random-effects estimation model was used due to the heterogeneity of the interventions and diverse populations evident across the studies.

RESULTS

Selection of studies

In total 2,496 studies were identified from PsychInfo, Allied and Contemporary Medicine Database (AMED), Embase, Medline and SCOPUS. An additional 34 studies were identified via Google scholar and hand searching reference lists of included studies and relevant review articles. 914 of these were duplicate studies, which meant that 1,616 titles and abstracts were initially screened. A further 1,592 studies were excluded at this stage. Full text articles were retrieved for 24 studies. At this stage 14 clearly did not meet defined inclusion criteria. These are presented in Table 2.2 Characteristics of Excluded Studies. The remaining 10 studies met full inclusion criteria and were therefore included in the systematic review. Necessary quantitative data was available for seven studies, which were included in the meta-analyses.

Study Quality

Risk of bias for each study is presented in Table 2.3 and a summary of risk of bias is reported in Figure 2.2. Overall this indicates that included studies were predominantly of high quality across a range of domains. One study was rated at low risk of bias across all domains (Agyapong, Juhas, Ohinmaa, Omeje, Mrklas, Suen, Dursun & Greenshaw, 2017) but sufficient detail was not available for all studies to fully assess risk of bias. In particular one study was rated unclear across four of the six domains (Huang, Dillon, Terrones, Schubert, Roberts, Finklestein, Swartz, Norman & Patrick, 2014).

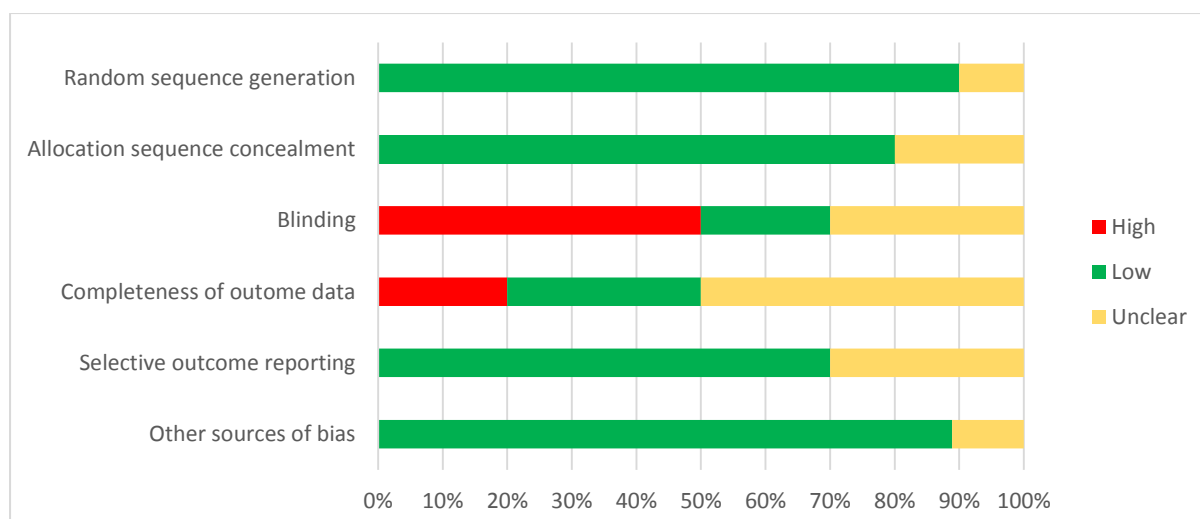


Figure 2.2 Summary Risk of Bias for included studies (n=10)

With the exception of one study without sufficient detail (Huang et al, 2014), random sequence generation was reported across studies. Similarly allocation sequence concealment was evident in the majority of studies (80%) where information was not readily available to assess the remaining 20%.

Due to the nature of the intervention and the ethical obligation to obtain informed consent, it is likely that participants would have been aware of group allocation in eight of the studies where control group participants were not in receipt of any SMS throughout the study. Therefore, blinding of participants was not always achievable. For two of the included studies (Agyapong et al, 2017 & Whittaker et al, 2017) control group participants received placebo messages making blinding of participants easier to achieve, with consideration for minimising risk of contamination for participants in Whittaker et al (2017) study. Blinding of personnel was clearly evident in six of the studies (DeNiet, Timman, Bauer, van den Akker, Buijks, de Klerk, Kordy & Passchier, 2012, Agyapong et al, 2017, Whittaker et al, 2017, Nguyen, Shrewsbury, O'Connor, Steinbeck, Hill, Shah, Kohm, Torvaldsen & Baur, 2013, Haas, Martin & Park, 2017 & Seid, D'Amico, Varni, Munafo, Britto, Kercksmar, Drotar, King & Darbie, 2012).

Completeness of outcome reporting was considered to be at low risk of bias in three studies (Agyapong et al 2017, Haas et al, 2017 & Seid et al, 2012) where attrition rates were below recommended 20% for short term follow up and 30%

Table 2.2: *Characteristics of excluded studies (n=14).*

Study reference	Reason for exclusion
Anstiss, D & Davis, A. 'Reach Out, Rise Up': The efficacy of text messaging in an intervention package for anxiety and depression severity in young people. <i>Children and Youth Services Review</i> 58, 99-103	Outcome measured not relevant (comparison between intervention and control group relate to evaluation only)
Bjornholt, K., Christianson, E., Atterman Stokholm, K., & Hvolby, A. (2016). The effect of daily small text message reminders for medicine compliance amongst young people connected with the outpatient department for child and adolescent. <i>Nordic Journal of Psychiatry</i> . 70(4):285-9	Outcome measured not relevant (compliance)
Branson, C.E., Clemmey, P., & Mukherjee, P. (2013). Text Message Reminders to Improve Outpatient Therapy Attendance Among Adolescents: A Pilot Study. <i>Psychological Services</i> 10(3), 298-303.	Outcome measured not relevant (attendance). Not RCT
Buchter D., Kowatsch T., Tanner A., Vural S., Laimbacher J., Mudespacher A., L'allemand D. (2016). Treatment of adolescents with under-or overweight by stress regulation exercises: An SMS-supported randomized controlled study. Paper presented at European Obesity Summit, Gothenburg, Sweden	Full text not available in English
Franklin, V.L., Waller, A., Pagliari, C., & Greene, S.A. A randomized controlled trial of Sweet Talk, a text messaging system to support young people with diabetes. <i>Diabetic Medicine</i> 23, 1332-38. DOI: 10.1111/J.1464-5491.2006.0198.X	Outcome measured not relevant (disease specific self –efficacy)
Furber, G., Jones, G. M., Healey, D., & Bidargaddi, N. (2014). A Comparison Between Phone-Based Psychotherapy With and Without Text Messaging Support In Between Sessions for Crisis Patients. <i>Journal of Medical Internet Research</i> , 16(10), e219. http://doi.org/10.2196/jmir.3096	Adult population targeted
Gonzales, R., Hernandez, M., Murphy, D.A., Ang, A. (2016). Youth recovery outcomes at 6 and 9 months following participation in a mobile texting recovery support aftercare pilot study. <i>The American Journal on Addictions</i> 25(1), 62-68.	Outcome measured not relevant (substance use)
Kauer, S. D., Reid, S. C., Crooke, A. H. D., Khor, A., Hearps, S. J. C., Jorm, A. F., Sanci,L., & Patton, G. (2012). Self-monitoring Using Mobile Phones in the Early Stages of Adolescent Depression: Randomized Controlled Trial. <i>Journal of Medical Internet Research</i> , 14(3), e67. http://doi.org/10.2196/jmir.1858	No SMS intervention.
Owens, C., & Charles, Nigel. (2016). Implementation of a text-messaging intervention for adolescents who self-harm (TeenTEXT): A feasibility study using normalisation process theory. <i>Child and Adolescent Psychiatry and Mental Health</i> 10:14 DOI 10.1186/s13034-016-0101-z	Not RCT

Rajabi, A., Ghasemzadeh, A., Ashrafpouri, Z., & Saadat, M. (2012). Effects of counselling by mobile phone short message service (SMS) on reducing aggressive behaviour in adolescence. <i>Procedia- Social & Behaviour Sciences</i> 46, 1138-1142. Doi10.1016/j.sbspro.2012.05.263	Not RCT
Ranney, M. L. (2015). A Mixed-methods Pilot Study Of iDove: Text-message Prevention For Teen ED Patients. <i>Academic Emergency Medicine</i> 22 (1) 372-S372.	Not RCT
Shapiro, J.R., Bauer, S., Andrews, E., Pisetsky, E., Bulik-Sullivan, B., Hamer, R.M., Bulik, C.M. (2010). Mobile therapy: Use of text-messaging in the treatment of bulimia nervosa. <i>International Journal of Eating Disorders</i> 43(6), 513-9. Doi: 10.1002/eat.20744	Adult population targeted
Sirriyeh, R., Lawton, R., & Ward, J (2010). Physical activity and adolescents: an exploratory randomized controlled trial investigating the influence of affective and instrumental text messages. <i>British Journal of Health Psychology</i> . 15(4). 825-40.	Outcome measured not relevant (physical activity)
Vasbinder, E., Goossens, L., Janssens, H., De Winter B., Van Dijk, L., Vulto, A., Rutten-Van Molken, M., Van Den Bemt, P. (2016). E-monitoring of asthma therapy to improve compliance in children (E-MATIC).: A randomised controlled trial. <i>European Respiratory Journal</i> 48 (3), 758-67. doi: 10.1183/13993003.01698-2015	Intervention not targeting adolescent population. SMS messages predominantly targeting parents.

Table 2.3: *Risk of bias for included studies (n=10)*

	DeNiet et al 2012	Agyapong et al (2017)	Whittaker et al (2017)	Huang et al (2014)	Nguyen et al (2013)	Boker et al (2012)	Haas et al (2017)	Johnson et al (2015)	Seid et al (2012)	Fabbrocini et al (2014)
Random sequence generation	Low	Low	Low	Unclear	Low	Low	Low	Low	Low	Low
Allocation sequence concealment	Low	Low	Low	Unclear	Low	Unclear	Low	Low	Low	Low
Blinding	High	Low	Low	Unclear	High	Unclear	High	Unclear	High	High
Completeness of outcome data	High	Low	Unclear	Unclear	Unclear	High	Low	Unclear	Low	Unclear
Selective outcome reporting	Unclear	Low	Low	Low	Low	Unclear	Low	Low	Unclear	Low
Other sources of bias	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low

for long term follow up (Higgins & Greene, 2011) an intention to treat approach was reported and the method for dealing with missing data was clear. Whilst an intention to treat approach was reported in a further four of the studies (Whittaker et al, 2017, Nguyen et al, 2012, Huang et al, 2014 and Johnson, Patterson, Ho, Chen, Nian, Davison, Slangle & Mulvaney, 2016) it was unclear how missing data was attended to in these studies. All participant data was included in DeNiet et al, (2012) study and the authors provide useful information in relation to factors that may have contributed to dropout or compliance. However attrition rates were high in the control group (31%) resulting in an assessment of high risk of bias in this category. High risk of bias in this area was also evident in Boker, Feetham, Armstrong, Purcell & Jacobe, (2012) study, who excluded data for participants who dropped out. As there was a greater number of participants (25%) who discontinued in their SMS intervention group compared to the control group (10%) the information from these participants may have provided some understanding about why dropout rates in the intervention group were higher compared to control group participants.

Published protocols were available for six studies (Agyapong et al, 2017, Whittaker et al, 2017, Huang et al, 2014, Nguyen et al, 2012, Haas et al, 2017 & Johnson et al, 2016) allowing for full assessment of selective outcome reporting. Whilst it is recognised that protocols may have been prepared for the remaining studies, these were not available to review. Nonetheless, the findings reported corresponded with the presented aims of the research across all studies (DeNiet et al, 2012, Boker et al, 2012 & Seid et al, 2012 & Fabbrocini et al, 2014).

No additional sources of bias were identified in eight out of the nine included studies. This was considered to be unclear in DeNiet et al (2012) and Fabbrocini et al (2014) study as it was not clear whether adjustments were made for baseline differences identified between intervention and control groups.

Characteristics of Studies

A summary of study characteristics is presented in Table 2.4.

Participants

A total of 1,630 participants were recruited across the ten studies included in this review. Overall, the majority of these were female (64%).

Table 2.4: *Characteristics of included studies (n=10).*

Author	Country	Aim of study	Population	Text message Intervention	Control group	Dosage
DeNiet et al (2012)	Netherlands	Evaluate the effect of SMS maintenance treatment on body mass index and psychological well-being in overweight and obese children	Overweight or obese children Age range- 7-12 yrs Mean 9.9 yrs	Children submitted self-monitoring data relating to physical activity, healthy eating and mood. Individualised messages were then sent promoting social support, motivating participants, reinforcing positive changes and suggesting behaviour modification and self-management skills learnt during prior Big Friends Club intervention	No SMS messages. Continued with Big Friends Club (as did intervention group)	Frequency: Weekly Timing: Not known Duration: 9 months
Agyapong et al (2017)	Canada	To test the efficacy of using supportive text messaging as a means of improving treatment outcomes in depressed patients	Participants fulfilling diagnostic criteria for Major Depressive Disorder. Age range: Above 16- more specific info not presented Mean: Not specified.	Pre-programmed, supportive text messages based on CBT principles, to target mood improvement.	Received less frequent text messages thanking them for participating in the study.	<u>Intervention</u> Frequency: Bi-daily Timing: 10 am, 7 pm Duration: 3 months <u>Control</u> Frequency: Fortnightly Timing: Not specified

Whittaker et al (2017)	New Zealand	To assess the effectiveness of a mobile phone depression prevention intervention using multimedia CBT messages to reduce depressive symptoms and improve quality of life among adolescents.	Adolescents attending year 9-12 at participating schools. Age range:13-17 yrs Mean:14.3 yrs	Multimedia Messages based on 15 key messages derived from CBT about "living in a positive space" including a mix of SMS, video diary messages, celebrity video messages and "mobisodes" designed specifically for Maori and Pasifika adolescents.	Received same number and type of messages but content related to healthy eating.	Duration:3 months <u>Intervention & control groups</u> Frequency: Bi-daily Timing: Not specified Duration: 9 weeks
Huang et al (2014)	USA	To evaluate whether a tailored Weight Management Intervention (WMI) was more effective than a generic weight management intervention for survivors of childhood leukemia.	Paediatric survivors of Acute Lymphoblastic Leukemia (ALL). Age range: 8-18 yrs Mean: 13 yrs	Web, text and phone counselling WMI. Weekly materials tailored for cancer survivors sent to participants in intervention group via internet programme. Tailored text messages and queries sent to ensure participants received and understood intervention messages. Regular phone calls with Health Coach also received.	Monthly printed weight management materials (not tailored for cancer survivors) and regular calls from health coach. No text message component.	<u>Intervention group</u> Frequency: <i>SMS-</i> Bi-daily <i>Web materials:</i> Weekly <i>Phone calls:</i> Month 1- weekly Months 2,3,4: bi-monthly <u>Control group</u> Frequency: <i>Printed material:</i> Monthly <i>Phone calls:</i> Month 1: bi-weekly

						Months 2,3,4: monthly
						Timing: Not specified
						Duration: 4 months
Nguyen et al (2013)	Australia	To determine the effect of additional therapeutic contact for community based weight management programme informed by principles of CBT for adolescents	Adolescents overweight to moderately obese. Age range: 13-16 yr olds- specific range not presented. Mean: 14.1 yrs	All participants completed Phase 1 of Loozit Programme. During phase 2 intervention group received Additional Therapeutic Contact (ATC) including a combination of telephone coaching, SMS and/or emails. Electronic messages (based on preference) reminded participants of important points from Phase 1. Approx 2/3 messages included prompt to reply to encourage interactivity.	No Additional Therapeutic Contact received at phase 2.	Frequency: Monthly (32 messages in total) Timing: Not specified Duration: 21 months
Boker et al (2012)	USA	To test whether daily automated text messages result in increased adherence to medication in patients with mild to moderate acne compared with control subjects and the impact of this on patient reported quality of life.	Patients with mild to moderate facial acne suitable for treatment with topical medication. Age range: 14-35 yrs Mean: 22.6 yrs	Reminder messages sent to participants reminding them to apply their medication. Content of messages were identical except for the recipients' first name. Participants were asked to reply if and when they applied medication.	No reminder text messages for application of the same medication as intervention group.	Frequency: Bi-daily Timing: a.m. & p.m. Duration: 12 weeks.

Haas et al (2017)	USA	To assess the impact of a Text Message Educational Automated Compliance Health (TEACH) programme to engage and educate adolescents and young adults with Coeliac Disease.	Adolescents and young adults with Coeliac Disease diagnosed for at least 1 year prior to enrolment. Age range: 12-24 yrs Mean: Intervention group: 15.8 yrs, Control group: 16.4 yrs	Automated text messages designed to engage and educate participants with CD. Content included links to online resources regarding diet, restaurant search tool, organization website, reminders and bi-directional quiz questions.	No text messages. Continued with standard of care management.	Frequency: 2-3 per week (45 messages in total) Timing: Evenings Duration: 12 weeks
Johnson et al (2016)	USA	To examine the impact of a text message based reminder system on adherence rates, self-efficacy, reported asthma control and disease related quality of life in adolescents with asthma	Adolescents with diagnosis of asthma. Age range: 12-17 specific range not presented. Mean: Intervention group: 14.17 yrs, control group: 13.93 yrs.	Reminder messages sent to participant for each dose of medication scheduled through MyMediHealth (MMH) web application. MMH contains tools for patients to create and print structured medication lists, create a dosing schedule for each medication and to arrange text message reminders and visualise medication adherence performance for each medication.	Control participants received action lists and online educational materials about asthma medication management as part of usual care. No reminder messages sent.	Frequency: Dependent on individual. Timing: Dependent on individual. Duration: 3 weeks.
Seid et al (2012)	USA	To assess acceptability, feasibility, fidelity and estimated effect sizes of adherence intervention to reduce asthma	Adolescents with diagnosed moderate and	Tailored text messages introduced as messages from self delivering booster motivation and	Control participants received same asthma education intervention and	Frequency: Daily Timing: Customized

		symptoms and improve HRQoL in sample of low income African American teens.	severe persistent asthma. Age range: 12-18 yrs. Mean: 15.1 yrs.	reminder for access to nurse asthma coach.	received a mobile phone with equivalent voice and text allowances but no messages	Duration:4 weeks
Fabbrocini et al (2014)	Italy	To evaluate the impact of a 12 week SMS intervention on adherence to acne treatment programme.	Adolescents and young adults with mild, moderate or severe acne. Age range: 14-28 yrs. Specific range not presented Mean: 19.5 yrs (intervention group) 18.5 years (control group)	Reminder messages were sent to participants. Message content related to frequently asked questions about acne medication.	No SMS messages	Frequency: Bi-daily Timing: Morning and evening Duration: 12 weeks

1067 participants were included in the subgroup measuring psychological health in the meta-analysis and 254 in the Quality of Life subgroup. In the absence of precise information relating to the actual age range of participants in three of the ten studies, it is not possible to provide exact information regarding the age of participants across all studies. Based on the information available (7 out of 10 studies) the youngest participant was aged 7 and the oldest 35. For all but four of the included studies (DeNiet, 2012, Boker et al, 2012, Agyapong et al, 2017 & Fabbrocini et al 2014) the mean age of participants fell within the adolescent range according to the World Health Organization definition (WHO, 2016). It could be argued that the mean age in three of these studies (DeNiet et al, 2012 Boker et al, 2017 & Fabbrocini et al, 2014) were within a suggested broader range that considers adolescence to begin earlier and end later than that proposed by the WHO (Herman-Giddens et al, 2012 & Twenge & Park, 2017)

Studies were conducted in a range of Westernised Countries including five in the USA (Huang et al, 2014, Boker et al, 2012, Haas et al, 2017 & Johnson et al, 2015 & Seid et al, 2012) and one in Canada (Agyapong et al, 2017), New Zealand (Whittaker et al, 2017), Australia (Nguyen et al, 2013), the Netherlands (DeNiet et al, 2012) and Italy (Fabbrocini et al, 2014) respectively. Participants from a range of ethnic backgrounds are represented across the studies including participants of Dutch, New Zealand European, Maori, Pacific Island, Asian, Hispanic, White, Caucasian and African American descent.

Targeted health behaviours

A range of health behaviours were targeted across the studies in attempt to improve psychological wellbeing amongst diverse clinical groups. This included; prevention and intervention for adolescents (Whittaker et al, 2017) and patients with depression (Agyapong et al, 2017), weight management for overweight adolescents (DeNiet et al, 2012, Nguyen et al, 2013) including survivors of Childhood Leukaemia (Huang et al, 2014), dietary behaviour for adolescents with Coeliac Disease (Haas et al, 2017), medication compliance for adolescents with acne (Boker et al, 2012 & Fabbrocini et al 2014) and also patients with asthma (Johnson et al, 2016) including those considered to be at risk of poor outcomes and low rates of adherence to treatment (Seid, 2012).

SMS characteristics

In three of the included studies SMS messages sent were reminders only (Boker et al, 2012, Johnson et al, 2015 & Fabbrocini et al, 2014). In the remaining majority (DeNiet et al ,2012, Agyapong et al, 2017, Whittaker et al, 2017, Nguyen et al, 2013, Haas et al, 2017 & Seid, 2012) participants in the intervention groups were sent supportive text messages including content designed to engage, educate , re-enforce, motivate and promote positive wellbeing.

The duration of the SMS intervention varied amongst included studies ranging from 3 weeks (Johnson et al, 2015) to 21 months (Nguyen et al, 2013). The impact of this on study findings is unclear, although findings reported by Boker et al (2012) and Johnson et al (2015) suggest that there may be a saturation point during which any observed positive effects may dissipate. Boker et al (2012) report that 33% of participants in their intervention group started ignoring messages after 2 weeks and during the pilot testing of their text message reminder system, Johnson et al (2016) noted a period of time when text messages were eagerly accepted by participants but recognised this was not always maintained and a willingness to interact appeared to decline with time.

Similarly the frequency of messages sent to participants was not consistent across studies ranging from twice daily to weekly. Participants in receipt of bi-daily messages in Boker et al (2012) study suggest that this may have been too frequent as 26% of participants reported that they found the messages to be annoying. Whereas participants in receipt of less frequent messages in Haas et al, (2017) study suggested that the frequency of 2-3 messages per week was appropriate. Similar to suggestion from earlier reviews (Hall et al, 2015) further exploration regarding optimum dosage would therefore be beneficial. This would help to understand acceptable levels of frequency, which as Berrouguet et al (2016) highlight, may be an important factor for the success but also for the failure of any SMS intervention.

Intervention vs control groups

Control group participants received no SMS messages in seven of the studies and placebo messages in Agyapong et al, 2017 and Whittaker et al, 2017 studies. In Whittaker et al (2017) control group participants received the same

frequency and type of messages as intervention participants with content relating to cyber safety rather than psychological wellbeing. Whereas control participants in Agyapong et al, (2017) study received a thank you SMS message once a fortnight thanking them for participating in the study. This was considerably different to participants in their intervention group who received supportive messages twice a day.

Multi-modal intervention

Only three of the included studies used SMS interventions exclusively (DeNiet et al, 2012, Agyapong et al, 2017, Haas et al, 2017) and one utilised Multi Media messages sent through SMS (Whittaker et al, 2017). All other studies included additional multi-modal components including the provision or access to telephone coaching (Nguyen et al, 2012, Huang et al, 2014 & Seid et al, 2012), web based aspects (Huang et al, 2014, Johnson et al, 2016) and medication (Boker et al, 2012 & Johnson et al, 2016 & Fabbrocini et al, 2014). In Nguyen et al (2012) participants were able to request email messages rather than SMS messages. Their associated article (Kornman, Shrewsbury, Chou, Nguyen, Lee, O'Connor, Steinbeck, Hill, Kohn, Shah & Baur, 2010) suggests that there was not a strong preference in adolescents for either of these methods (27% requested SMS only, 20% email only and 53% requested both email and SMS).

A greater number of reported significant findings was apparent in studies incorporating multi-modal methods (DeNiet et al, 2012, Whittaker et al, 2017, Huang et al, 2014, Seid et al, 2012 & Fabbrocini et al, 2014) compared to studies involving SMS only (Agyapong et al, 2017 & Haas et al, 2017). Whilst this may indicate that multi modal approaches offer a superior approach, this cannot be determined given the small number of studies currently available to draw comparisons from.

Outcomes measured

The studies included measured outcomes that could be categorised into two distinct groups; those measuring psychological health and those measuring quality of life. Six studies measured quality of life (Agyapong et al, 2017, DeNiet et al, 2012, Boker et al, 2012, Haas et al, 2017, Johnson et al, 2016, Seid et al, 2012 & Fabbrocini et al, 2014), four measured psychological health (Agyapong

et al, 2017, Whittaker et al 2017, Huang et al, 2014 and Nguyen et al, 2013) and two studies (Agyapong et al 2017 & Fabbrocini et al 2014) measured both.

Meta-Analysis

Necessary information was available for seven of the ten included studies.

Effects of SMS intervention on improving psychological distress

Adopting a random effects estimation model to estimate the pooled effect ($k = 4$) (Agyapong et al, 2017, Huang et al, 2014, Nguyen et al, 2013 & Whittaker et al, 2017) of using text messages to improve psychological health did not reveal evidence of significant differences between intervention and control group scores at the end of an SMS intervention, $g = -0.02$ (95% CI = -0.19 to 0.15, $p = 0.86$)*. Heterogeneity was within an acceptable range ($I^2 = 19$, $p = 0.30$) indicating that the variation across studies is due to homogeneity rather than

* $g =$ Hedges' g

chance (Higgins & Thompson, 2002).

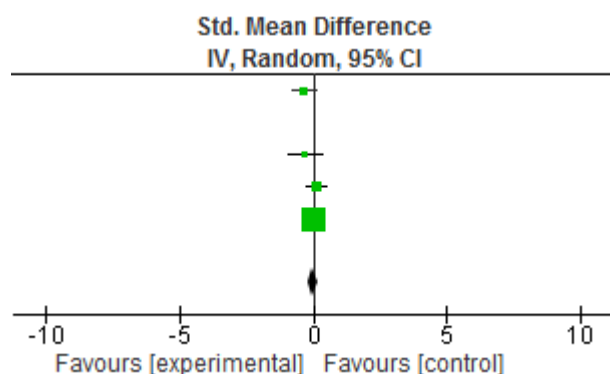


Figure 2.3. Forest plot of the effects of SMS intervention on improving Psychological Distress ($n = 4$)

Effects of SMS intervention on improving quality of life

A slightly greater trend was evident when pooled effects ($k = 4$) (Agyapong et al, 2017, Boker et al, 2012, Haas et al, 2017 & Johnson et al, 2016) were explored to investigate the impact of text message interventions on self-reported quality of life. However, this effect was marginal and not significant, $g = 0.10$ (95% CI = -0.15 TO 0.36, $p = 0.43$). Again, heterogeneity was within the recommended range ($I^2 = 6$, $p = 0.36$).

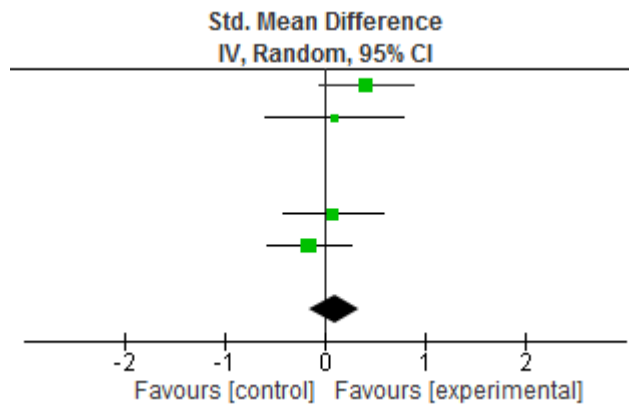


Figure 2.4. Forest plot of the effects of SMS on improving quality of life (n= 4).

Due to the small number of studies included in each meta analyses, funnel plot analysis was not conducted. However, it was noted that there was a wide range of number of participants across the included studies. Independent sample sizes were relatively small across all studies (ranging from 26- 140), with the exception of Whittaker et al (2017) study which included a total of 835 participants.

SMS Intervention effects

A summary of findings is reported in Table 2.5.

Despite the results from the meta analyses, half of the studies included did report significant differences in relation to psychological outcomes (Huang et al, 2014, Haas et al, 2017, Johnson et al, 2016, Seid et al, 2012 & Fabbrocini et al, 2014) and in Agyapong et al (2017) significant differences in relation to body mass index between intervention and control groups were reported. It is of note that the greatest statistical significance was reported in Fabbrocini et al (2014) study ($p < 0.0001$), which was excluded from the meta-analysis but evidenced the most statistically significant improvement in psychological distress and quality of life.

Only one of the studies reporting significant findings was considered to be a low risk of bias across all domains (Agyapong et al, 2017) as there was a high risk of participant blinding bias in at least three (Haas et al, 2017, Seid et al, 2012 & Fabbrocini et al 2014) and the risk of this was unclear in one study (Huang et al, 2014). A number of other factors suggest that such findings are interpreted with caution due to; underpowered or small sample sizes (Agyapong et al, 2017, Huang et al, 2014), the utilisation of a psychometric measure validated on adult

Table 2.5. *Summary of findings for included studies (n=10).*

Author	Number of participants	Missing data (Withdrawal/lost to follow up)	Outcome measured	Measurement timings	Summary of findings
DeNiet et al (2012)	Total: 141 Intervention: 73 Control: 68	Intervention: 12 discontinued with SMS, 10 withdrew from intervention group Control: 21	The Self Perception Profile for Children (SPPC) Child Health Questionnaire (CHQ-PF50)	Baseline 3 months 6 months 9 months	No significant differences were found between the control group and intervention group on global self-worth (as measured on SPCC) or psychosocial health (CHQ PF50). Minimal gains were observed for global self-worth but these were not significant at 9 months of the text message intervention.
Agyapong et al (2017)	Total: 73 Intervention: 35 Control: 38	Intervention group: 2 Control group: 2	Beck Depression Inventory (BDI) EQ- 5D L	Baseline: 3 months	Significant difference in BDI at 3 month follow up between the intervention and control group, with a medium effect size reported. There was no statistically significant difference in EQ 5D L scores between intervention and control group despite five participants in intervention group reporting no anxiety/ depression at the end of the intervention compared to only one in the control group. .

Whittaker et al (2017)	Total: 855 Intervention: 426 Control: 429	Intervention: 32 Control: 37	Child Depression Rating Scale-Revised Reynolds Adolescent Depression Rating Scale 2 nd Ed (RADS-2) The Paediatric Quality of Life Enjoyment and Satisfaction Questionnaire (PQ-LES-Q)	Baseline (after 9 day run in programme for both groups) 9 weeks 12 months	No significant differences in mean CDRS-R scores between groups. Both groups demonstrated slight improvements at initial follow up followed by a worsening at 12 months. Similar pattern of improvement followed by decline observed in both groups for MFQ scores. PQ-LES-Q scores increased in intervention group but not control group although this was not statistically significant.
Huang et al (2014)	Total: 38 Intervention: 19 Control: 19	Intervention: 1 Control group: 2	Kiddie Schedule for Affective Disorder and Schizophrenia (K-SADS)	Baseline 4 months	Significant difference between intervention and control group scores on negative mood subscale of CDI.

					No other significant differences between groups reported for other subscales of the CDI. .
Nguyen et al (2013)	Total: 151 Intervention: 73 Control: 78	Intervention: 6 Control: 4	Harter Self-Perception Profile (global self-worth)	Baseline (post phase 1): 12 months:	No group differences were found between ATC (intervention) group and control group.
			Mental Health Inventory-5 (MHI-5)		
Boker et al (2012)	Total: 40 Intervention: 15 Control: 18	Intervention: 5 Control: 2	Dermatology Quality of Life Index	Baseline: 12 weeks:	No group differences were found between the text message intervention and control group. All participants reported improved acne related quality of life. The mean improvement from baseline to post intervention for the intervention group was 42% and 42.9% for the control group.
Haas et al (2017)	Total: 61 Intervention: 31 Control: 30	Intervention: 1 Control:	NIH PROMIS Patient Reported Outcome Measurement	Baseline 12 weeks	There was a significant improvement in NIH PROMIS global mental health scores at the end of the intervention for the intervention group. There was no significant difference between pre and post scores in the control group.
Johnson et al (2016)	Total: 98	Intervention: 9	Mini Paediatric Asthma Quality	Baseline	Compared with participants in the control group, participants in the intervention group demonstrated

	Intervention: 46 Control: 43	Control: 2	of Life Questionnaire	3 weeks	significant improvements in asthma related quality of life.
Seid et al (2012)	Total: 28 Intervention: 14 Control: 14	Intervention: 2 Control: 0	PedsQL	Baseline 1 month 3 months	Small to large effect sizes reported in relation to improved HRQoL in intervention group. Effect sizes were maintained even after intervention ended.
Fabbroci ni et al (2014)	Total: 160 Intervention: 80 Control: 80	Intervention: 6 Control: 9	Cardiff Acne Disability Index (CADI) Dermatology Life Quality Index (DLQI)	Baseline 12 weeks	Better improvements in all parameters measured were reported amongst intervention group compared to control group. Statistical improvements in quality of life and psychological and social consequences of acne for intervention group compared to control group.

population but completed by adolescents (Haas et al, 2017) and potential confounding factors associated with multimodal intervention (Huang et al, 2014, Seid et al, 2012, & Fabbrocini et al 2014). Thus making it difficult to delineate effects resulting from SMS components specifically versus other aspects of intervention.

Further promising but not significant results were found in five studies, where an improvement in psychological health (Nguyen et al, 2012, Agyapong et al, 2017 & DeNiet et al, 2012) and quality of life (Whittaker et al, 2017, Johnson et al, 2016) was reported. DeNiet et al, (2012) also provide support for the use of SMS messages in improving engagement and compliance as they report lower dropout rates for their adjunct intervention in their SMS intervention group. Furthermore, a greater number of participants receiving SMS messages to promote psychological health reported that they found the intervention helpful in getting rid of negative thoughts, to relax, solve problems, have fun and deal with issues in school in Whittaker et al (2017) large scale study. Again, these studies are not without limitation, including a reliance on the use of self-reported measures, difficulties with generalisability (all included studies) and as above, difficulties with the delineation of findings due to the multi-modality of intervention programmes (Whittaker et al, 2017, Nguyen et al, 2012 & Johnson et al, 2016).

Whilst the feasibility and acceptability of the intervention was not the focus of this review, there was some evidence, which suggested that participants were able to engage with this particular approach to intervention and participants in Johnson et al (2016) study expressed an interest in continuing with the intervention. Sixty five percent of participants in Fabbrocini et al (2014) study indicated that they were very satisfied with the text message service. Overall, participants in Haas et al (2017) study also reported that they enjoyed the intervention and a mean bi-directional response rate of 81% was recorded suggesting that by enlarge participants were able to engage using this method of intervention.

No significant adverse events were reported in any of the included studies. At worst, quality of life scores for control group participants in Boker et al (2012) study improved marginally better (42.9%) than intervention group participants

(42%). Further information in relation to “discontinuers” would have been beneficial. The gathering of information relating to motivation to withdraw would also have been helpful to identify whether any potential negative experiences influenced decisions to discontinue with this particular type of intervention.

DISCUSSION

To our knowledge this is the first systematic review to explore the effects of SMS on clinical outcomes relating to psychological wellbeing in adolescents. Though a number of implemented studies are evident in the literature, only a small proportion of these (those included in this review) have adopted the most robust study design of an RCT. It is, therefore, apparent that this is not an area well researched thus far.

The results of the two meta analyses conducted as part of this review do not provide statistical support for the use of SMS to improve psychological distress in adolescents. Though not statistically significant, more promising findings in relation to improved quality of life for participants in receipt of text messages were found compared to studies measuring psychological distress, although the considerably fewer number of participants included in the quality of life subgroup may be relevant. It is also recognised that two of the studies included in this subgroup involved the additional use of medical treatment (Boker et al, 2012 & Johnson et al, 2016). It is possible that this may have contributed to improved symptomology and thus improved quality of life at a faster rate than other studies where the focus was on psychological intervention.

Similar to review findings exploring health behaviour more generally (Orr & King, 2015 & Hall et al, 2015) the sustainability of any positive effects of SMS intervention remains unclear with mixed findings evident as part of this review. It may be relevant that the length of intervention for those studies reporting significant findings were of relatively short duration ranging between one and four months (Agyapong et al, 2017, Huang et al, 2014, Haas et al 2017, Seid et al, 2012 & Fabbrocini et al, 2014). This concurs with previous findings relating to the short term benefits of SMS intervention (Fjedsoe, Marshall & Miller, 2009). However, findings from Seid et al (2012) indicate that there may also be longer term benefits as improvement in their intervention group were sustained even after the intervention completed and participants were no longer in receipt of

SMS messages. As questions remain regarding the optimum dosage for maximum impact, the promotion of studies more consistent in their duration would allow for more robust exploration of this.

Aside from the efficacy of the intervention in improving clinical outcomes, there were positive indications from participants regarding the acceptability and feasibility of the approach to promote psychological wellbeing. The significance of this should not be underestimated given the challenges associated with engaging adolescents with health interventions (MacDonald, 2006) and in particular mental health services (Rickwood, Deane & Wilson, 2007). As the efficacy of any intervention begins with a willingness to engage, continued investigation would allow for better understanding about how best to utilise this medium to appeal to this challenging population and support psychological outcomes.

In six of the studies (DeNiet et al, 2012, Agyapong et al, 2017, Whittaker et al, 2017, Huang et al, 2014, Nguyen et al, 2013 & Seid et al, 2012) there were clear theoretical underpinnings for the messages, which included content that aligned with evidence based practice. Predominantly interventions were informed by cognitive behavioural approaches (DeNiet et al, 2012, Agyapong et al, 2017, Whittaker et al, 2017 & Nguyen et al, 2012) with the exception of Seid et al (2012) who based their intervention on the principles of Motivational Interviewing and Huang et al (2014) whose intervention was in accordance with recommendations for working with their specific clinical group (childhood cancer survivors). As the strength of a therapeutic relationship has been evidenced as a key component in psychological intervention (Horvath, DelRe, Fluckiger, & Symonds, 2011) further consideration may be needed about how, if at all, this may develop differently during interactions using SMS. Further exploration of this would allow for any necessary adaptations to be made to extend access and enhance efficacy of evidence based approaches across a range of mediums.

In a number of studies there was a requirement for participants to provide their own mobile phone (Agyapong et al, 2017, Whittaker et al, 2017, Nguyen et al, 2012, Boker et al, 2012, Haas et al, 2017, Johnson et al, 2016 & Fabbrocini et al, 2014) and in some instances with particular requirements regarding network provider (Whittaker et al, 2017) and appropriate credit (Johnson et al, 2016).

This may have limited participants to those who were able to take part rather than those willing. As Seid et al (2012) provide promising findings to suggest that the use of SMS messages may be particularly effective with those particularly hard to engage, further research, adopting an inclusive recruitment strategy should be prioritised. Despite the likely challenges associated with this, a continued commitment to enabling access to services as well as research is required to better understand alternative approaches, particularly where access to mainstream services and intervention are problematic.

Limitations

There are a number of limitations that impact on the interpretation of findings in this review. Primarily the small number of studies and small sample sizes included in each of the meta analyses make it difficult to draw conclusive findings. Equally the inclusion of specific clinical populations and participants outside of the adolescent age range make it difficult to generalise findings across the adolescent population group. Though, it is noted that for all but one of these studies the mean age of participants fell within the adolescent range (information not available in Agyapong et al, 2017) according to the WHO (2016) definition.

A wide range of study designs, clinical population groups, interventions and outcome measures were evident across included studies thus making it difficult to draw comparisons and conclusive findings about specific components of an SMS intervention that impact on effectiveness. Again, this is similar to earlier review findings exploring broader health behaviour (Orr & King, 2015, Hall et al, 2015 & Militello et al, 2012) and should be considered when planning future research in this area.

It was unfortunate that necessary data was not available for three studies that would have been included in the meta-analysis pooling effects of SMS on quality of life. Whilst one of these studies did not report any relevant differences between participants in the control or intervention groups (DeNiet et al, 2012) Seid et al (2012) and Fabbrocini et al (2014) report greater changes in HRQoL and psychological health scores, respectively from baseline to follow up in their intervention groups. Inclusion of data from these studies may have impacted on the statistical findings reported.

Data extracted from the studies included in this review were reliant on self-report measures. This may be particularly relevant given the population and topic under review. Children and adolescents are reported to be more susceptible to the influences of social desirability (Mwamwenda, 1995) and this may be particularly influential when reporting psychological health (Logan, Claar & Scharff, 2008, Hunt, Auriemma & Cashaw, 2010). It would, therefore, be beneficial for future research to consider the inclusion of additional methods for reviewing clinical outcomes, to improve reliability of any reported clinical changes or lack thereof.

The limitations of the systematic review itself are also acknowledged and the impact of these on the findings considered. For example, in response to challenges from earlier reviews and the apparent need to understand outcomes based on good quality studies, this review limited inclusion to RCT studies only. This clearly limited the number of studies available and may have come at a cost to comparing interventions that were more similar in design or measurement of outcome. Indeed the non significant findings of the meta analyses may in itself be indicative of the evident differences between the studies included. Furthermore, it is possible that the broad search terms used to search the literature were too broad, compromising the efficiency of the review. Specifically, it became clear during the search process that SMS was an acronym for a number of other irrelevant terms, which could have been avoided if the search terms were limited to text messaging and associated abbreviations.

Concluding remarks

A number of the studies included in this review were published most recently, in the same year as the search for this review. This perhaps implies that there is a renewed focus on the use of SMS in addressing more complex health behaviours rather than the more simplistic behaviours apparent in earlier reviews (Fjedsoe et al, 2009). However the availability of empirical evidence remains limited, suggesting that ongoing enquiry is warranted. Further information regarding the specific components (the what, the when and the who) that impact on the effectiveness of this type of intervention is required to draw more definite conclusions.

As opportunities for technological intervention advances at a fast pace, it is both an opportunity and a challenge to ensure that academics, practitioners and policymakers alike continue to ensure that innovative approaches to intervention are engaging, evidence based and cost effective. There is emerging support for the acceptability and feasibility of the use of SMS interventions to promote psychological wellbeing and some encouraging findings relating to potential effects on clinical outcomes, in even those hard to reach amongst this challenging population. This is likely to be particularly important during this time of austerity, where services are stretched in the provision of services for those willing to engage, where those hardest to reach are at risk of falling under the radar, yet potentially most in need. Though challenging, further exploration of this should, therefore, be promoted.

**CHAPTER THREE
PSYCHOMETRIC CRITIQUE**

**Critique of the KIDSCREEN 27 Health Related Quality of Life measure
and consideration for its use with a forensic population.**

Word Count: 5,519

CONTENT

- 1. Abstract**
- 2. Background information**
- 3. KIDSCREEN**
- 4. Reliability**
- 5. Discriminatory power**
- 6. Validity**
- 7. Discussion**
- 8. Future direction**
- 9. Concluding remarks**

ABSTRACT

Background

Health Related Quality of Life (HRQoL) is increasingly becoming emphasised as an important measurement in healthcare. HRQoL relates to an individual's and others perceptions of their physical, psychological and social aspects of their life and the impact of these factors on their wellbeing and functioning. It is a construct that applies to both children and adults. However, by virtue of their differing life stages, experiences and activities, contexts are likely to be broadly different requiring specific consideration when measuring HRQoL in children and young people.

Method

This review considers the psychometric properties and other clinical factors relating to the KIDSCREEN 27 (short version) measure of HRQoL and wellbeing. An overview of the measure is presented followed by consideration for the reliability, validity and application of the KIDSCREEN 27.

Strengths and Limitations

A rigorous methodology was applied to develop the KIDSCREEN measures, which included a literature review, Delphi study and focus groups, which may have contributed to the robust support for the reliability and validity of the KIDSCREEN 27. Inconsistent findings in relation to the measure's sensitivity to change suggest that further enquiry in relation to this should now be prioritised.

A number of validation studies reported and referenced in the literature were conducted by the authors of the instrument potentially contributing to a bias in the information currently available. Further independent enquiry is, therefore, encouraged.

The KIDSCREEN tools have been used in a number of studies to explore HRQoL in a variety of population groups. To date this has not included a forensic population. Given the prevalence of poor health in the forensic population developing understanding and valid measurement and monitoring of HRQoL in this group could provide valuable contribution to individual assessment and intervention and widen understanding of the health needs of this complex group. Consequently, further enquiry with this group is recommended.

BACKGROUND INFORMATION

The World Health Organisation definition of health highlights the importance of psychological and social dimensions of wellbeing (WHO, 2006). Across clinical practice, research and public health, an individual's wellbeing including Health Related Quality of Life (HRQoL) is increasingly becoming emphasised as an appropriate and important measurement in health care. This can not only inform individual assessment, intervention and evaluation (Ravens-Sieberer, Erhart, Wille, Wetzel, Nickel & Bullinger, 2006) but also supports the understanding of the burden of disease and the identification of health inequalities to identify appropriate allocation of resource (Solans, Pane, Estrada, Serra-Sutton, Berra, Herdman, Alonso, Rajmil, 2008).

HRQoL is a complex, subjective multi-dimensional concept making it a difficult construct to define (Gill & Feinstein, 1994). Indeed a number of definitions are proposed, which commonly refer to the subjective perception of an individual and their wellbeing. More specifically, HRQoL relates to an individual's and or/others' perceptions of their physical, psychological and social aspects of their life, and the impact of these factors on their wellbeing and functioning. Whilst the construct applies to both children and adults, by virtue of their life stage, children and young people's experiences, activities and contexts are likely to be broadly different from the adult population requiring specific consideration when assessing HRQoL (Matza, Swensen, Flood, Secnik, & Leidy, 2004).

The measurement of HRQoL in children and adolescents presents with unique challenges. There are particular concerns that self-report information amongst the younger age group may be unreliable as a result of under developed cognitive and reasoning abilities. This includes an apparent tendency to base responses on current state of mind rather than more general reflections over a specified period of time (Deighton, Croudace, Fonagy, Brown, Patalay & Wolpert, 2014). This is despite evidence dating back to the 1980s that children as young as 5 years old are able to provide accurate self-report information (Varni, Thompson & Hanson, 1987). In a more recent study Varni, Burwinkle, & Lane, (2005) provide additional support for the reliability and validity of self-report HRQoL information from the age of 5, when age appropriate measures are employed.

It is promising that an increasing interest in patient reported outcomes amongst the younger age group is emerging. Indeed the long term benefits of health promotion and early identification and intervention highlights the importance of developing methods for the early identification of factors impacting on an individual's functioning. Consequently a number of instruments to measure this complex concept have now been developed including disease specific and generic assessments (Varni, Burwinkle & Lane, 2005). As indicated, disease specific instruments are intended to measure the impact of a health condition on an individual's functioning. Whereas generic measures consider broader dimensions of HRQoL and can therefore be applied to "healthy" population groups as well as clinical populations to provide a comprehensive overview of HRQoL and increase opportunities to compare the influence of specific conditions on HRQoL. An apparent lack of consideration for international comparability and cultural influence in the measurement of HRQoL amongst children and adolescents prompted the emergence of the KIDSCREEN project (Ravens-Sieberer, Herdman, Devine, Otto, Bullinger, Rose, Klasen, 2014).

This review considers the psychometric properties and other clinical factors relating to the KIDSCREEN 27 (short version). An overview of the measure is presented followed by consideration for the reliability, validity and application of the KIDSCREEN 27. The psychometric values presented are taken from the KIDSCREEN handbook unless otherwise indicated (Ravens-Sieberer et al, 2016).

KIDSCREEN

The KIDSCREEN project, involving 13 European Countries in total, was funded by the European Commission in 2001 to develop a standardised measurement of HRQoL using a cross cultural approach. This comprehensive process involved a literature review, a Delphi study and focus groups resulting in three versions, differing in length of the KIDSCREEN self-report questionnaire; The KIDSCREEN 52 (long version), 27 (short version) and 10 (Index) (Ravens-Sieberer et al, 2016). Each of these provide profile information relating to self-reported HRQoL for children and young people aged between 8 and 18. Proxy measures are also available for each version, which allows for parents and/or carers to report on HRQoL from the perspective of the child or young person. These may be particularly useful when there is difficulty in the gathering and/or reliability of

self-reported information. However, the authors recommend, given the subjective nature of the concept of HRQoL itself, that self-reported assessment should be prioritised where appropriate. The KIDSCREEN measures are currently available in ten different languages, which were translated during the development phase to promote cross cultural harmonisation.

The KIDSCREEN instruments were rigorously tested and based on a large sample size of 22,827 from across the KIDSCREEN European Countries (Ravens-Sieberer et al 2014). Classical test theory and modern psychometric methods were utilised incorporating item response theory methods including rasch analysis and Differential Item Functioning (DIF). The full version demonstrated good psychometric properties providing detailed profile information relating to ten HRQoL dimensions ; Physical Wellbeing, Psychological Well-being, Moods and Emotions, Self-Perception, Autonomy, Parent Relation & Home Life, Financial Resources, Social Support & Peers, School Environment and Social Acceptance (Bullying). (Ravens-Sieberer, Gosch, Rajmil, Erhart, Bruil, Duer, Auquier, Power, Abel, Czemy, Mazur, Czimbalmos, Tountas, Hagquist, & the European KIDSCREEN Group, 2005). To reduce response burden and administration costs the shorter KIDSCREEN 27 was developed (Ravens-Sieberer, Auquier, Erhart, Gosch, Rajmil, Bruil, Power, Duer, Cloetta, Czemy, Mazur, Czimbalmos, Tountas, Hagquist, Kilroe & the European KIDSCREEN Group, 2007).

A mixed approach was used to reduce the items from the 52 to the 27 version. This included exploratory and confirmatory factor analysis, rasch analysis and expert opinion (Robitail, Ravens-Sieberer, Simeoni, Rajmil, Bruil, Power, Duer, Cloetta, Czemy, Mazur, Czimbalmos, Tountas, Hagquist, Kilroe, Auquier & The KIDSCREEN Group, 2007). This resulted in 27 questions, measuring five condensed scales: Physical Well-being; which explores physical activity and energy levels of the individual, Psychological Well-Being; measuring general mood and feelings about themselves, Autonomy & Parent Relations; which considers free time, family relationships and financial resources, Social Support & Peers; considering the amount of time spent with peers and the quality of these relationships and School Environment; which explores the respondents feelings about school and their teachers and their perceptions of their learning and concentration.

This shorter version is likely to provide a more accessible tool for those who might otherwise feel overwhelmed or challenged by a lengthy questionnaire. A five point decision scale is presented measuring frequency or intensity for each question using a time frame of one week, which was considered appropriate for the age group. The majority of the items are positively formulated, however a number of questions across the subscales are negatively formulated and thus require recoding to ensure that higher scores are indicative of a higher QoL. The authors do not provide information relating to clinically significant thresholds but suggest that scores outside of the mean score of 50 $\pm 0.5 \times 10$ should be used as a guiding principle. Rasch scores for each dimension can also be transformed into T values and compared with normative data from a range of reference groups to allow for the interpretation of scores.

In accordance with the probabilistic Rasch model, as scores on items were polytomous and rated on a five point scale, partial credit model analyses were conducted. In essence, this allows for the relationship between the difficulty of an item and the respondents' positioning on the measured latent trait to be accounted for in their scores (i.e. their response will be a function of their HRQoL and the level of HRQoL expressed by the item). Infit mean scores were within the recommended range (0.5-1.5, Linacre, 2002) between 0.80 and 1.20 for each scale (Ravens- Sieberer et al, 2016., Jafari, Bagheri, & Safe, 2012 & Erhart et al, 2009), therefore, fulfilling the assumptions of the partial credit model indicating that the scales were productive for the measurement of HRQoL. To test that the items within each of the instruments was functioning consistently across different groups of participants, DIF was assessed using logistic regression. Scott, Fayers, Bottomley, De Graeff, Groenvold, Petersen, Sprangers, & EORTC & Quality of Life Cross-Cultural Meta-Analysis Group (2006) provide support for the robustness and practical advantages of this approach with HRQoL instruments. Comparisons across culture, age and gender indicated that small cultural differences were observed in both the KIDSCREEN 52 and 27 versions. Specifically, for the KIDSCREEN 27 this was observed when measuring Physical Wellbeing and Social Support and Peers dimensions. The authors (Ravens- Sieberer et al, 2016) suggest that the cultural differences observed relate to secondary aspects, relevant to the trait, which are supported by theory, though it would have been helpful to present further empirical findings in

support of these claims. Further support for the KIDSREEN scales derived from multitrait analysis, which verified that items were assigned to the scale that they were most strongly correlated with. To ensure that each scale within the measures were related to separate concepts, but not totally unrelated or redundant, inter-scale correlations were assessed. As each inter-scale correlation reported in the handbook was below 0.71, ranging from 0.36 to 0.59 for the KIDSCREEN 27, each scale was considered to be measuring separate concepts relating to HRQoL.

RELIABILITY

The assessment of reliability is required to determine the “repeatability” of any psychometric instrument. The KIDSCREEN 27 demonstrated good internal consistency. For each of the five dimensions Cronbach’s alpha coefficients ranged from 0.80 to 0.84 indicating that relevant items were measuring the same construct. Floor and ceiling effects were explored to examine the proportion of respondents scoring particularly low or high on the measure respectively. No floor effects were observed. However, 14.87% had the highest score within the Social Support and Peers dimension. It is possible that this relates to the unique developmental stage of respondents. As adolescence marks a time when peers gain powerful influence (Prinstein, Boergers & Spirito, 2001), it is possible that this is indicated in the observed ceiling effects reported.

A subsample of 559 children and young people completed the KIDSCREEN 27 on two separate occasions, approximately two weeks apart, to assess test-re-test reliability. No changes in health status were reported by these respondents or their parents. Intraclass Correlation Coefficient (ICC) values ranging between 0.61 to 0.74 suggest that the instrument had adequate test-re-test stability. An increase on scores on the Psychological Well-Being Scale were reported at re-test, suggesting that caution is required and adequate control groups recruited where possible, when reporting outcomes based on pre and post scores on this scale (Ravens-Sieberer et al, 2016).

DISCRIMINATORY POWER

Reported Ferguson’s delta values indicate appropriate discriminatory power for all scales on the KIDSCREEN 27 indicating that respondents’ scores were

distributed across the range of scores. Values ranged between 0.81 and 0.99 across the 13 Countries, falling in the higher range amongst the UK sample (δ : 0.95 to 0.98). This suggests that across the scales the KIDSCREEN 27 was able to distinguish between those with higher and those with lower HRQoL, though these findings are interpreted with caution as it is not clear whether adaptations to Ferguson's delta values were made in accordance with the polytomous scores (Hankins, 2007).

VALIDITY

The validity of each of the KIDSCREEN instrument has also been assessed to consider whether they provide an accurate measure of HRQoL thus allowing for accurate and appropriate inferences to be drawn from an individual's score.

Face validity

The authors do not provide information relating to the face validity of any of their instruments. However it is clear that the questions relate to physical, and psychological health and the impact on functioning and thus related to the measurement of the construct of HRQoL. A potential disadvantage of this is that respondents may amend their responses accordingly. Though Motl, McAuley & DiStefano (2005) demonstrate minimal effects of influences such as social desirability on respondents self-report ratings, when measuring physical activity, one of the dimensions covered in the KIDSCREEN.

Construct validity

As part of the international pilot study, the relationship between KIDSCREEN scores and a number of factors were explored using Cohen's effect size to assess whether the KIDSCREEN was an accurate measure of the HRQoL construct. Socio-demographic and socio-economic variables, health status, psychosomatic complaints, mental health and behaviour problems, health care utilisation, social support and family and family health behaviour were all explored in relation to their effects on KIDSCREEN scores due to their association with HRQoL. The authors report that these were identified based on existing literature, authors experiences and results from the pilot testing. Overall The KIDSCREEN instruments are able to discriminate between groups expected to show

differences in HRQoL as highlighted below. Where available relevant findings from additional enquiry is presented.

Anticipated differences according to socio-demographic and socio-economic factors were explored using the Family Affluence Scale (FAS) (Currie, Molcho, Boyce, Holstein, Torsheim, Richter, 2008) and the International Standard Classification of Education (ISCED, 1997) grouping participants into three categories (low, medium and high). The FAS collected information relating to family car ownership, bedroom occupancy, the number of computers at home and the number of holidays over a 12 month period to provide a measure of socio-economic status. Reported effect sizes indicate that respondents of higher socio-economic status report better HRQoL, which has been indicated previously (Von Rueden, Gosch, Rajmil, Bisegger, Ravens-Sieberer & the KIDSCREEN group, 2006). Marginal effect sizes were reported when comparing KIDSCREEN dimension scores between low and medium socio-economic groups, with the largest difference observed on the Autonomy & Parent relation scale (ES= 0.35). A moderate effect size for this scale was subsequently reported when comparing low to high socio-economic groups (SE= 0.54). The ISCED measured mother and father education level, which enabled the three subsequent groupings; low (primary school), medium (secondary school) and high (university degree). Marginal effect sizes were reported, with the only value falling above the recommended 0.2 observed when comparing low and medium parental education groups on the Physical Well-being KIDSCREEN dimension (SE=0.27). Effect sizes between the low and high groups were minimal ranging between 0.02 and 0.17.

As children and adolescents with specific health care needs are likely to have poorer HRQoL (Sawyer, Reynolds, Couper, French, Kennedy, Martin, Staugas, Ziaian & Baghurst, 2004) physical health status, was measured using the Children with Special Health Care Needs Screener (CSHCN), to consider differences in KIDSCREEN scores for those with special health care needs compared to healthy individuals. This measure contains five question sequences to identify the presence and duration of physical, emotional, behavioural, developmental or other health conditions (Bethell, Read, Stein, Blumberg, Wells & Newacheck, 2002). Mean scores were lower for individuals with identified

health care needs across all dimensions of the KIDSCREEN score. A moderate effect size of 0.41 was observed when comparing healthy children and adolescents with those with special health care needs on the Physical Wellbeing subscale, providing particular support for the validity of this dimension. The other small effect sizes (0.22 to 0.29) indicate that smaller differences were observed between healthy and those with special healthcare needs in all other KIDSCREEN dimensions

Correlations between psychosomatic complaints and HRQoL were reviewed as it is anticipated that individuals suffering with psychosomatic health complaints will have a lower HRQoL (Klemenc-Ketis, Kersnik, & Colaric (2011). In order to assess this, HRQoL scores were compared with scores on the Health Behaviour in School aged Children Psychosomatic Complaints Symptom Checklist (Currie, Samdal, Boyce & Smith, 2001). This self-report measure provides an index of psychosomatic health complaints score, which relates to the frequency of eight psychosomatic health complaints. Significant low to moderate correlations are reported in the KIDSCREEN manual, across all dimensions for each of the three KIDSCREEN instruments. For the KIDSCREEN 27, the highest correlation coefficient $r = -0.52$, $p < 0.001$ suggests a moderate correlation between the Psychosomatic Health Complaints index and the Psychological Well-Being dimension. The remaining correlation coefficient values were also significant ranging between -0.25 and -0.42 thus indicating that children and adolescents who experience psychosomatic health complaints are more likely to report lower HRQoL across all dimensions on the KIDSCREEN 27. However, this was not evident in a more recent empirical study conducted by Albert, Hudalla, Traue & Hetzer, 2012 who utilised the KIDSCREEN 27 to compare HRQoL for heart transplantation recipients and healthy controls. In their study Albert et al (2012) reported no significant differences in KIDSCREEN 27 scores and psychosomatic complaints.

Existing findings suggest that HRQoL would be lower amongst children and adolescents with mental health difficulties (Weitkamp, Daniels, Romer & Wiegand- Grefe, 2013). Scores from the Strengths and Difficulties Questionnaire (Goodman, 1997) were subsequently used to identify healthy young people and those with borderline and noticeable mental health difficulties. The SDQ is a self-

report measure, with parent or educator by proxy versions available to assess emotional symptoms, conduct problems, hyperactivity/ inattention, peer relationship difficulties and prosocial behaviour. Comparison with each dimension of the KIDSCREEN 27 confirmed that HRQoL was significantly lower for those presenting with mental health difficulties. The greatest effects were observed in Psychological Well-being on the KIDSCREEN 27 for those with noticeable mental health difficulties (ES= 0.68), as would be expected if the dimension was functioning as intended. With the exception of Physical Well-being (ES= 0.42) all other dimensions of the KIDSCREEN 27 demonstrated moderate effect sizes (Autonomy & Parent relation ES= 0.56, Social Support & Peers ES= 0.55 and School Environment ES= 0.62). However, the comparison of self-report and by proxy measures may have confounded these findings, as there is some evidence to suggest that self-report and by proxy scoring may differ and result in conflicting categorisations (Theunissen, Vogels, Koopman, Verrips, Zwinderman, Verloove-Vanhorick & Wit, 1998 & Baca, C. B., Vickrey, B. G., Hays, R. D., Vassar, S. D., & Berg, A. T., 2010). More recent findings reported by Rodrigues, Pedroso, Pontes & Kappler (2015) provide further support that HRQoL scores on the KIDSCREEN are lower for adolescents with mental health difficulties. However more moderate effect sizes are reported in this study. Greatest differences were observed in the Social Support & Peers and Autonomy and Parent relation subscales with mean Cohen's d values equal to 0.42 and 0.46 respectively. Whereas greatest effects were observed in the Psychological Wellbeing (E= 0.68) and School Environment (E= 0.62) subscales in the validation studies.

Parental reports regarding the use of healthcare services were also collected to consider the relationship between use of healthcare and HRQoL as higher utilisation of healthcare has been associated with poorer HRQoL (Ziaian, deAnstiss, Antoniou, Puvimanasinghe, & Baghurst, 2016). Visits to a healthcare professional in the past 4 weeks and hospital admissions in the past 12 months were recorded. KIDSCREEN 27 dimension scores for those who have accessed healthcare services and/or been hospitalised were compared with those who have not. Low to moderate effect sizes were recorded with the biggest difference evident on the Physical Well-being KIDSCREEN dimension (E.S= 0.39 & E.S = 0.34) for those who visited a healthcare professional in the previous 4 weeks

and those who were hospitalised in the past 12 months respectively. Thus providing some support that individuals with lower HRQoL, measured using KIDSCREEN scores were more likely to access healthcare services. Though also drawn from the KIDSCREEN pilot sample, Rajmil et al (2005) provide further support for the detection of different HRQoL scores in those with and without special health care needs using the KIDSCREEN 27. They report significant associations between KIDSCREEN scores below the 25th percentile across all domains and percentage of healthcare visits ($p < .05$).

As the moderating effects of social support on HRQoL have been indicated (Cheng, Gutierrez- Colina, Loiselle, Strieper, Frias & Blount, 2014) differences in KIDSCREEN dimension scores were also explored according to reported social support. Ten of the participating KIDSCREEN European countries, provided information relating to social support using an adapted version of the Oslo Three item Social Support Scale (Brevin & Dalgard, 1996). This validated measure contains three questions to ascertain the number of people available to support an individual, the interest and concern shown from others and availability of support. Results from analysis revealed significant large effect sizes. The smallest effect size was observed when comparing Social Support and Physical Well-being (S.E= 0.57) and the largest effect size (S.E= 1.01) comparing Autonomy and Parent Relation dimension with Social Support. Similar significant effects were reported when considering parent-child relations. This was assessed using an adapted version of the Social Adjustment Scale (SAS) (McDowell & Newell, 1996). Children with poorer parent-child relations had lower HRQoL scores across all dimensions of the KIDSCREEN. As with social support, the greatest effects were observed on the Autonomy and Parent Relation dimension (S.E= 0.93). Moderate effect sizes were observed on the Psychological Well-being and School Environment dimensions (S.E= 0.74), supporting the hypothesis that children and adolescents with poor social support are more likely to report lower HRQoL.

Finally, as problematic parental health has been associated with poorer HRQoL (Riley, Spiel, Coghill, Dopfner, Falissard, Lorenzo & Preuss (2006) the relationship between KIDSCREEN dimension scores and parent health behaviour was explored by the authors. Parents were asked about the frequency that they

and or their spouse smoked at home in the presence of their child (ranging from never to always) and also problematic drinking as indicated by criticism of their drinking from others in relation to either their own or their spouse's behaviour. In accordance with prior findings parental health was associated with HRQoL. Small effect sizes were reported in relation to parental smoking, with low effects in the Physical Well-being (E.S= 0.24) and School Environment (E.S= 0.21) dimensions of the KIDSCREEN 27. Greater effects were observed when considering parental alcohol problems, comparing groups where no parental difficulties were reported with groups where problems were indicated for both parents, with greatest effects (poorer HRQoL) observed on the Psychological Well-Being KIDSCREEN dimension (S.E= 0.46). Thus indicating that the KIDSCREEN instruments were able to detect anticipated differences in HRQoL according to parental smoking and alcohol behaviour.

Criterion Validity

Ravens- Sieberer et al (2007) provide support for the criterion validity of the KIDSCREEN 27 where correlations between the KIDSCREEN 27 and similar dimensions on the 52 version were explored. Pearson correlation co-efficients were particularly strong when the dimensions of the two questionnaires were similar, ranging from 0.71 (KIDSCREEN 27 Parents & Autonomy and KIDSCREEN 52 Financial) to 0.96 (KIDSCREEN 27 School Environment and KIDSCREEN 52 School). The lowest correlation (0.63) was observed when assessing KIDSCREEN 27 Psychological Wellbeing with KIDSCREEN 52 Self Perception subscale suggesting that the KIDSCREEN 27 Psychological wellbeing dimension may not provide a strong indication of self-perception.

Three validated questionnaires, measuring similar concepts to the KIDSCREEN instruments were identified by the authors to assess concurrent validity. That is, to compare the KIDSCREEN dimensions to other similar dimensions on existing tools; the Youth Quality of Life Instrument-Surveillance Version (YQOL-S) (Edwards, Huebner, Connell, & Partick, 2002, Patrick, Edwards, & Topolski, 2002), Child Health Questionnaire (CHQ) (Landgraft, Abetz & Ware, 1996) and Child Health and Illness Profile (CHIP-AE) (Starfield, Riley, Green, Ensminger, Ryan, Kelleher, Kim-Harris, Johnston & Vogel-Crawford, 1995). The YQoL-S is a 13 item measure that contains contextual items that can be scored by an

observer and a perceptual scale that can only be self-reported. Comparisons were made between the perceptual scale of the YQoL-S and the KIDSCREEN dimensions. The Child Health Questionnaire (CHQ) measures QoL in children aged between 5 and 18 and allows for scale scores to be combined to produce summary scores for Physical Functioning and Psychological Health. These summary scores were compared with the dimensions of the KIDSCREEN instruments. The third questionnaire, the CHIP-AE provides a more generic measure of health status across five domains of health, assessing Satisfaction, Comfort, Risk Avoidance, Resilience and Achievement. Comparisons were drawn between the Satisfaction subscale and the dimensions of the KIDSCREEN. Whilst the authors of the KIDSCREEN report all correlations to be significant ($p < 0.001$) the Pearson's correlation coefficients presented in their manual do not exceed the more stringent value of 0.7 recommended by Hemphill (2003). With regards to Physical Wellbeing, Pearson correlation coefficients ranged between 0.25 and 0.59. Low correlations were reported when comparing the CHQ Physical Functioning scales with the four other KIDSCREEN subscales, which are not directly related to physical health. Stronger correlations were reported with regards to the KIDSCREEN Psychological Wellbeing scale, with a correlation coefficient of 0.63 when compared with YQoL-S and 0.62 when compared with the CHIP-AE satisfaction scale. Moderate convergent validity was reported for the Autonomy and Peer Relation KIDSCREEN dimension, with the highest correlations when compared with the YQoL-S perceptual scale (0.54) and the CHIP-AE satisfaction domain (0.51). Low to moderate concurrent validity was reported for the Social Support and Peers scale with correlation co-efficient values ranging from 0.11 to 0.39 when compared with CHQ Physical Functioning and CHIP-AE Satisfaction scale respectively. Similarly low to moderate Pearson values were reported for the KIDSCREEN School Environment scale with correlation co-efficient values ranging between 0.09 (CHQ Physical Functioning) and 0.48 when compared to the Perceptual Scale for the YQoL-S.

Thus far, the literature relating to the KIDSCREEN questionnaires (and equivalent HRQoL measures) largely relates to the validity of the measures as reported in the validation studies. To date there is minimal evidence regarding the measures sensitivity to change. It has been suggested that questionnaires, like the KIDSCREEN, developed using Item Response Theory (IRT) may offer a

superior ability to detect responsiveness to change. However, though there is emerging evidence to support the use of the KIDSCREEN questionnaires in the measurement of treatment or intervention outcomes (Villalonga- Olives, Rojas-Farreras, Vilagut, Palacio-Vieira, Valderas, Herdman, Ferrer, Rajmil & Alonso, 2010, Murillo, Bel, Perez, Corripio, Carreras, Herrero, Mengibar, Rodriguez-Arjona, Ravens-Sieberer, Raat, Rajmil, 2017) this is not consistently reported (Deighton et al, 2014). Further exploration of this is, therefore, encouraged.

KIDSCREEN 27 by proxy

Although a full evaluation of the psychometric properties of the associated KIDSCREEN 27 by proxy version is beyond the scope of this review, the reported intraclass correlation co-efficient values (0.44-0.60) suggest that there was agreement between the two KIDSCREEN 27 versions. However, it is recognised that these values fall within the poor to moderate ranges. As considered previously, this may be indicative of differences in self and by proxy reporting in children and adolescents (Davis, Nicolas, Waters, Cook, Gibbs, Gosch & Ravens-Sieberer, 2007).

DISCUSSION

The authors provide robust support for the reliability and validity of the KIDSCREEN instruments including the 27 version. Though seemingly resource intensive, the methods employed during the development of the measure, including a literature view, Delphi study and focus groups may have contributed to the promising psychometric data presented in the handbook. The large sample size and the use of modern psychometric methods further contribute to the rigour of the KIDSCREEN questionnaires.

The KIDSCREEN is one of a number of generic paediatric HRQoL measures demonstrating appropriate reliability and validity. Solans et al (2008) list 30 other generic measures in their systematic review, each of which provides unique information relating to a variety of dimensions associated with HRQoL. This raises concern about potential conceptual inconsistencies between measures, perhaps contributing to confusion relating to the construct of HRQoL itself. This may explain some of the lower values reported in relation to the KIDSCREEN convergent validity. Comparatively, the KIDSCREEN is one of only a

few measures which considers the impact of psycho-social factors on HRQoL including bullying and peer rejection and financial resources, potentially broadening understanding of factors impacting on HRQoL in this particular age group.

A number of the measures in Solans et al (2008) review report more detailed psychometric properties than the KIDSCREEN. This includes the Child Health & Illness Profile (CHIP)-AE Child Health Questionnaire, Paediatric Quality of Life (PedsQL 4.0), Vecu et Snte Percue de Adolescent (VSP-A) & Youth Quality of Life (YQOL). However, unlike any of the other measures reviewed, the KIDSCREEN was developed across different cultures simultaneously. This increases opportunities for using a validated tool across cultures and in international research without the complications of adaptation.

The availability of the three versions, differing in length, further increases accessibility of the KIDSCREEN in practice and research, allowing for a responsive approach for those unwilling or unable to engage with a lengthy psychometric measure. This offers flexibility for clinicians or investigators to match the questionnaire to the needs of the client or research. The availability of a computerised adaptive test module is also beneficial. This provides further flexibility and consistency in relation to how and when the measure can be completed and is in line with participants' preference for completing patient reported outcomes online (Campbell, Ali, Finlay, & Salek, 2015). Furthermore, computerised analysis offers an efficient response in a climate of reduced resource.

It is recognised that a number of the studies evaluating the measures have been published by the authors of the tool. Therefore, further exploration from independent reviewers, who may be better positioned to apply a more critical appraisal may be beneficial.

FUTURE DIRECTION

As with many HRQoL measures, future direction should now focus on the usefulness of the tools in clinical practice and research given some of the challenges impacting on the measurement of HRQoL as discussed by Varni et al

(2005). Additional exploration may also be required regarding the use of the measure with such a wide age range (8-18) as this may contribute to insensitivities for age related experiences, particularly as HRQoL is likely to change during childhood and into adolescence (Bevans, Riley, Moon J, & Forrest, 2010).

The KIDSCREEN tools have been used in a number of studies to explore HRQoL in a variety of population groups including those with cerebral palsy, cancer, ADHD and Autism to name but a few (Erhart, Raven-Sieberer, Dickinson, Colver & European SPARCLE & KIDSCREEN Groups, 2009, Engelen, Koopman, Detmar, Raat, van de Wetering, Brons, Anninga, Abbink, & Grootenhuis, 2011, Klassen; Miller, & Fine, 2004 & Meral & Fidan, 2013). Given the prevalence of poor health amongst the forensic population (Harris, Hek & Condon, 2006) developing understanding and valid measurement and monitoring of HRQoL could provide valuable contribution to individual assessment and intervention and also widen understanding of the health needs of this complex group. It is encouraging that research in this area is developing but it currently remains in its infancy (Fitzpatrick, Chambers, Burns, Doll, Fazel, Jenkinson, Kaur, Knapp, Sutton & Yiend, 2010). The emergence of recovery focused approaches within the mental health field (Department of Health, 2011), has contributed to an increased recognition within forensic psychiatry of the importance of promoting individualised recovery to meet a number of important human needs for those in conflict with the law. Whilst public safety and recidivism amongst forensic clinicians and researchers remains a priority, understanding and promoting other important areas of a young person or adult "offenders" life may in itself prove effective in addressing criminogenic factors and improving outcomes (Ayland & West, 2007). Interventions that offer an opportunity to address areas of an individual's life that are important to them is likely to enhance intrinsic motivation and increase and maintain engagement with treatment (Kuokkana, 2016). The identification of areas affecting HRQoL may therefore be particularly useful with this specific group requiring consideration for the assessment and impact on functioning for those within secure settings.

As it stands, the KIDSCREEN measures do not include a scale to detect social desirability, which may be particularly relevant when applying the tool to a

Forensic population. Social desirability relates to an individual's desire to make a favourable impression on others, which can compromise the validity of any self report measure. This appears to be particularly relevant when working with a forensic population, where there are clear incentives and a tendency for this group to present themselves in a favourable way (Tan & Grace, 2008, Andrews & Meyer, 2003). The underpinning Rasch model applied during the development of the KIDSCREEN measures goes some way to reflect an individual's actual response pattern. However, the absence of a Social Desirability Scale does not allow for the detection of a response pattern biased by this relevant influence. Consideration for how to preserve validity when using the measure with this group would, therefore, be beneficial.

CONCLUDING REMARKS

Overall, the KIDSCREEN offers a clinically useful set of measures that can support the identification of difficulties with functioning relating to various aspects of HRQoL. The shortened KIDSCREEN 27 version allows for a more practical measure when working with hard to reach children and adolescents who are more likely to have under developed literacy skills (Bryan, Freer & Furlong, 2007), without impacting on the psychometric rigour or reducing the level of detail to that of the screening tool (KIDSCREEN 10). The availability of proxy versions is particularly useful when individuals are unable to complete self-report measures. However, given the nature of the construct of HRQoL it is suggested that self-report is likely to provide more accurate information relating to a child or adolescents perceptions. It also provides a tool for engaging children and adolescents in discussion about their HRQoL and engaging them in plans that are relevant to their perceived needs, which may be particularly useful in engaging particular groups who are difficult to engage. Ongoing enquiry to support the predictive validity and application of the measures in clinical research and practice should now be prioritised.

CHAPTER FOUR

Development and pilot of a text message intervention to improve psychological wellbeing amongst at risk adolescents.

Word Count: 4,219

- 1. Abstract**
- 2. Background Information**
- 3. Method**
- 4. Results**
- 5. Discussion**

ABSTRACT

Background

Text messages are a preferred method of communication amongst adolescents, providing an accessible method for social interaction throughout their day. As mobile phone ownership is high across demographic groups, text messaging holds potential to impact positively on wellbeing both directly and indirectly for even those hardest to reach.

There is growing recognition that children and young people should be regarded as competent social agents who should be consulted about issues involving them. Consequently young people were recruited to participate in the developmental phase of a text message intervention.

Method

Two independent focus group sessions were held to explore the acceptability of various types of text messages and to determine the preferred frequency of messages. Text messages were refined and developed in line with feedback. A pilot study tested the text message intervention and the outcome measures identified for use in the proceeding research study.

Results

A sample of fourteen, sixteen and seventeen year olds, including eight females and six males, who were engaged with the YSS and attending "Ready for Work" programmes were involved in the development of the SMS intervention. Discussion revealed mixed opinion regarding the types of messages that young people would consider to be acceptable. Participants highlighted the importance of personalised messages, sent from someone known to the recipient that were engaging and succinct. Participants also raised the issue that some messages had potential to impact negatively on participants if they were unable to identify their strengths as encouraged by one of the example messages. Message content and the schedule of the intervention was refined in accordance with feedback, which was subsequently tested on two participants during the pilot study. Feedback from the two pilot study participants was largely positive and they were able to complete pre and post measures without issue. During the pilot study the logistical demands of running an SMS intervention manually became apparent and the implementation of an automated system prioritised.

Conclusion

The valuable contributions made by participants in the development of the text message intervention led to the refinement of text message content and schedule of the intervention. Furthermore, the active participation of young people involved in the development phase of the intervention provides additional evidence that young people are able to provide helpful insights that might not otherwise have come to light, regarding matters involving them.

BACKGROUND INFORMATION

Strong support networks have been linked to both positive psychological and physical health benefits (Wang, Wu, Liu, 2003) Uchino, Cacioppo & Kiecolt-Glaser, 1996, Ozbay, Johnson, Dimoulas, Morgan, Charney & Southwick, 2007 Khan & Hussain, 2010). High quality and quantity social and emotional support has been indicated as a protective factor in risk of morbidity, mortality, quality of life in those with chronic diseases (Reblin & Uchino, 2008) and mental health (Wang, Cai, Qian & Peng, 2014). Though there is no definitive agreement regarding the exact mechanisms through which social support mitigates poor health outcomes, the promotion of positive health behaviours and effective coping strategies and the effects on neurobiological factors have been suggested (Uchino, 2006 & Ozbay et al 2007).

Text messages are a preferred method of communication amongst adolescents, providing an accessible method for social interaction throughout their day (Lenhart, Ling, Campbell & Purcell, 2010). As mobile phone ownership is high across demographic groups (Thomas, Heinrick, Kuhnlein & Radon, 2010) text messaging holds potential to impact positively on wellbeing both directly and indirectly for even those hardest to reach. The suggested release of dopamine upon receipt of a text notification may make this particular type of communication unconsciously pleasurable and favourable (Hall, Cole-Lewis & Bernhardt, 2015). However, there is some debate about whether communicating with others digitally, through computer mediated communication (CMC) methods has the same relational benefits as face to face contact.

A number of conflicting theories have been proposed, which seek to explain how text based communication impacts on social relationships and wellbeing indirectly. For example the Cues Filtered out (CFO) approach groups a number of theories that suggest that lack of verbal and non-verbal cues compromise the social capabilities of digital communication. From an evolutionary perspective, it is argued that the brain and other motor and sensory organs have evolved to facilitate face to face communication, making text based interactions more cognitively challenging and less pleasurable (Baumeister & Leary, 1995). However, theories of interpersonal adaptation suggest that through a process of adaptation, digital communication can be as effective as those that occur in

person. For example the Social Information Processing (SIP) theory (Walther, 1992) suggests that where verbal and non-verbal cues are unavailable individuals learn to adapt their interpersonal communication to make use of what is available through a particular medium. Given that only a fraction of information is available through digital communication compared to face to face interactions, Walther argues that relational effects may take longer to come to fruition. The Adaptive Structuration Theory expands on the SIP suggesting that there is an ongoing interaction between the technological and the social environment, where an individual's familiarity and use of a chosen medium can result in changes in social rules and norms. Findings from a recent RCT conducted by Holtzman, DeClerck, Turcotte, Lisi & Woodworth (2017) provide evidence of the superior supportive benefits of face to face communication. However, the comparable satisfaction ratings between face to face and text message interactions with someone known to an individual rather than the confederate in the study suggests that text messaging can provide a source of meaningful social contact.

Whilst increased opportunities to communicate with others around the clock has potential to enhance social ties, the potential negative effects of increased exposure has been associated with sleep disturbances, stress and mental health problems (Lemola, Perkinson-Gloor, Brand, Dewald-Kaufmann & Grob, 2014, Tamura, Nishida, Tsuji & Sakakibara, 2017, Thomee, Harenstam & Hagberg, 2011). The majority of participants in Thomee et al (2011) study felt that there were expectations for them to be contactable via their mobile phones throughout the day. Whilst for most this was not considered to be a source of stress in itself, where this was indicated, poorer mental health outcomes were observed. This suggests that whilst access to communication aids may increase opportunities for social contact there is also potential for this to be a source of stress.

More advertently, text messaging can provide a medium through which to promote positive health behaviour using well established health behaviour and change models, such as the health belief model, social cognitive theory, transtheoretical model and self-determination theory. To date these have been applied in a number of eHealth interventions to promote positive health behaviour (Riley, Rivera, Atienza, Nilsen, Allison & Mermelstein, 2011) and there

is some evidence to suggest the superior benefits of SMS interventions which are grounded in theory (Noar, Benac & Harris, 2007). However, despite a surge of interest into the use of SMS interventions to promote positive health outcomes, a current criticism of the available literature relates to a lack of theoretical underpinnings guiding the design of interventions (Hall et al, 2015). Therefore during the developmental phase of the SMS intervention to promote psychological wellbeing used in this study, it was important to consider the theoretical underpinnings that would inform message content.

Self Determination Theory (SDT)

Ryan and Deci's (2000) Self Determination Theory (SDT) is a theory of human motivation that has been applied to promote positive outcomes in a range of contexts including health, education, work, sport and forensic settings. It is a theory that falls under the umbrella of "positive psychology", which refers to the scientific study of optimal human functioning and flourishing (Seligman, 2000). SDT posits that individual and circumstantial factors, in particular social environments that satisfy three basic psychological needs; autonomy, competence and relatedness to others, facilitate positive psychological wellbeing. Autonomy refers to the experience of behaviour that is self-endorsed, stemming from personal choice (Niemi & Ryan, 2009). Competence relates to feeling effective and even masterful in one's abilities and feeling connected, loved and cared for leads to a sense of relatedness to others (Lynch, 2010).

According to the SDT, the processes of internalization and integration are key to self-regulation and sustainable behaviours which are beneficial to health and wellbeing. The term internalization in the context of this theory relates to the transformation of controlled, external regulation to that which is internalized when corresponding behaviours are personally endorsed as valuable by an individual. Thus leading to more autonomous self-regulation (Ng, Ntoumanis, Thøgersen-Ntoumani, Deci, Ryan, Duda & Williams, 2012). It is argued that self-determination will only occur once a value or regulatory process integrates with an individual's core sense of self (Deci, Eghari, Patrick & Leone, 1994).

Predominantly the theory has been used to inform behaviour change interventions (Patrick & Williams, 2012). As the theory is able to cast a

perspective on how positive mental health can be attained, it also contributes to understanding how constraints and negative conditions can result in psychological difficulties, thus informing how need satisfaction can influence mental health. As described by Sheldon (2012) the theory of self-determination suggests that just as physical requirements support the growth and development of plants and organisms, the satisfaction of the three identified psychological needs are essential to support intrinsic motivation, growth and health. The SDT argues that rather than positive emotion and wellbeing being the indicators of mental health per se, these are actually the bi-products of psychological need satisfaction. Therefore an individual's mental health will be directly influenced by psychological need satisfaction. Evidence in support of this is provided by Reis, Sheldon, Gable, Roscoe & Ryan (1996) who report correlations between individuals' daily fluctuations in the satisfaction of autonomy and competence and psychological outcomes including self-esteem, mood, vitality and physical symptoms.

SMS content

A key proponent of the SDT is that social environments need to nurture these three psychological needs. As there is support (Holtzman et al, 2017) to suggest that digital communication can provide a source of meaningful social contact thus forming part of an individual's social environment and there is evidence to support the applicability within a range of contexts, including forensic settings, text messages in this study were underpinned by the SDT.

The content of text messages were designed to nurture and encourage participants to seek opportunities to satisfy the three psychological needs: to encourage psychological freedom, challenge themselves and promote meaningful relationships.

Service user involvement

Involving service users in the design and evaluation of health services is a key aspect of the UK Department of Health strategy for modernising the NHS and the NHS Constitution (Department of Health and Social Care, 2015). Active service user participation is aligned with Children and Young People Increasing Access to Psychological Therapy principles to ensure that services are accessible,

high quality and responsive to the needs of a target group (British Psychological Society, 2010). Empowering service users in this way is also aligned with recovery based approaches which place emphasis on building resilience, seeing beyond an individual's difficulties, recognising their abilities and taking control over their lives where they can (Bonney & Stickley, 2008). Owens et al (2011) highlight that, to date, greater emphasis has been placed on service user involvement in the design of services, with less focus on the impact in the design of interventions. Whilst service users' views allow for their needs and preferences to be considered, it is recognised that these may not always align with the evidence bases regarding effective approaches. This requires careful consideration to avoid becoming a tokenistic process that has potential to undermine the very aims of service user participation. In a recent paper presented by Sharpe, Shepher, Kool, Whittaker, Nosa, Dorey, Galea, Reid & Ameratunga (2015) the benefits and challenges of recruiting service users from their target population to support the design and structure of their text messaging intervention are discussed. In their developmental study Sharpe et al (2015) were successfully able to identify factors that were important in ensuring that the intervention was engaging, relevant and useful, informing the subsequent design of a more costly randomised controlled trial.

There is growing recognition that children and young people should be regarded as competent social agents who should be consulted about issues involving them (Claveirole, 2004). Therefore, young people were recruited to participate in the developmental phase of the research, which included focus group sessions and a pilot study. This provided the opportunity to obtain insights and understanding about young people's perceptions of what would increase accessibility and acceptability of a text message intervention to improve psychological wellbeing.

The focus groups offered an opportunity to give insight into the attitudes, feelings, beliefs and reactions from a sample of the target population. They provided an opportunity to explore topics within the context of a social gathering, which prompted thoughts and interactions amongst peers (Smithson, 2000). As highlighted by Williams & Katz, (2001) this has potential to reveal aspects that may not have come to light in a one to one setting or via

questionnaires. The group setting also offered an efficient approach to seeking the views of a number of service users.

Focus group members and pilot study participants were recruited from a Youth Support Service in the South of England. The service remit extends beyond that of a traditional Youth Offending Team, adopting a case management approach to provide integrated, targeted and preventative service for young people and their families who are, or at risk of the following:

- Anti-social and offending behaviour
- Victim of youth crime
- Not in Education, Training or Employment (NETE)
- Homeless
- 14+ year olds who are Children in Need (under section 17 (10) of the Children's Act, 1989)
- Young people who are open to the Service but not accessing Child and Adolescent Mental Health Services (CAMHS)
- Young people with significant substance misuse issues.

This includes a "Ready for Work" programme for young people out of education, training and employment to increase employability through the development of literacy, numeracy and interpersonal skills.

Aims

This intervention development study aimed to explore the acceptability of various types of text messages and to refine and develop those messages in line with feedback. A second aim was to determine the preferred frequency of messages and the study also explored the feasibility of delivering regular text messages at the preferred frequency. Finally the study piloted the SMS intervention and the study outcome measures.

Design

Focus group discussions were used to explore young people's perceptions of acceptability of text messages and to use their views to refine the content of the

messages, timing and anything else that may have been an important part of such an intervention.

A pilot study was subsequently conducted once message content and intervention schedule was refined.

METHOD

Participants

Youth Support Service staff, responsible for the oversight of 'Ready for Work' programmes across the county were approached to consider appropriate groups that would be willing to participate in a focus group session regarding the use of text messaging to improve psychological wellbeing. Programme facilitators were asked to liaise with their cohorts to explore interest. Of the four groups that were approached, permission was given from two of these pre-determined groups. Participants were given the opportunity to opt out of the session. Those who agreed to take part were required to provide written consent and were entered into a prize draw.

A sample of fourteen, sixteen and seventeen year olds, including eight females and six males, who were engaged with the YSS and attending "Ready for Work" programmes were involved in the development of the SMS intervention.

Two female focus group members agreed to take part in the pilot study.

Procedure

In the preliminary stages of development and in preparation for focus groups, a range of different types of messages were prepared, conveying messages to encourage self-determination. This included quotes, prompts and questions. These examples were then used to facilitate discussions regarding proposed content for the intervention. Each group participated in one focus group session in March 2016. These took place in two different youth centres in different parts of the County. "Ready for work" programme facilitators also attended the session.

Each session was recorded using a mobile phone voice recording application, which was password protected. Example messages were printed out and shared with focus group members. Participants were asked to endorse examples that they would consider appropriate to receive by marking on the print outs.

A copy of the focus group schedule and consent form can be seen in Appendix 7 & 8.

Directly after each session, facilitator reflections were noted. Session recordings were listened to repeatedly to identify key points raised by participants. These were then presented in a summary report.

RESULTS

Focus group sessions lasted between 22 and 26 minutes.

Discussion revealed mixed opinion regarding the types of messages that young people would consider to be acceptable. For some, they suggested that they would hold a preference for inspirational quotes 'like a little positive thing every day might help' 'it would help you think throughout the day' (Focus Group 2) but for others they would find these 'cringey' and 'a bit cheesy' (Focus group 1). Some suggested that they would be happy to receive jokes via text messages but for others this would not be welcomed 'my nan wouldn't even send me stuff like that' (Focus Group 1).

There were also differences in the preference for the timings of the messages ranging from the morning through until the evening. Consequently, a range of content and timings were embedded into the SMS intervention to ensure that these factors were explored in greater detail as part of the formal research process. Across both groups participants were clear that messages should not be sent more frequently than daily, therefore, together with pilot study participants, it was agreed that messages would be sent bi-daily.

Themes that emerged from the focus group session included the importance of personalised messages, 'I take more notice of things that suit me than others' (Focus Group 2) 'different ones are for different people' 'something like are you alright, how you doing, do you need to talk' (Focus Group 1) sent from

someone known to the recipient, 'you wouldn't really want to talk to a stranger because you wouldn't know if you could trust them. I think most people want someone there that they can trust' 'it's more easy to talk to someone you trust' 'if it's from someone you know then it's not a pointless text, like you'd think about it after' (Focus Group 2) that were engaging and succinct 'not full blown paragraphs' (Focus Group 1).

Participants dismissed the use of quotes signed off by sports or celebrities and these were therefore removed from the selection of messages. The opportunity to reply to messages was raised as an important factor by both groups.

Unfortunately this was beyond the scope of the current study and the limitations of this are acknowledged. However, based on participant's feedback the messages were sent from a pre-programmed contact entitled "Youth Support Service" to ensure that participants were aware of the message sender and messages of shorter duration were selected for inclusion in the study.

Participants suggested that they would utilise website links and therefore the final message contained a link to Young Mind's website.

Importantly, young people raised the issue that some of the example messages could impact negatively on participants because there was a sense that they might struggle to identify their strengths as encouraged by one example SMS message 'no one really thinks about what they are good at themselves, you more think about what you're not good at because you can't see it yourself can you' 'they might not actually be able to think about positive things' 'you'd have to think about what you were sending to someone before you send it' (Focus Group 2). This led to consideration of how messages could be interpreted by participants and consequently SMS messages were adapted to prompt young people to discuss with others where necessary.

Taking into consideration the emergent themes from the focus groups and ongoing dialogue with two dedicated focus group members, a variety of messages were identified and incorporated into a schedule of SMS messages to be sent to participants over a period of three weeks. As previously noted motivational messages were designed to promote autonomy, competence, and relatedness and included messages that were positively endorsed during the focus group sessions. The agreed messages are shown in Table 4.1.

Table 4.1. *Text messages included in schedule and psychological underpinning.*

Text Message	Psychological underpinning
Hey. Your thought for today: To make a difference in someone's life you don't have to be brilliant, rich, beautiful or perfect, you just have to care! Have a good day!	Relatedness
Hey. Just remember- it doesn't matter how slowly you go as long as you don't stop. Remind yourself of this when things are getting a bit much! Enjoy your day!	Competence
Afternoon. Do one thing today that your future self will be proud of. Keep a note of this somewhere if you can. Have a good one!	Autonomy
Here's a quote for helping you or those around you through tough times: H.O.P.E. Hold On Pain Ends! Remember to talk to someone you can trust if you're finding things difficult. Don't forget the Youth Support Service is here to help. Take care, YSS.	Relatedness
Hey. What one thing are you good at? See if you can find some time to do this at some point today. Speak with a friend or your Youth Support Officer about this if you need to. Have a good day!	Competence
Hey. Did you know that helping others is a good way of helping yourself? Be kind, everyone you meet is battling something. Enjoy the rest of your day!	Relatedness
Hey. Remember to surround yourself with people who will support you to be the best version of yourself. Have a good day!	Relatedness
Hey. Remind yourself that the only person you should try to better than is the person you were yesterday. Make today a good day!	Autonomy
Hey. Nothings Impossible. The word itself says I'm Possible. What do you want to achieve in the coming days. Set yourself a small goal and work towards the IM possible. Talk this through with your Youth Support Officer. Have a good one!	Competence
A quote to get you thinking.....You can't always control your thoughts but you can choose how to respond to them. Save this somewhere and remind yourself when things get tricky. Have a good one!	Autonomy
When you see your Youth Support Officer next, talk to them about your 3 of your strengths. Write these down somewhere and remind yourself regularly. Have a good one!	Competence
Hey. This is the last message....hope you've found them useful and thank you for agreeing to take part. Check out the Young Minds website for some tips on keeping your mind healthy. www.youngminds.org.uk/ . Have a great day!	Autonomy

The same two female focus group members expressed an interest in further involvement in the design of the intervention and agreed to participate in a pilot study. The young people were able to provide valuable feedback in relation to the presentation of one of the messages, which was an acrostic poem, which would better enable its interpretation and appeal. This was amended accordingly.

Results from the Pilot study

A pilot study was conducted prior to the pre-post study presented in Chapter 5. Participants in this pilot study completed all aspects of the research and intervention including consent forms, baseline, post intervention measures and the post intervention interview. In addition, participants were asked to provide verbal feedback regarding their experience of the pilot, aspects that they would continue with in the subsequent study and any suggestions for improvements. Participants were able to complete the pre and post measures without issue and reported these to be of appropriate length.

During the pilot study the logistical demands of running an SMS intervention manually became apparent and the need for an automated system was prioritised.

A secure Client Relationship Management system with capability for time based workflow and a secure SMS provider was identified. This meant that at regular defined intervals, outbound messages triggered the pre-defined message to be sent to participants. The SMS provider had functionality to name the message sender as YSS, which addressed the issue raised by focus group participants about the importance of knowing the sender of the messages. This formed an important aspect in identifying an appropriate SMS provider.

Feedback from the two pilot study participants regarding the intervention was largely positive, though this was unsurprising given their involvement in the design of the intervention, which may have contributed to bias in their feedback. One participant made a suggestion to deliver the morning messages a little later and the schedule was updated accordingly.

The issue of participant availability during the intervention became apparent highlighting the need for contingency planning in the event of missed post intervention commitments. Consequently an application to record telephone interviews was sought and trialled with consent. Consent forms were adapted accordingly in preparation for the feasibility study.

DISCUSSION

Young people were involved in the design of the SMS intervention used in the feasibility study presented in the proceeding chapter. In total 14 young people were involved in the co-production of this intervention, making valuable contributions regarding the content of the messages and the structure of the intervention through focus groups and participation in a pilot study.

Overall, young people were able to provide valuable feedback, where social interactions during the focus groups led to discussions amongst group members about their experiences of text messaging, their preferences and potential barriers that require consideration. As a result of their feedback consideration was given to the presentation, accessible content and timings and frequency of message delivery. Importantly, young people were able to reflect on the potential for difficulties that may have arisen in relation to one of the example messages and potential amendments that would mitigate this. This prompted further consideration for how messages might be negatively interpreted and adaptations were made accordingly prior to the implementation of the study.

There were occasions when participant feedback was not aligned with the underlying aims of the study. As recognised by Sharpe et al (2015) this highlights that whilst user preference is likely to be helpful in the provision of accessible services this may not always align with theoretical or evidence based findings. That said, the effectiveness of even the most superior evidence based interventions may be compromised if they are not accessible to service users.

The subsequent pilot study trialled the SMS intervention with two participants. This provided an opportunity to pilot the outcome measures and post intervention interview schedule and obtain feedback in relation to their experience of the intervention. This also provided a valuable opportunity to reflect on the research process, to understand challenges relating to the

research protocol and strategies for overcoming these. For example, one participant's disclosure regarding her use of illicit substances triggered a safeguarding concern that required reporting. Doing so, within the context of research felt unfamiliar and somewhat uncomfortable, particularly as the young person had committed her personal time to the development of the intervention. The importance of well defined procedures from the outset and access to supervision was key to addressing this issue ethically, expediently and in a manner that was helpful for the young person.

Strengths and limitations

There is growing recognition that children and young people should be regarded as competent social agents who should be consulted about issues involving them (Claveirole, 2004). The valuable contributions made by participants in the development of this SMS intervention provide further support for this approach.

Participants that engaged in this developmental phase of the research study were adolescents, attending a "Ready for Work" programme due to their disengagement with mainstream education or training or unemployment. By virtue of their age and vulnerability they are likely to be under-represented in research and patient and public involvement (Flanagan & Hancock, 2010). Thus their involvement in the design of this research study provided an opportunity to gain insight from this hard to reach group, which may not have been gained through other means, increasing the likelihood of real world impact (Kirby, Lanyon, Cronin & Sinclari, 2003).

Moreover, as advances in technology are occurring at a fast pace and young people's preferences and use of particular tools or approach may change accordingly, involving young people in the preliminary stages provided an opportunity to mitigate the risk of designing an intervention no longer endorsed by this "tech savvy" group (Mason, 2014).

The potential benefits for the young people involved in the co-production of the SMS intervention are also recognised. Their engagement in the process offered an opportunity for empowerment and the promotion of active participation and pro-social behaviour. Although not a focus or measure of the study, such an inclusive approach may also have increased confidence and self-belief where this

might otherwise have been hindered by their life experiences and current circumstances (Kirby, Lanyon, Cronin & Sinclair, 2003).

The limitations of this small scale developmental study are also recognised. Focus group and pilot study participants were recruited using a convenience sampling approach. By virtue of their age and NETE status, there were likely parallels between participants in the developmental stages and those recruited to the substantive study. However, specific characteristics of focus group and pilot study participants were not obtained. Therefore the extent to which they are representative of the target group included in the pre-post study cannot be established.

It is recognised that the dynamic of the groups may have influenced the interactions and findings from the sessions. On reflection, it may have been beneficial to include a second facilitator during these sessions to support with challenging behaviour and to capture those spontaneous interactions that occurred outside of the group.

Furthermore, resource permitting it would have been advantageous to include an independent researcher to assist with the focus group summary reports in order to minimise bias regarding the interpretation of findings. Finally, the example messages used in the focus group sessions were presented on paper, which may have contributed to a different experience than when received from a mobile phone (Sharpe et al, 2015).

**CHAPTER FIVE
RESEARCH PROJECT**

A text a day to live the upbeat way? A mixed methods study to explore the accessibility and acceptability of a text message intervention to improve psychological wellbeing among young people in contact with the Youth Justice System.

Word count: 12,408

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- 1. Abstract**
- 2. Introduction**
- 3. Method**
- 4. Results**
- 5. Quantitative analysis**
- 6. Feasibility and acceptability of the SMS intervention**
- 7. Concluding remarks**

ABSTRACT

Background: The high prevalence of mental health problems and underutilisation of mental health provision amongst those within the Youth Justice System (YJS) remains a cause for concern. Increased mobile phone ownership amongst adolescents across demographics and the emerging promise of mobile health (mHealth) interventions provides a real opportunity to engage young people using a preferred method of communication.

Design and Methods: This mixed methods study explores the feasibility and effectiveness of a 3 week, bi-daily text message intervention, underpinned by Self Determination Theory (SDT) and co designed by young people to improve psychological wellbeing amongst young people who have offended. Participants completed the KIDSCREEN 27 questionnaire at baseline and again at the end of the intervention. The acceptability of the intervention was explored using Visual Analogue Scales (VAS) and semi-structured interviews at the end of the intervention.

Results: 18 young people aged between 16 and 18 who have a history of offending participated in the intervention. 16 young people completed baseline and post intervention measures and 15 completed post intervention interviews. No significant differences were reported between pre and post dimension and total scores on the KIDSCREEN 27. However negative correlation coefficients indicate a moderate effect that participants with lower KIDSCREEN scores at the beginning of the intervention were more likely to report the intervention to be helpful for their wellbeing. Participants subject to diversionary intervention were more likely to read the messages and rated the helpfulness of the intervention at dealing with stresses higher than those subject to statutory intervention. Five themes relating to participants experience of the intervention emerged from a thematic analysis of post intervention interviews.

Conclusions: Qualitative findings from this small scale study indicate that, for some, using text messaging to promote psychological wellbeing is an acceptable method, particularly for those with poorer psychological wellbeing and those on the periphery of the YJS. However there was no statistical evidence to suggest that the intervention was effective in improving psychological wellbeing. The emergent themes highlight important factors to consider when designing or implementing an intervention of this nature for this unique population. Further exploration is required to establish how mobile health interventions can be adapted to ensure that they are accessible to those embedded within the YJS who are likely to be in greatest need. **Keywords: Feasibility, adolescence, young offenders, psychological wellbeing, SMS, text message, mobile Health.**

INTRODUCTION

Background information

There is potential for young people to be both troubling and troubled as a result of the scale of the biological, neurological and psychosocial changes that occur during adolescence (Christie & Viner, 2005, Blackmore, Burnett & Dahl, 2010), with the greatest challenges associated with those who are not neurotypical, with lifelong histories of behavioural difficulties (Bjork & Pardini, 2015). A significant proportion of mental health disorders emerge during this challenging life stage. According to the WHO (2018) mental health disorders are the largest cause of burden of disease amongst young people. Although there is evidence to suggest that young people want to discuss their health care issues, studies of help seeking behaviour suggest that negative attitudes about professional help, lack of emotional competence, embarrassment and stigma are likely to compound adolescents' willingness to engage with professionals about difficulties they may be experiencing (Klein & Wilson, 2002 & Rickwood, Deane, Wilson, Ciarrochi, 2005).

Poor mental health is associated with other health and developmental concerns in young people (Patel, Flisher, Hetrick, & McGorry, 2007), which includes substance use and violence. During this transitional life stage the malleable brain undergoes significant changes with the reward centre becoming hypersensitive (Van Leijenhorst, Zanolie, VanMeel, Westenberg, Rombouts & Crown, 2010). This is at a time when young people are more susceptible to the influence of their peers and become more independent in their activities and in their decision making. It is, therefore, unsurprising that a spike in risk taking, which includes offending behaviour is observed during this stage of development (Steinberg, 2008). In recognition of this and in the knowledge that many young people who offend during adolescence will not persist with this behaviour into adulthood, the response to youth crime has adapted in the UK to ensure that resources are directed towards those in greatest need of intervention (Moffitt, 2015). This has meant that those young people within the formal Criminal Justice System are more likely to present with complex needs that require a well-considered approach (Taylor, 2016).

The underutilisation of mental health provision amongst those within the Youth Justice System remains a particular cause for concern given the high prevalence of mental ill health amongst this group (Barrett, Byford, Chitsabesan & Kenning, 2006). This hard to reach group present unique challenges, particularly in relation to access to appropriate and preventative mental health provision. Young people who offend are reluctant to access professional support until they reach a point of crisis, which may co-occur at a time when they become known to other agencies (Klein & Wilson, 2002 & MacDonald, 2006). Now more than ever, they are those likely to be exposed to multiple risk factors that impact and perpetuate mental health difficulties (HMIP, 2017). Moreover their presenting difficulties, evident at the point at which they come into contact with services may well compromise their ability to engage with other aspects of their care. Though there is increased interest into the effectiveness of interventions with young offenders, much less is known about successful techniques for engaging with this hard to reach group (Mason & Prior, 2008). As the effectiveness of any meaningful intervention is dependent upon an individual's willingness to engage, ongoing investment to understand this important component of any intervention is imperative and likely to prove dividends in the long term.

In recognition of the challenges and difficulties with access to Child and Adolescent Mental Health Services (CAMHS) amongst the adolescent population, the Children and Young People Increasing Access to Psychological Therapies transformation approach was launched by the UK Government in 2011. Unlike the adult IAPT approach a key component of this service transformation was to embed the principles of increasing access across existing services including local authorities who provide Youth Offending services. An integral part of this is the active participation of service users in the design of any new mental health provision, to ensure that services are responsive to the needs and preferences of this tech savvy population, where technological advances and evolution impact on how they live, learn and interact (Giedd, 2012).

Advances in accessible technology provides a real opportunity to utilise adolescents' preferred source for online health information (Gray, Klein, Noyce, Sesselberg & Cantrill, 2005), to promote healthy behaviour and deliver health interventions in an acceptable, real time, non-threatening manner. As the

prevalence of mobile phone ownership amongst adolescents is high regardless of socio- demographic status (Thomas, Heinrick, Kuhnlein & Radon, 2010, Childalert, 2015) and young people use text messaging as a preferred method for communicating, sending approximately 60 text messages a day (Underwood, Rosen, More, Ehrenreich & Gentsch, 2013), there is an opportunity to engage with a broad range of young people through text messages, without excluding those more marginalised unlikely to have access to more advanced smart phone technology (Hingle, Nichter, Medeiros & Grace, 2013).

Interest into the use of SMS interventions has burgeoned in the last decade and there are emerging findings from large scale studies, Randomized Control Trials (RCT's), systematic reviews and meta analyses that support the use of SMS in improving health behaviour and outcomes for a variety of population groups (Franklin, Waller, Pagliari & Greene, 2006, Militello, Kelly & Melnyk, 2012, Wei, Hollin & Kachnowski, 2011 & Allbright, Krantz, Jarquin, DeAlleaume, Coronel-Mockler & Estacio, 2015). The qualitative findings of Allbright et al (2015) suggest that a one size fits all approach to this method of intervention is unlikely to be acceptable to differing population groups and associated needs, instead recommending that consideration should be given to the specific needs of each target group.

The effects of SMS interventions on psychological health amongst adolescents in particular was explored in the meta-analysis presented in Chapter 2. The feasibility of the approach and a potential for positive effects suggest that further exploration of the approach with adolescents would be beneficial. To date no research has been conducted amongst an adolescent offender population. Consequently, this feasibility study will explore the acceptability and effectiveness of a text message (SMS) intervention to promote positive mental health and wellbeing amongst this hard to reach group.

Research Aims

The acceptability and effectiveness of an SMS intervention co-designed with young people (Chapter Four) will be explored using a combination of qualitative and quantitative methods. The acceptability of the intervention will be analysed using retention and dropout rates and information obtained from semi-

structured post-intervention interviews and Visual Analogue Scales (VAS). Quantitative analysis of participant pre and post intervention outcome measure scores (using the KIDSCREEN 27, short version) will provide information relating to the effectiveness of the intervention in promoting positive mental health and wellbeing. It is hypothesized that participants' scores on four dimensions of the KIDSCREEN questionnaire will be higher at the end of the intervention indicating better mental health. Findings from this study will then indicate whether further large scale research would be beneficial to inform clinical practice.

METHOD

Participants

Inclusion criteria

Young people working with the Youth Support Service during the study recruitment period (between April and October 2016) for the duration of the SMS intervention and who met the following criteria were invited to take part in the study:

- Aged 16-19
- History of offending or sentencing within 12 months of recruitment to the study.
- Own a mobile phone

Exclusion criteria

Due to the nature of the intervention and the requirement to access text messages, incarcerated young people were not able to take part.

Participants who didn't complete follow up data were excluded from data analysis.

Information relating to participant eligibility was verified using information recorded on the YSS CareerVision case management database.

Following Braun and Clarke's recommendation of 6 to 10 participants for theme analysis with small sample studies (Braun and Clarke, 2013, p 50), the target minimum target sample size for interviews was set at 10 participants.

Measures

KIDSCREEN 27 (short version) outcome measure (KIDSCREEN Group, 2016)

The KIDSCREEN 27 (short version) questionnaire is a quality of life and wellbeing measure used in this study to compare pre and post intervention wellbeing. Whilst most quality of life measures for children and adolescents have predominantly been developed for chronically or severely ill patients, the KIDSCREEN measures extend to provide normative data relating to the wider non clinical adolescent population. The KIDSCREEN instruments measure health related quality of life (HRQoL) and wellbeing in children and young people aged 8-18 years across different national and cultural contexts. There are three versions available of different lengths, all with reported good psychometric properties (discussed in greater detail in Chapter 3). The short version takes approximately 10-15 minutes to complete in comparison to 15-20 minutes for the full version. The shorter time commitment required for the KIDSCREEN 27 was considered to be most appropriate for the participant group involved in this research with a minimum of information loss from the full KIDSCREEN 52 version (KIDSCREEN Group, 2016) and was therefore adopted in this research.

The KIDSCREEN 27 (short version) questionnaire provides profile information relating to five dimensions (Physical Wellbeing, Psychological Wellbeing, Autonomy and Parent Relation, Social Support & Peers and School Environment), which map closely to the factors outlined in Ryan & Deci (2000) self-determination theory underpinning the content of the messages sent. Respondents were required to rate the frequency and intensity of a number of factors using a five point scale.

Each participant completed four of the five dimensions of the KIDSCREEN 27 (Physical Well-Being, Psychological Well-Being, Autonomy & Parents, and Peers & Social Support). They were told to leave out the fifth dimension (School

Environment) as, by virtue of their age participants in this study were unlikely to be attending School.

A five point decision scale is presented measuring frequency or intensity for each question using a time frame of one week. The majority of the items are positively formulated, however a number of questions across the subscales are negatively formulated and were thus recoded to ensure that higher scores are indicative of a higher Quality of Life. Rasch scores for each dimension were calculated using the SPSS syntax provided by in the KIDSCREEN handbook and interpreted in accordance with normative data for adolescents according to gender and age.

Visual analogue scales (VAS)

VAS are used to measure the subjective experience of an individual. Although the VAS has largely been utilised in the assessment and management of pain, there is support for the validity, reliability and feasibility of these scales in the measurement of other therapeutic outcomes (Miller, Duncan, Brown, Sparks, & Claud, 2003). Four VAS, consisting of a horizontal line of 100mm in length (Wewers & Lowe, 1990), anchored at each end with labels describing the extreme end of the subject under investigation were used in this study. Respondents were asked to mark a point on the 100 mm line indicating the extent to which they considered the intervention to be "Helpful" or "Not helpful" at supporting their wellbeing or dealing with stresses, the extent to which they felt "Good" or "Bad" after receiving the messages and frequency of reading the messages from "always" to "never".

Interview schedule

An interview schedule was developed with 12 open ended questions to explore the acceptability and accessibility of the text messages. A copy of this is presented in Appendix 13. This was piloted in the pilot study, where participants were appropriately able to respond to the open ended questions.

Procedure

Recruitment

Young people working with the Youth Support Service under the Criminal Justice remit were approached to take part in the study. Amongst the wide-ranging remit of the Service, each year the Youth Support Service works with approximately 570 young people aged between 10 and 18 delivering restorative, preventative and statutory interventions to prevent and lower risk of offending and risk of harm.

Youth Support Officers (YSOs) from Youth Support Service (YSS) locality teams were notified about the study through the bi-monthly service bulletin. They were also provided with a leaflet explaining the purpose of the research alongside an adapted version to share with eligible young people. In addition each locality team was provided with a poster to display in the local youth centre with contact details to register for the study (See Appendix 5).

YSOs were encouraged to discuss the study with eligible young people and contact the researcher where young people expressed an interest in participating. Where necessary the researcher was able to discuss any queries with YSO's and interested young people prior to agreeing to participate.

Participants who agreed to take part were provided with a detailed information sheet as part of the recruitment process and required to provide written informed consent (See Appendix 10 & 11). The voluntary nature of involvement was reiterated particularly to those participants subject to statutory intervention to prevent issues of coercion. Participants were made aware of their rights and the process to withdraw from the study at any stage. They were reassured that this would not affect their future care and were not required to provide a reason for their withdrawal. Participants were advised (via the information sheet and consent form) that should they withdraw from the study that the data collected up to the point of withdrawal would be retained and could be used in the final analysis, where appropriate.

All participants were entered into a prize draw, which commenced at the end of the study.

SMS Intervention

The development of the SMS intervention is presented in detail in Chapter Four.

Participants received twelve text messages in total over a period of 22 days. Messages were sent bi-daily at varying times of the day. For efficiency and to minimise confounding factors, text messages were sent from a secure, password protected automated system, which connected a Client Relationship Management Tool (CRM) with an SMS messaging Application Programming Interface (API). This meant that each participant received the messages in the same order, at the same time of day and on the same days of the week according to the SMS schedule, which can be seen in Appendix 9.

Data collection

Each participant completed four dimensions (Physical Well-Being, Psychological Well-Being, Autonomy & Parents, and Peers & Social Support) of the KIDSCREEN 27 short version within seven days of the start of the SMS intervention. To preserve anonymity each participant was allocated a unique study code at the start of the intervention. Each questionnaire was labelled according to this code. An instruction sheet was prepared in the event that the researcher was unable to meet with the participant in person. This enabled referring YSOs to facilitate completion of the questionnaire if necessary.

Participants then completed the four dimensions of the questionnaire again within seven days of the completion of the SMS intervention. The four visual analogue scales were also completed to measure participants' attitudes towards the SMS intervention. In the event that a participant was not able to meet with the researcher face to face, these were sent in the post with a pre-paid envelope for return. Participant responses were inputted to SPSS ready for analysis.

At the end of the intervention participants were also asked to take part in a short semi structured face to face interview to explore their views and acceptability of the SMS intervention. Each interview was recorded using a secure smartphone recording application and transcribed manually by the researcher. Where possible, interviews were conducted face to face in YSS offices or in an alternative suitable quiet location. Where face to face interviews

were not possible participants were offered the opportunity to participate in telephone interviews using a secure smartphone recording application. Consent to record interviews was obtained. Interviews lasted between 8 minutes and 8 seconds to 36 minutes and 16 seconds (median 16.1 minutes). Interviews were transcribed verbatim.

Ethical considerations

Ethics approval was granted by the University of Nottingham Faculty of Medicine and Health Sciences Research Ethics Committee (Reference number D10112015SoMPAPPhD) on 11.01.15. Permission to conduct the research within the Youth Support Service was provided by the Head of Service.

No adverse effects were anticipated as a result of involvement in the SMS intervention. However participants were made aware that they was no capacity to reply to the messages send and were provided with contact information in the event of an emergency.

Analysis

Quantitative data were analysed using SPSS version 22. Pre and post means on the four dimensions of the KIDSCREEN 27 measure were compared. Where assumptions of normality were satisfied, paired sample t tests were conducted. Alternatively, where assumptions of normality were violated the non-parametric Wilcoxon Signed Rank test was applied.

Taking a conservative approach to the level of measurement of the VAS scale, Spearman's rank order correlation was applied to explore characteristics that may have correlated with participant VAS scores.

Qualitative data were analysed using contextualist thematic analysis. Largely an inductive approach was applied, though the underpinning of text messages by the Self Determination Theory will have inevitably borne influence during the interpretation process. The 6 phases of analysis recommended by Braun & Clarke (2006) were followed. This began when the interviews were transcribed offering an initial opportunity to become familiar with the data. Subsequent time was then spent reading and re-reading transcribed interviews when initial

consideration for codes began. During phase two, codes were identified manually across the content of the whole data set and marked on the left hand margin of the transcribed interviews. To explore the relationship between codes, individual codes were written out and arranged into piles where commonalities in individual codes appeared. An independent researcher was involved at this stage to ensure trustworthiness of the themes. Mind maps were utilised to aid this iterative process. Once agreement was reached regarding the resulting themes, the coded data were then reviewed and themes refined to ensure that they fitted with the data set before defining and naming the master themes and subthemes within these. During this stage the themes were recorded on the right hand margin of the transcribed interviews and the data were also reviewed for evidence disconfirming emergent themes. This resulted in the subtheme "Messages didn't always have an impact" and Master Theme 5 "Barriers impacting on the success of the intervention" in attempt to provide the most representative interpretation of the data. Regular supervision throughout the process of thematic analysis provided an additional opportunity to establish trustworthiness of themes. The final stage of the thematic analysis is evident in the findings presented below.

Reflexivity

In recognition of the influence of the researcher's background, perceptions and interests, a reflexive approach to enquiry was applied throughout the research process (Ruby, 1980). This included diarising reflections, which included considerations for how my approach, questioning style and role may have influenced participants' responses in interview. For example, as an experienced professional working with young people I was aware of how my attempts to engage with young people may have influenced their responses. Clinically I have found validation and positive re-enforcement to be useful when working with young people, however, I was mindful about the appropriateness of this within the context of the research. I reflected on how this may have been interpreted by participants, perhaps indicating that their responses were what I wanted to hear and thus influenced by social desirability rather than a true account of their experiences. During supervision I reflected on how my personal and professional investment in the research may also have influenced my receptiveness to

negative cues. I was also aware of how gender may have influenced research findings as the majority of participants in this study were male, which may have impacted on their interactions with a female researcher. The identification of themes alongside an independent researcher and regular supervision provided an invaluable opportunity to reflect more objectively and consider feedback from an independent and more experienced researcher respectively.

RESULTS

Participants

A total of 18 participants agreed to take part in this research study, 16 completed baseline and post intervention measures and 15 completed post intervention interviews. Participant demographic characteristics are presented in Table 5.1.

No participants withdrew from the SMS intervention, however one participant reported that he did not receive any of the text messages sent and a further two participants indicated that their phones had become unavailable during the course of the intervention. For one participant this was as a result of his mobile phone being disconnected and for the other, her mobile phone had been confiscated by her parents. Where available, data from participants who had received any of the SMS intervention were included in analysis. Subsequently, 16 participants completed pre and post measures and 15 participated in post intervention interviews. Figure 5.1 provides an overview of participant involvement in this study.

The majority (13/16) of participants who completed the study were male. Discussions with Youth Support Staff during the recruitment phase of the research suggest that the under-representation of females recruited to the study (3/18) may have related to the specific inclusion criteria for enrolment in this study. Within the service, young males (80%) are disproportionately represented amongst those subject to Criminal Justice intervention. It was suggested (but not substantiated) that the eligibility criteria may have limited the number of females eligible to participate rather than the under representation being indicative of poor uptake amongst females. Specifically, the requirement for participants to be aged between 16 and 18 AND have committed

an offence or subject to Criminal Justice Intervention within the preceding twelve months may have limited the number of females eligible to participate. Typically this concurs with observed gender differences in offending where males are more likely to offend (Farrington & Painter, 2004) but where females are more likely to demonstrate earlier onset offending behaviour (Ferguson & Horwood, 2002).

Table 5.1. *Participant characteristics*

Variable	N (Total 16)
Age	
16	3
17	12
18	1
Gender	
Male	13
Female	3
Ethnicity	
White British	13
Other Asian	2
Any other mixed background	1
Accommodation	
Living with family	12
Supported accommodation	3
Temporary accommodation	1
Education	
Education or Training	12
Full time Employment	2
Part time Employment	1
Not in Education, Training or Employment	1
Mean no. offences	4.13 (4.3)
Total no. participants with history of violent offending	8 *
Total no. participants with history of illicit substance	6 *
Type of intervention	
Diversionary	7
Statutory Court Order	9

(*1= missing value)

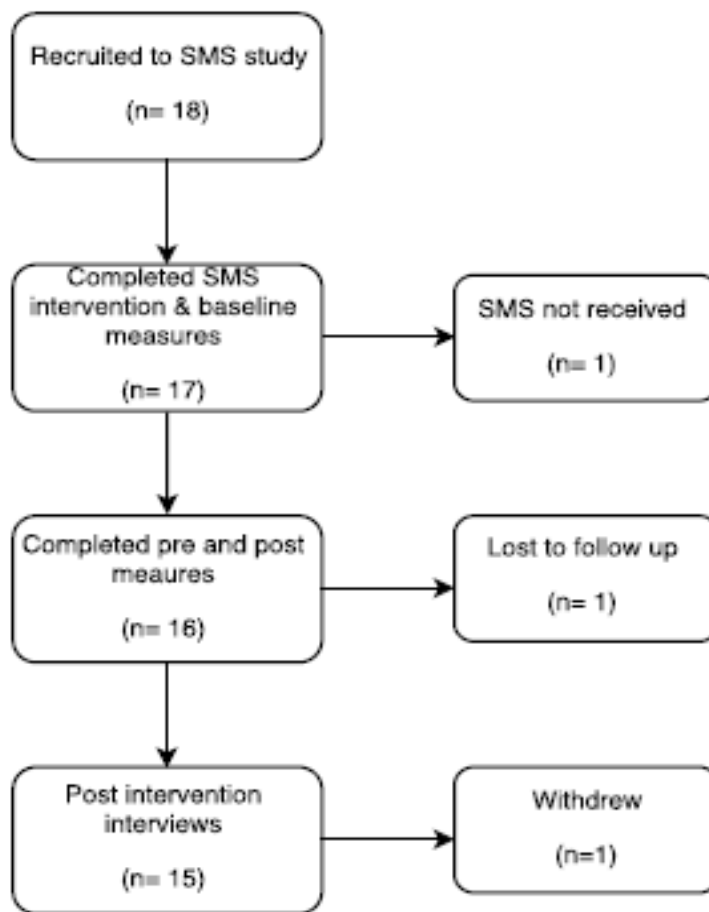


Figure 5.1. Participant flow diagram

The mean age of participants was 16.88 (0.5). Participants were predominantly White British (13/16). The remaining participants were from Other Asian (2/16) and Other Mixed backgrounds (1/16). This is typically representative of Ethnicity across the County (Surrey-I Partnership, 2017). Indeed, the population served by the YSS is predominantly White British (90%).

The majority of participants (12/16) were recorded as living at home. The remaining participants were either in supported accommodation (3/16) or temporary accommodation (1/16) at the time of the SMS intervention. For the purpose of analysis participants were grouped into two categories according to those living at home and those in alternative accommodation. In total 94% (15/16) of participants were engaged in some form of Education, Training

(12/16) or Employment (3/16). Only one young person was classified as Not in Education, Training or Employment (NETE).

Offending history

The number of known offences committed by participants within twelve months of enrolment in the study, ranged between 0 and 12. The exact number was not known for two participants.

A variety of offence types were recorded for participants included in this study, which ranged from low level anti-social behaviour to offences against the person and possession of a bladed article. A large proportion of participants' index offences involved a variety of offence types (44%).

Predominantly participants were subject to statutory intervention (9/16) including Referral Orders (7/16), a Youth Rehabilitation Order (1/16) and a Detention and Training order (1/16). The remaining seven were subject to a diversionary intervention, which included Youth Cautions (1/16), Youth Restorative Interventions (5/16) and a preventative approach for one participant.

QUANTITATIVE ANALYSIS

Group KIDSCREEN scores

Group scores in relation to normative data are summarised in Table 5.2. According to the national normative data for the United Kingdom, collectively, at baseline, participants in this study fell below the mean and within the 25th and 50th percentiles on the Physical wellbeing, Psychological Wellbeing and Parent Relations & Autonomy dimensions of the KIDSCREEN 27. At baseline participants demonstrated a low quality of life (lower than the threshold of the mean of the reference group minus half a standard deviation) relating to physical wellbeing indicating that participants felt physically exhausted, physically unwell and unfit with low energy. Otherwise group scores indicate that participants demonstrated "normal" health related quality of life across the other domains. Scores on the Social Support were elevated, falling between the 50th and 75th percentile, but remained below the mean for adolescents within the UK. At the end of the

intervention a decrease in group KIDSCREEN scores meant that the group score on this dimension fell to between the 25th & 50th percentile. More promisingly the group Psychological Wellbeing score improved moving above the mean and in the higher 50th to 75th percentile but within the “normal” range. All other dimension scores remained below the mean at the end of the intervention.

Table 5.2. *Group KIDSCREEN scores in relation to normative data presented in KIDSCREEN handbook (KIDSCREEN Group, 2016)*

KIDSCREEN dimension	Mean Baseline Percentile	Mean Post intervention percentile
Physical wellbeing	Between 25 th & 50 th	Between 25 th & 50 th
Psychological wellbeing	Between 25 th & 50 th	Between 50 th & 75 th *
Parent relations & autonomy	Between 25 th & 50 th	Between 25 th & 50 th
Social support & Peers	Between 50 th & 75 th	Between 25 th & 50 th *

* *Indicates a change in percentile ranking*

Efficacy of intervention

To assess for normality in both pre and post intervention KIDSCREEN subscale and total scores, Shapiro Wilks tests ($p < .05$) (Shapiro Wilks, 1965) and visual inspections of histograms, normal Q-Q plots and box plots revealed that three of the four subscales on pre intervention scores were approximately normally distributed (Physical Wellbeing, Autonomy and Parent Relation and Social Support and Peers). Similarly scores on three of the post intervention subscales were approximately normally distributed for Physical Wellbeing, Psychological Wellbeing and for Autonomy and Parent Relation and also Total scores. However, scores on the pre intervention Psychological Wellbeing subscale and scores on the post intervention Social Support and Peers subscale did not appear to be normally distributed. Therefore parametric statistical tests were performed on

two subscales (Physical Wellbeing and Autonomy and Parent Relation) and Total scores and non-parametric tests conducted on the Psychological Wellbeing and Social Support and Peers subscales.

Table 5.3. *KIDSCREEN* dimension mean pre and post scores, change scores and *p* values according to parametric assessment

KIDSCREEN Dimension	Baseline KIDSCREEN T values (based on Rasch Person Parameter)	Post KIDSCREEN T values (based on Rasch Person Parameter)	Change Score	P value
	Mean (SD) (n= 16)	Mean (SD) (n= 16)	Mean (SD) (n= 16)	
Physical wellbeing	42.8 (5.85)	44.2 (5.01)	1.4 (3.9)	0.171
Psychological wellbeing	45.6 (9.9)	47.8 (7.9)	2.19 (6.3)	-
Parent Relations & Autonomy	44.04 (8.41)	46.07 (10.7)	2.03 (9.8)	0.42
Social Support & Peers	48.03 (9.6)	46.1 (4.7)	-1.97(6.9)	-
Total	82.69 (13.4)	85.6 (12.3)	2.9 (9.6)	0.25

As can be seen in Table 5.3 an increase in mean scores was observed after the SMS intervention, however, these difference were not statistically significant between pre and post intervention, Physical Wellbeing scores; $t(15) = 1.44$, $p = 0.171$), Autonomy and Parent Relation pre and post intervention scores; $t(15) = 0.83$, $p = 0.42$, or between pre and post total scores; $t(15) = 1.197$, $p = 0.25$.

Findings from Wilcoxon Signed Ranks Tests (Table 5.4) also indicated that post test scores, were not significantly higher than pre test scores on the Psychological Wellbeing subscales $z = -1.293$, $p = 0.196$. Neither were post

Table 5.4. *Median pre and post KIDSCREEN scores and p values according to relevant non parametric assessment*

KIDSCREEN Dimension	Baseline KIDSCREEN T value (based on Rasch Person Parameter) Median (IQR)	Post KIDSCREEN T values (based on Rasch Person Parameter)	P value
Psychological wellbeing	42.5 (39.4-51.9)	48.5 (41.1-52.5)	0.196
Social Support & Peers	45.7 (40.5-55.8)	46.9 (44.4-46.9)	0.233

intervention scores significantly different to pre intervention scores on the Social Support and Peers subscale $z=-1.193$, $p= 0.233$.

Measuring perceptions of the intervention. VAS scores.

Sixteen of the participants completed Visual Analogue Scores at the end of the intervention providing information relating to their perception of the SMS intervention. As highlighted in Table 5.5 participants provided a wide range of responses to questions one and two suggesting that whilst some considered the intervention to be helpful in supporting their wellbeing, others did not. This corroborates the findings from pre and post KIDSCREEN comparisons and the qualitative findings discussed below.

Overall, participants did not consider the intervention to have a negative effect on their mood with both the mean (68.93) and median (67) scores appearing closer to the "Good" rather than the "Bad" endpoint. Although participant scores indicated that overall they did not consider the SMS intervention to be helpful at supporting their wellbeing, they continued to read messages that were sent.

Table 5.5. *Group VAS scores (Mean, median and Inter-quartile range).*

	Question 1	Question 2	Question 3	Question 4
	How helpful did you find the text messages at supporting your wellbeing?	How helpful did you find the text messages at helping you deal with stresses?	How did you feel after receiving the text messages?	How often did you read the text messages?
Mean	43.81	41.31	68.93 (27.26)	76.69
(SD)	(40.09)	(37.63)		(33.14)
Median	40	39.5	67	98
(IQR)	(0.5-82.5)	(0.25-81.25)	(49-96)	(48-100)

Factors associated with participant perceptions

Spearman's correlation co-efficient and Mann Whitney tests were conducted to explore whether perceptions of the SMS intervention (VAS scores) differed according to participant characteristics. Visual inspection of histograms, normal Q-Q plots, boxplots, outliers and Shapiro Wilks tests ($p < .05$) were conducted to assess distribution of respective groups. Where differences in distribution were observed between the groups included in analysis, mean ranks rather than median scores are reported.

Psychological wellbeing

Results of Spearman correlation indicated a relationship between participant pre intervention KIDSCREEN scores and how helpful they found the messages at supporting their wellbeing; $r_s = -.554$, $n = 16$, $p = 0.03$ and dealing with stress; $r_s = -0.57$, $n = 16$, $p = 0.02$. The negative correlation coefficients indicate a moderate effect that participants with lower KIDSCREEN scores indicating poorer wellbeing at the beginning of the intervention were more likely to report higher VAS scores in relation to the helpfulness of the intervention for their wellbeing and dealing with whereas participants with higher KIDSCREEN scores at the start of the intervention rated the intervention (according to VAS scores) to be less helpful. No correlations were reported in relation to pre intervention KIDSCREEN scores and how participants felt after receiving the messages $r_s = 0.149$, $n = 16$, $p = 0.59$ or how frequently they read the text messages $r_s = -0.07$, $n = 16$, $p = 0.79$.

Gender

There were too few females to conduct statistical tests but female participants appeared to rate the messages as more helpful at supporting their wellbeing ($Mdn = 79$, $range = 36-100$ vs $Mdn = 28$ $range = 0-100$) and dealing with stress ($Mdn = 76$, $range = 28-100$ compared to $Mdn = 36$, $range = 0-90$) but a higher median score for male participants indicated more positive feelings after receiving a message ($Mdn = 70$, $range = 0-100$ compared to $Mdn = 55$, $range = 48-100$). There was a greater range in scores for males regarding how frequently

they read the messages (*Mdn*= 93, *range* 0-100) compared to the females (*Mdn*= 100, *range* 98-100).

Type of intervention

Although no significant differences were detected between the number or type of offences committed by participants and their VAS scores, results from Mann Whitney tests did indicate a moderate association for those subject to diversionary intervention who rated the helpfulness of the intervention at dealing with stresses (*Mean rank*= 11.14) significantly higher than those subject to statutory intervention (*Mean rank*= 6.44), $U=13$, $p=.049$, $r=-0.4$. Similarly the diversionary group rated themselves as reading the text messages more frequently (*Mean rank*= 9.73) than the statutory group (*Mean rank*= 5.80), $U=14$, $p=0.04$, $r= -0.5$ suggesting a moderate association (Cohen, 1992). There was also a trend towards the diversionary intervention group rating the messages as more helpful for their wellbeing (Diversiory: *Mean rank*= 10.93 vs Statutory: *Mean rank*= 6.61), $U=14.5$, $p=0.07$. However, there was no significant difference between these two groups for how the messages made them feel.

Accommodation

Participants were categorised according to their accommodation status to explore any differences between those residing with their families and those in alternative accommodation. Participants not living at home had higher ratings for helpfulness for wellbeing (*Mean rank*= 10.5 vs *Mean rank*= 7.83) and for dealing with stresses (Alternative accommodation *mean rank*= 11 vs living at home *mean rank*= 7.67) but these differences were not significantly different.

FEASIBILITY AND ACCEPTABILITY OF THE SMS INTERVENTION

Thematic Analysis

Five main themes emerged from the inductive analysis of post intervention interviews. These are presented in Figure 5.2. Though there were times when participants found difficulty articulating their views they were able to provide valuable feedback regarding their experiences of the intervention. Examples for

each master theme are presented in Appendix 14. In this section the presenting themes will be outlined and considered in turn. Where relevant, and data available, the relationship with baseline, post intervention and change scores are discussed.

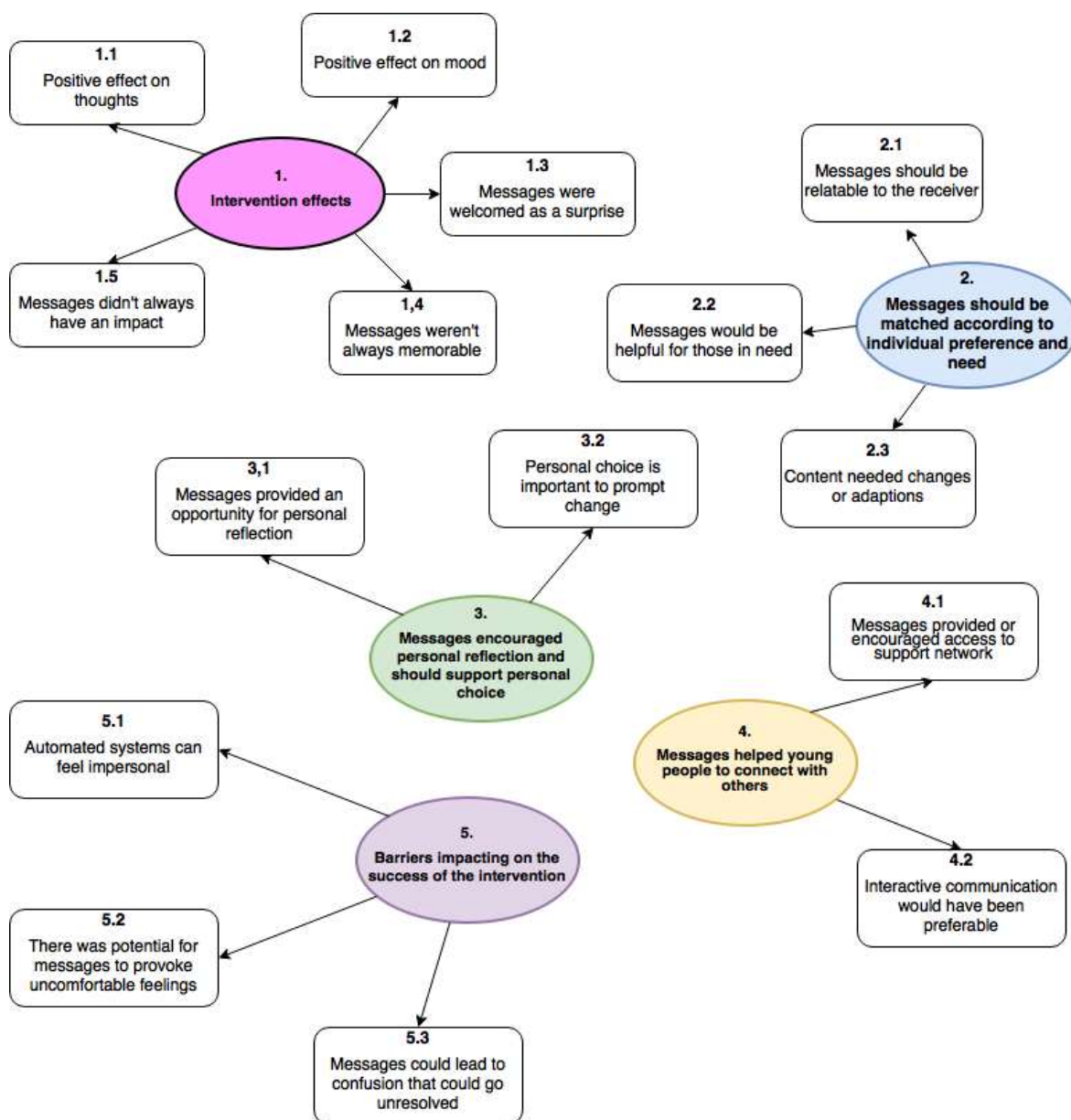


Figure 5.2. Map of Master Themes and Sub Themes.

Master Theme 1. Intervention effects

Throughout the interviews young people frequently spoke about the potential impact of the SMS intervention, reflecting on the effects, or lack of, of receiving the text messages. Whilst this was explored more quantifiably as part of the pre

and post and VAS score analysis the young people's willingness and ability to articulate if and how the intervention provoked internal changes was an evident theme across the data set. This was categorised into five subthemes; Positive effect on thoughts, Positive effect on mood, Messages were welcomed as a surprise, Messages weren't always memorable. The final subtheme entitled 'Messages didn't always have an impact' was included within this master theme in order provide a representative account of the mixed findings regarding the capacity of the intervention to provoke meaningful effects.

1.1 Positive effect on thoughts

There was a sense that the messages had the potential to positively impact on young people's thoughts, providing a source of motivation, focus and purpose to their day, similar to a behavioural activation approach, which seeks to increase engagement in meaningful activity in order to positively impact on psychological wellbeing (Mazzucchelli, Kane & Rees, 2010).

'It would make you think about doing more positive things'
(Participant 9, pg 1, line 15)

'Seeing a text message probably makes you feel happy because you know it would give you something to think about for the day'
(Participant 3, Pg 3, line 24).

Participants also reflected on the impact of the messages on their thoughts towards themselves and the benefits of

'thinking about the positives and strengths'
(Participant 3, pg 1, line 11)

promoting a sense of mastery and competence

'it's nice to think about the things you're good at'
(Participant 3, pg 2, line 34),

Self-esteem,

'actually thinking positively about yourself'

(Participant 2, pg 2, line 17),

and self-efficacy,

'it's just when I got my job and like just started my new job then I got that text then I thought yeah, things are changing like, that's when I thought like, I thought if I do it this way this will change'

(Participant 10, pg 17, line 5),

which are all associated with the promotion of positive psychological health (Shanahan & Bauer, 2004, Mann, Hosman, Schaalma, & Devries, 2004 & Cicognani, 2011).

Seventy-one percent (5/7) of those who reflected on the positive effects of the SMS intervention on their thoughts fell below the 50th percentile on the Psychological Wellbeing subscale and 42% (3/7) below the 25th percentile, indicating that this positive effect was more prevalent for those with poorer psychological wellbeing. There was evidence of improvement on the psychological wellbeing dimension for 42% (3/7) of participants that reflected on the positive impact on their thoughts.

The suggested influence of the intervention on young people's thoughts is not underestimated given the unique challenges that present when attempting to influence cognitive processes amongst adolescence during such a significant time in their development. It has been suggested that the focus on cognitive restructuring in standard cognitive behaviour therapy presents a particular challenge when working with young people as a result of their under developed ability to think in an abstract way and a resistance to attempts to challenge and control their thoughts at a time when they are striving for independence (Katz, Fotti, & Postl, 2009, Gaudiano, 2008). Providing a subtle opportunity to provoke positive thinking may have provided a more engaging, autonomous approach to impacting on thoughts.

1.2. Positive effect on mood

Participants (8/15) frequently referred to the impact of the SMS intervention on their mood suggesting a potential to improve affect

'Just receiving that little thing is very good to easily change how you feel'
(Participant 2, pg 3, line 11)

'some of them did like put me in to like sort of a better mood'
(Participant 9, pg 3, line 6)

*'Sometimes they just came at a good time like when I was ***** off. If I was happy I probably wouldn't even really read them because you don't need to'*
(Participant 15, pg 2, line 19)

or validate present mood

'when I was chilled out as well I got that text so it was alright, like the end of my day, just put a little cherry on the top so I was really happy and that'
(Participant 10, pg 18, line 3).

Again, it seemed that positive effects on mood was most evident amongst those with poorer psychological wellbeing as 63% (5/8) of those that reflected on the impact of the intervention on their mood fell below the 25th percentile for the KIDSCREEN at baseline. This included participant seven who, at baseline presented with a notably low psychological wellbeing dimension score that fell on the 3.6th percentile, suggesting that she had no pleasure in life, felt depressed and unhappy, with low self-esteem. At the end of the intervention her score improved moving to the 20.1 percentile and this may have related to an improvement in self esteem

'They were like encouraging...gave you motivation of things to make yourself feel better about yourself'
(Participant 7, pg 1, line 3).

An increase on the psychological wellbeing dimension amongst five of the eight participants commenting on an improvement in their mood was observed, corroborating participants' personal reflections presented within this theme. Furthermore for participants who made reference within this theme, there was

evidence of substantial improvement in overall KIDSCREEN scores, including some of the highest change scores within the data set (+16).

The self-reported effects of the intervention on mood was reported by all four participants residing in alternative accommodation. As suggested by participant five, the messages may have played a positive part in the daily routine that may have otherwise been facilitated by family members

'It gives you a little bit of inspiration in the morning....it gets you out of bed'
(Participant 5, pg, 2, line 6).

The potential for the intervention to positively influence a young person's mood, which featured across the data set, may be particularly worthwhile at a time when the biological, social and psychological determinants of adolescence contribute to changeable mood and where positive affect may offer a mediating role in the development of psychological difficulties (Park, 2004).

1.3. Messages were welcomed as a surprise.

The accessibility of the intervention and the potential for influence and support within real world settings appeared to be particularly favourable for some young people

Like they came up randomly, it was like unexpected, it's like a nice sort of surprise for someone.
(Participant 12, pg 3, line 18)

Like you don't actually know it's coming that's probably the best thing if you're really killing or if you break up or you're out somewhere and then you just get them
(Participant 5, pg 4, line 19).

This appeared to be more prevalent amongst those with lower baseline Psychological Wellbeing dimension scores falling between the 3.6 and 30.2 percentiles. This may be associated with the release of dopamine that has been indicated upon receipt of a text message (Hall, Cole-Lewis & Bernhardt, 2015) that may make this type of intervention unconsciously pleasurable, particularly

for those with depleted dopamine levels associated with low mood (Dunlop & Nemeroff, 2007).

A number of young people spoke about an increase in their use of their mobile phone during times of distress,

*'If I'm really low I always used to be on my phone'
(Participant 7, page 3, line 34)*

which for one participant provided a distraction from negative affect

*'If I was swelling then I would sit on my phone and it pops up. I would read it just to distract me- probably just stop thinking about things and I don't know after reading the message and distracting myself off the subject I could start playing games and then probably go and have a fag'.
(Participant 15, pg 2, line 30).*

As higher rates of mobile phone use have been reported amongst those with poorer psychological health (Sanchez- Martinez & Otero, 2009, Thomee, Harenstam, & Hagberg, 2011) delivering messages that have potential to impact on thoughts and mood may be particularly helpful for those in greater need at a time when they need it most.

1.4. Messages weren't always memorable.

Despite the identification of a number of positive effects of the intervention there was mixed opinion about the longevity of effects. For some, the impact extended beyond a brief period after receipt of each message

*'It was an acronym so it was easy to remember'
(Participant 2, pg 4, line 11)*

*'you can think about them throughout the day
(Participant 4, pg 1, line 11)*

but for many others the effects were short term

*'it just went out of my head as soon as I closed the message'
(Participant 1, pg 2, line 24)*

' for a few, like 5 minutes afterwards it would be like alright and that and then it would sort of, where it doesn't come through again or anything you sort of forget about it and get on with what you were doing'

(Participant 9, pg 3, line 26)

This concurs with other findings indicating the short term benefits of this particular method of intervention with less evidence in support of the long term impact (Vervloet, Linn, van Weert, de Bakker, Bouvy & Van Dijk, 2012, Hall et al, 2015).

1.5. Messages didn't always have an impact

Whilst a number of young people were able to acknowledge the impact of the intervention on their thoughts and feelings, this was not consistent across or within all participant accounts. For participants who referred to lack of impact of the intervention, there was contradictory indications elsewhere in their interview transcripts (3/8) or changes noted in their psychological wellbeing dimension scores or total KIDSCREEN scores (5/8 and 3/8 respectively). That said, in order to provide a true representation of participants' perceptions, it was considered important to include this as a sub theme in its own right.

Despite an increase on the psychological wellbeing dimension for one participant (six) who made reference to lack of impact of the intervention, there was a sense that the method of intervention would not in itself be enough to impact on psychological wellbeing, potentially highlighting the limitations of a stand alone intervention.

'Words don't really affect the way I feel' (Participant 1, pg 1, line 7)

' I just think from an emotional sense thing you can't probably speak to people like just by text messages sent out' (Participant 6, pg 3, line 35)

'There's nothing that could help anything you could send me to a phone. (Participant 17, pg 2, line 11)

Though for some, lack of effect was not unique to the type of intervention as there was a sense of helplessness associated with improving their wellbeing or

negative affect as they were unable to identify any adaptive strategies that would be helpful

'if I'm in a bad mood I'm in a bad mood or pissed off it's not going to change it'
(Participant 12, pg 2, line 7)

'nothing helped me feel better about myself'
(Participant 12, pg 7, line 21)

'nothing could help with my wellbeing'
(Participant 17, pg 1, line 9)

'nothing helps with me stress.... no cannabis, that's fine'
(Participant 10, pg 15, line 6).

Master Theme 2. Messages should be matched according to individual preference and need.

Similar to focus group participants, young people reflected on the personal relevance of message content and the importance of responding to individual need and preference

'it all depends on the people's mentality on how they take the messages'
(Participant 8, pg, 2, line 31)

contributing to the accessibility and perceived effectiveness of the intervention

'I understand maybe how they would help some people but I can't take it seriously'
(Participant 17, pg 1, line 22)

'If people can take things in like that and if it helps them then go for it but obviously it won't help everyone'
(Participant 12, pg 11, line 34).

2.1. Messages should be relatable to the receiver

Though there was mixed opinion about whether the specific messages chosen in this study resonated with individuals personally, the young people's frequent reference to diversity suggests that this is an important factor to consider when designing interventions for this group.

'Oh my god this is so like relatable'

(Participant 7, pg 4, line 19)

'I kind of felt like I related to them'

(Participant 7, pg 2, line 13)

'Some of them are not very applicable to me'

(Participant 2, pg 1, line 21)

Though for the participant (participant seven) with the lowest psychological wellbeing dimension score, the content of the messages felt relatable for her, she also reflected on how the personal relevance of the message content provoked an element of suspicion that she was being targeted resulting in a sense of unease

'I thought it was implying something'

(Participant 7, pg 5, line 1)

'the stuff that was put in it was relatable but I feel sometimes it was too relatable'

(Participant 7, pg 9, line 21).

As participant seven's score on the psychological wellbeing dimension was symptomatic of poor psychological health, it is possible that her interpretation of the messages were indicative of her cognitive processing and potential negative biases that may be perpetuating her difficulties in this area (Gotlib & Joorman, 2010).

2.2. Messages would be helpful for those in need

Participants frequently indicated that they did not consider themselves in need of intervention impacting on their perceived usefulness of the intervention

'I don't really have any stresses so I couldn't say it was helpful at all'.

(Participant 1, pg 2, line 7)

It didn't help but as I said I don't need to be helped so it wouldn't'

(Participant 17 pg 8, line 24)

'I don't really feel it would benefit me because I do feel like I am sort of like in a stable position where I've got friends around me that I can'

(Participant 9, pg 3, line 34).

Indeed the prevalence of high psychological wellbeing dimension scores amongst those suggesting that they did not need support with regards to this aspect of their life was high. Four of the five participants represented in this theme had baseline psychological wellbeing dimension scores falling above the 50th percentile, of which three were above the 80th percentile.

One participant suggested that their perception may have been different in different circumstances

'If I was in a stressful situation and I had something like that to look at and think about say more of the thought ones then I think it would help' (Participant 3, pg 2, line 17).

but for others they indicated that the intervention would be more helpful for others in greater need of support, though for three of these seven participants their psychological wellbeing dimension scores were below the 30.1 percentile suggesting that they may have benefitted from some support to improve their wellbeing.

'I'm not saying they're bad for people that need help, I don't need help'.

(Participant 17, pg 10, line 31)

'Someone going through a hard time or something would probably benefit a lot more. If someone was going through a hard time they would sort of wake up

and they would see like a positive message and I suppose that would probably give them a good start to the day'

(Participant 9, pg 1, line 28)

Such reflections provide further indication of adolescents' tendency to respond reactively rather than proactively to their health needs (MacDonald, 2006).

2.3. Content needed changes or adaptations

Participants were able to provide feedback relating to the messages sent and suggestions for content delivered via SMS that they would find helpful.

Young people indicated that the messages sent were too long, re-affirming focus group participants' recommendation for messages that are short and succinct.

'They just went on a bit'

(Participant 6, pg 1, line 20)

'Some of them were so long I didn't read them'

(Participant 14, page 7, line 23)

However, there was mixed opinion regarding the frequency in which the messages were sent and the length of the intervention suggesting that dosage may be most appropriately adapted for each individual.

There was a clear preference for the receipt of messages with a practical component that aligned with personal goals and priorities, which included appointment reminders. This has shown promise in improving adherence and compliance amongst other clinical groups (Franklin, Waller, Pagliari & Greene, 2006, Kannisto, Koivunen & Valimaki, 2014 & Trent, Thompson, Tomaszewski, 2015).

'Start sending job links, I would definitely look at them...The whole point of this stuff is to get us on the right track that way they will click on the job links and they might change their lives around'

(Participant 10, page 13, line 4, line 26)

'You've got to get a job so I might have read it'

(Participant 17, page 8, line 3)

*'I find it helpful when they tell me like you've got to go to a meeting and that.
(Participant 11, page 2, line 16).*

Where prompted to reflect and consider changes, one young person indicated that they may have found additional support helpful in identifying ways to apply this personally

*' When I got the message through I started thinking about it, I started thinking about what could I do that would like motivate me but obviously if there were examples you can do them basically straight away if you need to
(Participant 9, pg 5, line 10).*

Master Theme 3. Messages encouraged personal reflection & should support personal choice

Young people referred to the personal nature of the messages and the influence of personal choice in effecting change.

3.1. Messages provided an opportunity for personal reflection.

For some, the messages provided an opportunity for personal reflection away from the influence or distraction of others

*'They were nice to think about to just myself'
(Participant 3, pg 1, line 25)*

*'You want to send them late at night or early morning because they wake up and see that or they go to bed thinking oh yeah, when the phone aint blinging off with all their mates.
(Participant 10, pg 14, line 33).*

As suggested by Participant 10, this information may be particularly useful when considering optimal timings for the sending of messages, which again is likely to vary according to each individual.

3.2. Personal choice is important to prompt change.

Unsurprisingly, as young people strive for greater autonomy as they transition into adulthood, participants highlighted the importance of personal choice.

'I was thinking about the quotes more than people trying to yell at me'
(Participant 4, pg 2, line 1)

For this participant, her baseline score on Autonomy and Parent Relation dimension was low, falling on the 19.8 percentile, suggesting that she felt restricted, overlooked and not appreciated. In accordance with the SDT (Ryan & Deci, 2000), this suggests that for her, the intervention was able to promote a sense of autonomy, removing external controls, allowing her to appreciate the value of the intervention and to engage differently and more meaningfully with the messages sent than might otherwise have been presented by other influences in her life (Deci, Ryan & Williams, 1996).

However, this was not evident across the dataset. Despite the underpinning of the Self Determination Theory, a number of young people did not consider the SMS intervention to provide an opportunity to think more independently or enhance intrinsic motivation

'I don't find none of this stuff helpful because I don't want to be on it'
(Participant 10, pg 14, line 16)

'I need to do it myself but a day will come and I will do it'
(Participant 15, pg 10, line 9).

However, the frequency in which young people referred to this concept provides some insight about the importance of taking this into consideration when designing interventions to effect change.

The young people's tendency to retain messages on their phone provided some with an element of autonomy over how they utilised the intervention. The majority of young people (93%) indicated that they had saved the messages on their phones, predominantly as a result of habitual behaviour. Four participants (27%) suggested that they had or would want to access messages after the end of the intervention, re-enforcing the accessibility and real time benefits of this method of intervention (Free, Phillips, Watson, Galli, Felix, Edwards, Patel & Haines, 2013)

'Just before my interview I went over them quickly just lookin at them. I suppose it did help me to be fair because it couldn't have went any better'

(Participant 9, pg 7, line 16).

Master Theme 4. Messages helped young people to connect with others.

Young people spoke about ways in which an SMS intervention could provide opportunities for connecting with others, which was in essence being promoted as part of the intervention underpinned by Ryan and Deci theory of self-determination (2000).

4.1. Messages provided or encouraged access to support network

For some, the messages provided a sense of support in their own right. This was also reported by Ware, Pisarski, Tam, Wyatt, Atukanda, Musiimenta, Bangsberg & Haberer (2016), when participants reported feeling cared for as a result of their SMS reminder messages, which was associated with the offset of depressed mood and improved adherence.

'You kinda remember that you're not alone kinda thing'

(Participant 2, pg 3, line 8)

'Something to give you like support and advice on what to do'

(Participant 7, pg 1, line 12)

Interestingly only those subject to diversionary Criminal Justice intervention spoke about feeling a sense of support as a result of the intervention. Thus potentially highlighting the positive effects of a less-coercive, voluntary approach to youth justice, which has been identified as a mediator in treatment resistance with older population groups (Shearer & Ogen, 2008).

For others the messages appeared to prompt opportunities for participants to connect with their current support network

'I spent more time with my friends definitely'

(Participant 4, pg 1, line 26)

One of them said to speak to someone you trust so I found that really helpful'.

(Participant 7, pg 3, line 4)

'I read it and was like oh my gosh that actually reminds me of her and like it motivated me like to speak to her'.

(Participant 7, pg 6, line 27).

For one participant the message also offered an opportunity to be a source of support for others, which has also been associated with positive wellbeing in adolescents (Schwartz, Keyl, Marcum & Bode, 2009)

'I was forwarding a lot of them to my sister because she was having a hard week'

(Participant 2, pg 4, line 24).

4.2. Interactive communication would have been preferable.

Opportunities for interactive communication through SMS was not available as part of the current intervention. Participants indicated that this would have been preferable, offering an opportunity to provide feedback, continue dialogue and ask questions relating to the messages sent

'It's one that I wanted to text back'

(Participant 10, pg 2, line 1)

'I would have chatted. I could sit there and chat but like I don't know I wanted to ask questions'.

(Participant 15, pg 11, line 14).

However, it is suggested that further exploration is required to consider young people's willingness to utilise credit in order to engage in this. In the current study this was suggested as a barrier to accessing online content attached to their final message.

Master Theme 5. Barriers impacting on the success of the intervention.

There were a number of commonalities in young people's feedback relating to factors that may have hindered the success of the intervention. This feedback

may provide valuable information to be considered when designing future interventions.

5.1. Automated systems can feel impersonal

The impersonal nature of a pre-defined schedule, delivered via an automated system appeared to hinder the success of the intervention for three of the participants

'if it was sent from an automated service I wouldn't think twice about listening to it, not listening to it'
(Participant 6, pg 5, line 2)

'You want to feel like it's a person that you speak to'
(Participant 10, pg 22, line 26).

Though this was contrary to the changes observed in their pre and post change scores for two of these three participants, where their psychological wellbeing dimension scores increased by five each and their total KIDSCREEN scores improved by 16 and 13 respectively.

Participant 10 went on to suggest that without taking into account individual needs an intervention could be perceived as insincere and thus unhelpful

'So if you always send something back something positive you're not telling them the actual trust, you're just trying to get them on a path of positive instead of telling them the truth'
(Participant 10, pg 10, line 33).

Similar to master theme two young people re-iterated the importance of engaging individuals with an appealing and interesting approach, which is likely to vary from individual to individual

'I don't think they're very attractive or effective like to other young people.'
(Participant 6, pg 6, line 2)

'Find out what people are interested in before you start texting'
(Participant 1, pg 5, line 2)

'They didn't catch my attention'
(Participant 10, pg 7, line 28).

This further highlights the benefits of providing interventions that are responsive to individual need to ensure that they are sufficiently motivating to enable effectiveness (McMurrin, 2009).

5.2. There was potential for messages to provoke uncomfortable feelings.

In contrast to the more positive impact on mood described within Master Theme one, four young people indicated that the content of the messages contributed to more uncomfortable feelings

'They were just pretty cheesy to be honest'
(Participant 6, page 1, line 16)

'They were quite cringey'
(Participant 12, page 2, line 19)

hindering the potential impact and accessibility of the intervention

'It's just a bit cringey and wasn't going to help me'.
(Participant 17, page 5, line 8)

'Just annoying'
(Participant 14, pg 1, line 17).

For all three participants that referred to the provocation of uncomfortable feelings, a decline in total KIDSCREEN scores was observed, ranging from -1 to -12. A decline of -1 and -6 was also observed in psychological wellbeing dimension score for two of these three participants but an incline of five was evident for one participant.

One participant indicated that sending this type of information to his phone may have felt intrusive and embarrassing, which has previously been identified as a barrier for accessing mental health support amongst young people (Gulliver, Griffiths & Christensen, 2010)

*'That's like embarrassing. I don't really want that on my phone. It's cringey and I don't really want that on my phone'
(Participant 14, pg 4, line 21).'*

This stands in stark contrast to other participants who appeared to value the opportunity for personal reflection and sense of privacy that the messages provided as evident within Theme three.

All three of these participants were consistent in their accounts suggesting that they did not consider the intervention to be helpful for them but did not report negative effects beyond being embarrassing and annoying in their account. Rather,

*'it wasn't making things worse, I just thought they were a bit useless'
(Participant 12, page 7, line 13)*

5.3. Messages could lead to confusion that could go unresolved.

There were times when messages provoked a sense of confusion that went unresolved

*'Some of them you were thinking how I can do that and that would play on your mind'
(Participant 4, pg 2, line 25).*

Similar to theme four this suggests that participants may have benefitted from an opportunity to ask questions and seek clarification. The use of an interactive SMS intervention would not only emulate a more natural style of communication but may provide an accessible method (as young people indicated that this would be welcomed) for seeking help in relation to a topic where fear of stigma and embarrassment may deter young people from engaging with face to face support (Gulliver, Griffiths & Christensen, 2010 & Clement, Schauman, Graham, & Maggioni, 2015). Further exploration of an interactive SMS approach would therefore be beneficial.

DISCUSSION

No statistically significant differences were reported between participants KIDSCREEN dimension or total scores measured at baseline and again at the end of the intervention. However, the intervention may be more acceptable for young people on the periphery of the Criminal justice System and those with poorer psychological wellbeing as higher VAS ratings for perceived helpfulness for dealing with stress and frequency of reading the messages were found for those subject to diversionary intervention and lower KIDSCREEN scores at baseline were significantly associated with higher ratings for perceived helpfulness of the messages for supporting wellbeing and dealing with stresses respectively. There was no evidence that the intervention was associated with significant psychological harm although several participants had a decline in wellbeing over time and two participants indicated that they had had been agitated by the messages.

Participants were able to provide valuable information regarding their experiences of the SMS intervention resulting in the emergence of five master themes and 15 subthemes, which related to the impact of the intervention as well as recommendations regarding the design of any future SMS interventions.

Despite the challenges associated with the inclusion of participants notoriously hard to engage in both research and clinical settings eighteen participants were successfully recruited to participate in this SMS intervention feasibility study. Promisingly no participants withdrew from the SMS intervention (though one withdrew and two did not provide data necessary for inclusion in the research). It was disappointing that two participants were unable to complete the full intervention due to circumstances somewhat beyond their control. This highlighted some of the issues that may require consideration when investigating or facilitating mobile health interventions with this younger population, who are likely to be reliant on others to support their use of their own mobile phones.

The recruitment of a range of participants from those more complex cases to those likely to be limited to adolescent offending suggests that an SMS intervention may provide a unique opportunity to communicate with a range of young people. The groups low baseline scores, particularly with regards to

psychological wellbeing provides further evidence for the need to address the high prevalence of poor psychological health amongst those young people likely to come into conflict with the law (Harrington, Bailey, Chitsabesan, Kroll, Macdonald, Sneider, Kenning, Taylor, Byford & Barrett, 2005).

In this study, young people were able to consider and present valuable feedback relating to their experiences of the intervention, which would be helpful to consider in the design of any future research or intervention using an SMS intervention. Participants indicated that the method of communication was acceptable but that there may be parameters regarding specific content that may be more accessible than others. Participants expressed a preference for content of a practical nature but there was a strong indication that message content should be matched to the needs and preferences of an individual. In any event this approach is encouraged when working with an offending population (Andrews & Bonta, 2010).

The sense of discomfort surrounding the issue of psychological wellbeing that arose may be indicative of the fear of stigma and embarrassment that remains around this topic and impacts on engagement with services (Clement et al, 2015). Therefore ongoing commitment is required to identify, implement and evaluate accessible, effective methods for the delivery of psychological interventions in a manner that minimizes the influence of such barriers and is engaging for young people.

Two significant findings were evident from the quantitative analysis. Primarily the findings indicate that an SMS intervention to promote psychological health may be particularly helpful for young people with poorer psychological wellbeing. As poor psychological health and presenting symptoms may interfere with access to intervention (Wilson, 2010) a text message intervention may offer a less formidable approach for those in greatest need. This may provide a critical opportunity to target factors that may be impacting on an individual's ability to engage.

Secondly, the more favorable perception of the helpfulness of the SMS intervention for dealing with stresses amongst those subject to diversionary intervention suggests that such an intervention may be well placed within the

context of early intervention within the Criminal Justice System. It is disappointing, but not surprising, that those more complex young people symptomatic of those embedded within the formal Criminal Justice System were less receptive of the intervention (HMIP, 2017). That said, during the process of data collection this group were willing to engage in the research process. They were often eager and able to impart their views. Optimistically, despite their likely complex needs, this group were able to work alongside the researcher to inform and enhance practice. Ongoing collaborative work to identify accessible, effective methods with this group should therefore be encouraged despite the challenges that this may bring.

Though no significant differences were observed between KIDSCREEN scores at baseline and post intervention, there are indications from the qualitative and quantitative findings that indicate some effects of promoting self-determination through the medium of text messaging. Indeed in all but one (Social Support & Peers) of the KIDSCREEN dimensions, group scores increased and there was evidence within the qualitative analysis that suggested that the messages had promoted the three basic psychological needs required for healthy functioning and positive wellbeing outlined by Ryan & Deci (2000).

The self-reported effects of the intervention on participants' thoughts and mood suggest that the messages may have facilitated the process of internalisation, offering an opportunity for internal regulation, where subsequent behaviour is more likely to be seen as emanating from oneself and thus self determined and intrinsically motivated, increasing the likelihood of long term positive outcomes (Deci, Eghari, Patrick & Leone, 1994). In particular, the messages sent demonstrate a potential to support the required social context which facilitates the psychological need for relatedness to others. This was not only referenced in relation to the sense of support that participants felt as a result of receiving the messages but also the impact that receiving messages had on their subsequent interactions with their available networks. The social contexts in which we exist are evolving due to the prominence and dominance of technology in our social worlds. The emergence of this theme provides additional support for the interpersonal adaptation theories (discussed in Chapter Four), which suggest that digital communication can provoke meaningful social contact, even when a stand alone approach is used. Having said that, participants from the focus

groups and empirical study recommended the use of an interactive approach, which would have emulated a more natural approach to communication and responsive social support potentially offering greater impact in this regard.

As internalisation is more likely to occur if an individual feels a connection with those who convey messages (Ryan, 2009) and participants in this study indicated that they could achieve this through the medium of text messaging, there is real promise for the use of the approach to support not only relational outcomes but also behaviour change. However, the reduction in scores on the Social Support and Peers dimension suggest that whilst some considered the intervention in itself to offer access to social support, social support in other areas of participant's life had decreased at the end of the intervention, somewhat contradicting the qualitative findings that the intervention provoked opportunities to connect with others. As positive peer relationships are associated with positive mental health (Hightower, 1990), this is a cause for concern, although it is unclear whether this negative finding can be attributable to the intervention itself as there was no indication of this in participants' post intervention interviews. Instead, it is possible that this is indicative of a higher prevalence of problematic, turbulent friendships amongst this particular population group, where difficulties in relation to trust and conflict are more prevalent (Claes & Simard, 1992, Cesaroni & Peterson-Badali, 2005).

Although the theme 'Messages encouraged personal reflection and should support personal choice' emerged from the qualitative analysis, this related to participants' perception of the important role of personal choice and autonomy in behaviour change, rather than a resulting effect of the current intervention. Whilst an increase in Parent Relations & Autonomy dimension scores was evident at the end of the intervention, this was not statistically different. As personal choice is relevant for promoting internalisation (Milyavskaya & Koestner, 2010), it is possible that lack of effect in this regard compromised the ability of the intervention to promote significant changes. However, the insight demonstrated by participants in relation to the role of autonomy and personal choice in promoting change further re-enforces the importance of this psychological need across developmental groups including adolescents. Furthermore, the lack of effect indicated by those contributing to the subtheme 'Not in need of help' reiterates the need for an individual to personally endorse the importance of a

value or behaviour in order to engage and effect meaningful change (Ryan, Patrick, Deci & Williams, 2008). Therefore participants' suggestion for tailored messages matched according to need and preferences may not only contribute to increased accessibility through engagement but also the efficacy of this type of intervention.

Future direction

Though again not significant, a number of the findings, observed within the quantitative analysis may benefit from further exploration. Specifically, the tendency for participants not living at home to rate the intervention higher in relation to how helpful they found the messages at supporting their wellbeing, dealing with stresses and improving mood suggests that this method of intervention may be particularly helpful for this vulnerable group also. By virtue of their placement outside of the home this group may have reduced access to influential support networks. As the use of text messages was able to provoke a "sense of support", similar to that described by female participants in receipt of text messages to promote mental health in Chandra et al (2014) study, further enquiry to optimize opportunities in relation to this, particularly amongst those where support networks are compromised would therefore be beneficial.

Strengths and Limitations

The qualitative findings reported after a relatively short time show promise for the potential of such an intervention. Most importantly there were no obvious negative effects experienced by participants as a result of their involvement in the study suggesting that further exploration would be appropriate.

The qualitative approach provided a valuable opportunity to hear directly from young people about their experiences and factors that may be important to consider when designing interventions of a similar nature. Fifteen interviews was a satisfactory sample size for the qualitative analysis as Guest, Bunce & Johnson (2006) suggest that twelve interviews are sufficient to achieve data saturation. However, the methods employed are not without limitation. It was not always possible to meet with participants in person, which meant that four of the 15 interviews were conducted over the phone. Whilst Cuenca, Glazebrook, Kendall, Hedderly, Heyman, Jackson, Murphy, Rickards, Robertson, Stern, Trayner &

Hollis (2015) provide support for young people's ability to talk openly through telephone interviews, this approach may have limited opportunity to minimise external influences and build rapport, potentially impacting on participants' responses during interview. For both telephone and face to face interviews, there were times when participants' apparent defensiveness limited the information they were willing to share during interviews. This required an adaptable, responsive approach, which will have inevitably impacted on consistency across the interviews. Moreover, the personal experiences, prior training and investment of the researcher is likely to have influenced the approach and interpretation of findings in some way. However, as reported above, there was a commitment to a reflexive approach to enquiry in acknowledgement of this.

Additional limitations impacting on the interpretation of the study's findings are also acknowledged. Primarily this exploratory study included a small group of young people from a convenience sample with no control group to draw comparisons with. Therefore findings are interpreted with caution and the limitations regarding the generalizability of findings recognized. Specifically there was not a proportionate mix of males and females and the sample included was not ethnically diverse, though this is a close reflection of the service demographic.

The small sample recruited in this feasibility study limited the power of the study to detect significant differences and relationships. Though it was not possible to assess response rate for the study, a range of participants at differing stages of the Criminal Justice System agreed to take part and complete the intervention.

The KIDSCREEN 27 provided a simple measure of wellbeing. Although participants in this study were at the top end of the age range this provided an accessible measure for a cohort where literacy, speech, language and communication difficulties are more likely than in the general population (Bryan, 2004). Whilst the KIDSCREEN 27 demonstrates psychometric rigor, the limited evidence in support of the measures sensitivity to change (as indicated in Chapter Three) may have impacted on the findings reported in this study, particularly with regards the efficacy of the intervention. The absence of a social desirability scale when applying this self-report measure with a Forensic

population may also have implications for the reported findings. The inclusion of a short scale such as the Brief Social Desirability Scale (BSDS) (Haghighat, 2007) may have acknowledged the potential influence of this relevant bias. It was also unfortunate that total scores could not be compared with normative data as the fifth dimension of the questionnaire was not relevant for all participants in this study and therefore excluded from the measure in this study.

CONCLUDING REMARKS

The findings from this study indicate that text messages offer a feasible and accessible method to communicate with young people who have offended. However there is no evidence to suggest this standalone intervention offers an effective method to improve psychological wellbeing amongst this target population. Due to the likely complexities of this group and suggested benefits of multi modal methods (Karnik & Steiner, 2007) further exploration regarding the integration of an SMS intervention as part of a wider package of intervention is therefore recommended. It is suggested that the emergent themes from this study are considered in the design of any future enquiries into the use of SMS or mobile interventions with this population group.

CHAPTER SIX.

DISCUSSION

The accessibility and effectiveness of using text messages to promote psychological wellbeing amongst adolescents, including those at risk of offending and re-offending. A review of findings and consideration for future enquiry.

Word count: 2,631

Discussion

The feasibility and effectiveness of using an SMS intervention with the adolescent population has been explored, taking findings from a systematic review of the literature and the evaluation of an SMS intervention targeting young offenders. The recent transformational approach (IAPT CYP) to child and adolescent mental health services intends to increase access to psychological intervention across a range of services, including local authorities and third sector providers. The findings of this research will, therefore, be of interest to all those invested in the provision of accessible, novel approaches to improving the wellbeing of adolescents.

Whilst no significant results are reported in relation to the pooled effect on psychological wellbeing, a number of findings are discussed in the reviewed literature and the research study presented in Chapter Five. Within this final chapter the implications of these findings are considered.

As indicated in the introductory section of the systematic review, until more recently research exploring the use of text messaging has focussed largely on the adult population and on physical health behaviour. Earlier systematic reviews have indicated the superior benefits of this approach on compliance and adherence with less evidence to support the effectiveness on more complex health behaviour (Orr & King, 2015). It is promising that more recent intervention designs, including that presented in Chapter Five, have adapted accordingly to include supportive messages intended to engage, educate, re-enforce, motivate and promote positive health behaviour that go beyond mere reminders.

Within the systematic review, only ten randomised controlled studies were identified that met inclusion criteria. 70% of which were published within the last five years, suggesting that there is a growing interest and robustness in the enquiry of SMS interventions to target mental health in young people. The findings from the presented study further contribute to this emerging evidence base. Ongoing enquiry will allow for a greater sample from which to draw more definitive conclusions.

Despite the absence of statistically significant pooled effects or changes reported in the respective systematic review or research study, there are a number of

findings that suggest that text messages can offer an accessible and feasible approach amongst even those hardest to reach. Primarily, 50 % of the included studies did report significant findings in favour of the SMS intervention group and its positive impact on psychological wellbeing. (Agyapong et al, 2017, Huang et al, 2014, Haas et al, 2017, Johnson et al, 2016 & Fabbrocini et al, 2014). Other findings included lower dropout rates (DeNiet et al, 2012), favourable perceptions about the impact of the intervention (Whittaker et al, 2017) and evidence of the acceptability of the approach (Johnson et al, 2016, Fabbrocini et al, 2014 & Haas et al, 2017). The research study presented in Chapter Five further corroborate these findings as a range of participants with access to mobile phones were recruited and retained in the study and no participants withdrew from the SMS intervention. Most importantly there was no evidence to suggest that such an approach caused significant harm to participants. To the contrary, participants identified a positive impact on their thoughts and feelings (Theme One, Chapter Five) (though this was not evident for all participants) and VAS scores were anchored towards the more positive endpoints.

The mixed findings evident in both the systematic review and the research findings appear to corroborate Allbright et al (2015) earlier suggestion that a one size fits all approach is unlikely to be appropriate for differing populations with differing needs. This is akin to findings from other media campaigns promoting positive behaviour, reporting mixed evidence of the impact of universal campaigns when targeting at risk groups (Young, Lewis, Katikireddi, Bauld, Stead, Angus, Campbell, Hilton, Thomas, Hinds, Ashie & Langley, 2018, Flexon & Guerette, 2009). To the contrary, there is some suggestion that universal media campaigns can have unintended consequences. For example, exposure to anti-drug campaigns have found evidence of increased pro- drug effects as a result of exposure (Home Office, 2017 & Hornik, Jacobsohn, Orwin, Piesse & Kalton, 2008). Even where positive effects are reported, there is limited evidence in support of the long term benefits (Freeborn, Polenm, Hollis & Senft, 2000) and impact on high risk groups (Ulleburg, 2002), further re-enforcing the need for responsive approaches when attempting to address complex human behaviour.

With regards to the adolescent population included in the exploratory study presented in Chapter Five, the significant findings suggest that the intervention

was considered to be more helpful for those with poorer psychological wellbeing and for those on the periphery of the CJS. It is possible that exposure to positive environmental cues may have improved at least momentary affective states and cognition amongst those with poorer psychological health, with minimal impact for those with more prominent positive internal states. Whilst there has been greater focus on the success of the SDT in the promotion of physical health and activity (Buttitta, Rousseau & Guerrien, 2017), there is promising evidence to suggest that SDT psychological need satisfaction is a significant predictor of positive affect and wellbeing in adolescents (Veronneau, Koestner, & Abela, 2005). The significant finding in this study, alongside participants' qualitative feedback indicating a positive impact on affect (Subtheme 1.2) provides additional support that the promotion of psychological need satisfaction according to the SDT can also positively influence wellbeing.

The potential for preventative benefits of the SMS intervention was apparent in the findings that individuals on the periphery of the Criminal Justice System, appear to have been more open to the positive effects of the intervention. It is possible that young people are more susceptible to receive support from services at a diversionary stage without the constraints of a coercive formal Court Order. However, it is recognised that their early experience in the CJS may have contributed to a more compliant presentation impacting on their responses and the large number of quantitative analysis performed on the dataset may have increased the chances of achieving significant findings by chance (Type one error). In any event the perceived benefits for these two groups again highlight the superior benefits of matching interventions according to need and relevant characteristics (Andrews & Bonta, 2010).

The importance of responsivity was also an evident theme for participants in the present research study (Master Theme 2). This included factors such as relatable content, dosage and timings of messages, which was raised in the systematic review also and consistency in future study design recommended. However, the fast growing advances in technology mean that there are now greater opportunities to assess tailored interventions matched to need and preference, which may be more influential to determine optimum dosage rather than another one size fits all approach to enquiry (Allbright et al, 2015). As client centred practice is likely to enhance appeal and promote active engagement

perhaps the focus should also turn to determining the most efficacious methods for adopting such an approach using mobile phones (Greco, Lambert Park, 2016).

The provision of accessible and effective mental health services are in high demand at a time when services are repeatedly being threatened by economic deficit, budget cuts resulting in increased workload and thresholds and frustrating waiting times leaving young people and their families in distress (Frith, 2017). As mobile health interventions offer an opportunity to reach a wide range of individuals they have potential to offer a unique and efficient approach to address some of these challenging issues. However, there is a paucity of robust research to evidence the cost effectiveness of the approach and there is uncertainty regarding the sustainability of such interventions. Further enquiry is, therefore, required to fully attract the attention of clinicians, policy makers and commissioner's alike (de La Torre- Diez, Lopez- Coronado, Vaca, Aguado & De Castro, 2015).

Technological advances also offer an opportunity to consider methods for reviewing the effectiveness of mobile interventions. Currently there is a reliance on self-report measures. Largely, there was evidence to support the psychometric properties of the questionnaires employed within the studies included in the systematic review and the KIDSCREEN measures reviewed in Chapter Three and utilised in this research study. There is increasing emphasis regarding the importance of measuring HRQoL in healthcare, which offers a measure of wellbeing, in healthcare to inform assessment, intervention and evaluation. This provides an opportunity to identify collaborative treatment or intervention goals, which are meaningful to the individual and thus likely to enhance intrinsic motivation (Ryan & Deci, 2000). However, it would appear that an emphasis on sensitivity to change is required amongst child and adolescent HRQoL measurement, to ensure that measures are consistently able to detect changes in presentation (Solans et al, 2008) and adequately assess the effectiveness of interventions to improve psychological wellbeing and HRQoL. Indeed, inconsistent findings relating to the KIDSCREEN measures (presented in Chapter Three) ability to detect changes contributed to a limitation of the research study findings in Chapter Five. Furthermore a tendency for children and adolescents to under report the impact of their difficulties may also influence

study findings where HRQoL and thus impact on functioning is a key measurement of outcome (Van Roy, Groholt, Heyerdahl & Clench-Aas, 2010, Sibley, Pelham, Molina, Waschbusch, Gnagy, Babinski, & Biswas, 2010). Whilst proxy measures may go some way to addressing this it may be possible to capture additional real time data using mobile phones, assisting with the reliable measurement of outcomes as well as improving responsiveness.

As highlighted in both the systematic review and the research study there is a need to better understand the theory used to guide mobile health interventions. Qualitative findings from the empirical study (Theme Four: Connecting with others) support theories of interpersonal adaptation (outlined in Chapter Four) suggesting that digital communication can be as effective as those interactions that occur in person, with potential for additional advantages when dealing with sensitive subject matter by providing a level of privacy and encouraging opportunities for personal reflection (Master Theme 3). However, contradictory findings from quantitative analysis, where a marginal decrease in the groups Social Support and Peers dimension scores were observed, suggests that a positive effect on social connectedness was not always evident. Participants in the focus groups and intervention study referred to the superior benefits of two way communication via text messaging, which may have impacted on these findings given the unusual nature of the one way communication used in this SMS intervention. Future enquiry might, therefore, focus on a more interactive intervention. This would have the potential to overcome some of the barriers identified by participants in this feasibility study (Master Theme 5) by providing a means for communication that feels more personal, with greater opportunity to address some of the uncomfortable or unresolved thoughts or feelings that the one way intervention used in this study was not able to do. As greater acceptability of the intervention was associated with poorer psychological wellbeing, which has in itself potential to interfere with access and engagement with services (Mitchell & Selmes, 2007) it would seem appropriate to assess the impact of a personalised, interactive text message intervention, underpinned by evidence based psychological theory, for those waiting to access or in the initial stages of treatment expanding on the outcomes measured. This might include attendance, retention in treatment and quality of therapeutic relationships. Consideration for the provision of mobile phones and credit for participants, as

evident in some but not all of the studies included in the review, would allow for a more inclusive recruitment strategy that would not exclude young people on the basis of economic disadvantage. Furthermore, where possible a commitment to including data for those who drop out from either intervention or control groups might provide additional information about the positive or negative effects of text message interventions.

Clear theoretical underpinnings were evident in only 60% of the studies included in the systematic review. As with the research study presented in Chapter Four and Five these were based on existing health behaviour theories and models that may not necessarily be fit for purpose when considering the domain of mobile health more specifically. The studies included in the systematic review included studies with differing comparison groups as placebo messages were sent to participants in two of the included studies (Agyapong et al, 2017 & Whittaker et al, 2017) limiting opportunities to understand the importance of the content of the messages sent. As there is evidence to suggest that the receipt of a text message may in itself trigger the release of dopamine (Cole-Lewis & Bernhardt, 2015), the relevance of the message content and the theoretical underpinning for this may be somewhat irrelevant. Further enquiry separating studies with text messages, those without and those including placebo messages would, therefore, be beneficial to assess whether existing theories adequately explain the mechanisms underlying mobile health interventions. As suggested by Riley, Rivera, Atienza, Nilsen, Allison & Mermelstein (2011) there is an emerging need to develop new, specific and dynamic models to better understand how people, processes and technology align to influence health behaviour. This should now be a priority in mobile health enquiry.

The participants recruited and retained in the current study were representative of a range of young people accessing support from the integrated "Youth Offending" Service. This included those who might have been considered hardest to reach due to their personal circumstances and prior histories including non-engagement and non-compliance. Therefore, it may be unsurprising that such a simplistic, short term intervention did not reveal any statistically significant effects on psychological wellbeing, given their likely complexities (HMIP, 2017). Forensic populations are likely to live unstable and transient lifestyles (Junger-Tas & Marshall, 1999). Despite this, largely, participants in this study maintained

contact details for the duration of the study. Though the short term nature of the intervention may have contributed to this, it is acknowledged that an intervention of a longer duration may have resulted in difficulties in the delivery of the intervention and establishing contact with participants to complete the evaluation.

As discussed in Chapter Five, the inclusion of a subscale to determine the influence of social desirability on participants' responses would have been beneficial given the prominence of this bias in forensic populations (Andrews & Meyer, 2003). That said, young people's involvement in the development of the SMS intervention provided a valuable opportunity to hear directly from service users regarding the content and structure of the intervention that would be most acceptable to them, increasing opportunity for real world impact. At all stages young people were able to provide thought provoking and sometimes challenging feedback regarding their experiences, making helpful suggestions for improvement. The constructive contributions from young people across the stages of this research study provides encouraging support for the inclusion of children and young people in the design of services. Service user involvement in this study clearly aligns with the principles of IAPT-CYP, the recovery approach, the feedback from participants (Theme Two: Responsivity, Chapter Five) and recommendations for the measurement of intervention outcomes (Crawford, Robotham, Thanu, Patterson, Weaver, Barber, Wykes & Rose, 2011). Perhaps most promising was the involvement of those who might be considered unobtainable or difficult or hard to engage evidencing their competence as social agents, making valuable contributions regarding issues involving them (Claveirole, 2004). As those hardest to reach are likely to be those in greatest need (Brackertz, 2007) and easiest to forget, it remains a priority for researchers and clinicians to ensure that this group are consulted to inform the design of services despite the challenges that this may present. The qualitative findings evident in the five themes presented in the results section of Chapter Five should be used to inform the design of any future enquiry regarding the use of a text message intervention to promote health behaviour amongst this key population group, paying particular attention to methods that would ensure that the design and content of the intervention is matched to individual need and preference.

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Appendix 1. Abbreviations of search terms with Boolean operators

TERM	ABBREVIATIONS
Text message	SMS, short messag* service, text messag*
Population	adolescen* , teen* , young people, child
Intervention type	Intervention, promotion, prevention, program* , evaluat* , effect*
Outcome	mental health, wellbeing, well-being, quality of life, qol, psychoeducation, coping, stress, anxiety, depression, psychological wellbeing, psychological wellbeing, emotional well-being, emotional wellbeing, affective symptom*
Trial type	Randomised control trial , randomised trial , controlled clinical trial

Combination	Search terms with Boolean operators
SMS, adolescents, intervention	((sms OR "short adj messag* adj service" OR "text adj messag*") and (adolescen* OR teen* OR "young adj people" OR child*) and (intervention OR promotion OR prevention OR program* OR evaluat* OR effect*)).
SMS, adolescents, intervention, psychological wellbeing	((sms OR "short adj messag* adj service" OR "text adj messag*") AND (adolescen* OR teen* OR "young adj people" OR child*) AND (intervention OR promotion OR prevention OR program* OR evaluat* OR effect*) AND ("mental adj health" OR wellbeing OR well-being OR "quality adj of adj life" OR qol OR psychoeducation OR coping OR stress OR anxiety OR depression OR psychological adj wellbeing OR psychological adj wellbeing OR emotional adj well-being OR emotional adj wellbeing OR affective adj symptom* OR affect))
1+2+4	((sms OR "shORt messag* service" OR "text messag*") and (adolescen* OR teen* OR "young people" OR child*) and ("mental health" OR wellbeing OR well-being "quality adj of adj life" OR qol OR psychoeducation OR coping OR stress OR anxiety OR depression OR psychological adj wellbeing OR psychological adj wellbeing OR emotional adj well-being OR emotional adj wellbeing OR affective symptom*)).
1+2+3+4+5	((sms OR "shORt adj messag* adj service" OR "text adj messag*") and (adolescen* OR teen* OR "young adj people" OR child*) and (intervention OR promotion OR prevention OR program* OR evaluat* OR effect*) and ("mental adj health" OR wellbeing OR well-being "quality adj of adj life" OR qol OR psychoeducation OR coping OR stress OR anxiety OR depression OR psychological adj wellbeing OR psychological adj

wellbeing OR emotional adj well-being OR emotional adj wellbeing OR
affective symptom*) and
(randomised adj control adj trial OR randomised adj trial OR controlled
adj clinical adj trial)).

Appendix 2. Risk of bias assessment tool

Title of study:

Authors:

Year of publication:

Assessor:

Entry	Judgement (High/low/unclear risk)	Support for judgement
Random sequence generation		
Allocation sequence concealment		
Blinding (participants, personnel)		
Completeness of outcome data (attrition rates)		
Selective outcome reporting		
Other sources of bias (e.g. baseline imbalances between groups, likelihood of contamination)		

Appendix 3. Data extraction form.

Study ID: A		Report ID :	Date form completed:
First author:		Year of study:	Data extractor:
Citation.			
Method	Description		Location in text
Aim of study (e.g. efficacy, equivalence, pragmatic)			
Design (e.g. parallel, crossover, non-RCT)			
Unit of allocation (by individuals, cluster/ groups or body parts)			
Start date			
End date			

Duration of participation <i>(from recruitment to last follow-up)</i>		
Ethical approval needed/ obtained for study	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear	
Participants	Notes	Information unknown
Description		
Geographic location		
Number <ol style="list-style-type: none"> 1. Total 2. Eligible 3. Excluded 4. Refused 5. Randomised to intervention 6. Randomised to control 7. Withdrew 		
Age <ol style="list-style-type: none"> 1. Range 2. Mean 		
Gender <ol style="list-style-type: none"> 1. Male 2. Female 		
Ethnicity		

Other socio-demographic info		
Interventions		
Details of intervention (including theoretical basis, aim, format, SMS tailoring and directionality)		
Purpose of SMS messages used (reminder, instruction, request for info)		
SMS <ul style="list-style-type: none"> • dose • duration • timing 		
Details of control/ usual or routine care		
Details of any co-interventions		

<p>Delivery of intervention</p> <ol style="list-style-type: none"> 1. Timing 2. Frequency 3. Duration 		
<p>Fidelity/ Integrity Implemented as planned? Were all specified procedures/ components of intervention actually carried out? Based on Dane & Schneider 1998 recommendations</p> <p>Adherence</p> <ul style="list-style-type: none"> - Exposure - Quality of delivery- trainer etc. - Participant responsiveness- how many completed intervention - Program differentiation- did R's only receive planned intervention- contamination etc. 		
Outcomes		

Outcome measures <ul style="list-style-type: none"> • Primary • Secondary 		
Method of assessing outcome measure		
Validity/ Reliability of outcome measure		
Method of follow up for non respondents		
Timing of outcome assessment		
Adverse effects		
Additional notes (incl contact with author, power calculation, recorded in other language Duplicate publication		

Results							
Summary findings							Location in text or source (pg & ¶/fig/table/other)
Comparison							
Outcome 1 Outcome 2							
Subgroup							
Time point <i>(specify from start or end of intervention)</i>							
Post-intervention or change from baseline?							
Results	Intervention			Comparison			
	Mean	SD (or other variance specified)	No Participants	Mean	SD (or other variance specified)	No participants	
Outcome 1							
Outcome 2	Baseline- 50.7 3 months- 51.2 6 months- 51.6 9 months- 52.1						
Any other results reported <i>(e.g. mean difference, CI, P value)</i>							
No. missing participants							
Reasons missing							

No. participants moved from other group	N/a	N/a	
Reasons moved	N/A	N/a	
Statistical methods used and appropriateness of these <i>(e.g. adjustment for correlation)</i>	.		
Reanalysis required? <i>(specify)</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear		
Reanalysis possible?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear		
Reanalysed results			
Notes:			

Appendix 4. KIDSCREEN 27 measure



KIDSCREEN-27

Health Questionnaire for Children and Young People

Child and Adolescent Version

8 to 18 Years

Date: _____
Month Year

Hello,

How are you? How do you feel? This is what we would like you to tell us.

Please read every question carefully. What answer comes to your mind first? Choose the box that fits your answer best and cross it.

Remember: This is not a test so there are no wrong answers. It is important that you answer all the questions and also that we can see your marks clearly. When you think of your answer please try to remember the last week.

You do not have to show your answers to anybody. Also, nobody who knows you will look at your questionnaire once you have finished it.

Are you female or male?

female

male

How old are you?

_____ years

Do you have a long-term disability, illness or medical condition?

No

Yes

Which one? _____

1. Physical Activities and Health

1. In general, how would you say your health is?

- excellent
 very good
 good
 fair
 poor

Thinking about the last week...

	not at all	slightly	moderately	very	extremely
2. Have you felt fit and well?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Have you been physically active (e. g. running, climbing, biking)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Have you been able to run well?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thinking about the last week...

	never	seldom	quite often	very often	always
5. Have you felt full of energy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. General Mood and Feelings about Yourself

Thinking about the last week...

	not at all	slightly	moderately	very	extremely
1. Has your life been enjoyable?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thinking about the last week...

	never	seldom	quite often	very often	always
2. Have you been in a good mood?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Have you had fun?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thinking about the last week...

	never	seldom	quite often	very often	always
4. Have you felt sad?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Have you felt so bad that you didn't want to do anything?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Have you felt lonely?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Have you been happy with the way you are?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Family and Free Time

Thinking about the last week...		never	seldom	quite often	very often	always
1.	Have you had enough time for yourself?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	always <input type="radio"/>
2.	Have you been able to do the things that you want to do in your free time?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	always <input type="radio"/>
3.	Have your parent(s) had enough time for you?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	always <input type="radio"/>
4.	Have your parent(s) treated you fairly?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	always <input type="radio"/>
5.	Have you been able talk to your parent(s) when you wanted to?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	always <input type="radio"/>
6.	Have you had enough money to do the same things as your friends?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	always <input type="radio"/>
7.	Have you had enough money for your expenses?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	always <input type="radio"/>

4. Friends

Thinking about the last week...		never	seldom	quite often	very often	always
1.	Have you spent time with your friends?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	always <input type="radio"/>
2.	Have you had fun with your friends?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	Always <input type="radio"/>
3.	Have you and your friends helped each other?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	always <input type="radio"/>
4.	Have you been able to rely on your friends?	never <input type="radio"/>	seldom <input type="radio"/>	quite often <input type="radio"/>	very often <input type="radio"/>	always <input type="radio"/>

5. School and Learning

Thinking about the last week...

	not at all	slightly	moderately	very	extremely
1. Have you been happy at school?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Have you got on well at school?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thinking about the last week...

	never	seldom	quite often	very often	always
3. Have you been able to pay attention?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Have you got along well with your teachers?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix 5. Research study poster

A TEXT A DAY TO LIVE THE UPBEAT WAY



Are you aged 16 or over?



Do you have a mobile phone?



Have you been in trouble with the police in the last 12 months?

Your chance to  a £20 gift voucher?

What's it all about?

We want to see how young people who have been in trouble with the police and are attending the Youth Support Service feel about receiving regular motivational and supportive texts from the service.

The study is being carried out by the University of Nottingham

What do I have to do?

Young people who decide to take part in the study will fill in a short questionnaire and then be sent a text message each day for a few weeks. At the end of the study the young person completes the questionnaire again and talks to the researcher about how they felt about the text messages.

All young people who take part will be entered into a prize draw with a chance to win high street gift vouchers.

How do I get involved?

Talk to your Youth Support Officer or text Karla (0781443684) to find out more. .



The University of
Nottingham

Appendix 6. Information for professionals

A txt a day to live the upbeat way.



Calling all YSO's....

Are you working with a young person who...

- ☞ Is aged 16 and over
- ☞ Has received a YCC, YRI or Court Order within the last 12 months
- ☞ Has a mobile phone
- ☞ Wants the chance to win £20 gift vouchers

What's it all about?

As part of my Doctorate in Forensic Psychology I am running a study to explore the effects of a text message intervention to improve psychological wellbeing amongst young people who have offended.

The high prevalence of mental health difficulties amongst young people who offend combined with poor engagement with specialist services has contributed to my interest into accessible methods for improving wellbeing in this hard to reach group. Promising research findings suggests that text messaging interventions can improve health behaviours in a variety of population groups. I'm keen to explore whether these positive findings extend to adolescents who have offended.

How you can help?

Over a four week period participants will be sent text messages encouraging self determination to promote positive psychological wellbeing. They will be asked to complete a questionnaire at the beginning and end of the intervention and will be entered into a prize draw with a chance to win £20 high street vouchers. If you are working with a young person that meets the criteria then please contact me on 07814483684 asap.

I would be grateful if the attached poster could be displayed within your respective youth centres.

For further background information and study rationale please see attached document.

Additional Information: A text a day to live the upbeat way

Background

Advances in accessible technology provides a real opportunity to utilize adolescents' preferred source for health information (Gray, Klein, Noyce, Sessleberg & Cantrill, 2005) to provide psycho education and other effective intervention in an acceptable, non threatening manner. The prevalence of mobile phone ownership amongst adolescents is high regardless of socio-economic status (Thomas, Heinrich, Kuhnlein & Radon 2010, Childalert, 2015). The use of text messaging, therefore, provides an opportunity to engage a broad range of adolescents without excluding those more marginalized unlikely to have access to the internet or other more advanced smartphone technology. Emerging empirical findings support the use of SMS in improving health behaviour and outcomes for a variety of population groups (Franklin, Waller, Pagliari & Green, 2006, Militello, Kelly & Mazurek Melnyk, 2012, Wei, Hollin & Kachnowski, 2011 & Allbright, Krantz, Jarquin, DeAlleaume, Coronel-Mockler & Estacio, 2015). The qualitative findings of Allbright et al (2015) suggest that a one size fits all approach is unlikely to be acceptable to differing population groups and associated needs, instead recommending that consideration should be given to the specific needs of each target group. This feasibility study aims to explore the needs and acceptability of a text message intervention to promote positive wellbeing and resilience amongst an adolescents who have offended more specifically. The effectiveness of this type of intervention will also be explored using scores from participant's pre and post intervention questionnaire. Findings from this exploratory study can then be used to inform future research and practice.

Research objectives

To assess feasibility and efficacy of SMS intervention amongst adolescent population sample measuring retention, dropout rates and pre and post assessment scores. Semi structured interviews including Visual Analogue Scales will be completed at the end of the study measuring participant feedback and appraisal of the unique intervention.

Method

The intervention involves a series of text messages to participants' personal mobile phones, which are intended to promote autonomy, competence and social connectedness (associated with enhanced resilience and subsequent psychological wellbeing). Texts will be sent at intervals to study participants for a maximum of 4 weeks. The intervention will be co-produced with a panel of young people from Surrey Youth Support Service whose views will shape message content and frequency prior to the start of the intervention. After recruitment to the study participants will provide information relating to their age, sex and ethnicity, their index offence and type of intervention. demographic information and complete baseline scores on 4 dimensions (Physical Well-Being, Psychological Well-Being, Autonomy & Parents, Peers & Social Support) of the KIDSCREEN 27 (short version) health related quality of life questionnaire. . At four- week follow-up participants will complete the KIDSCREEN 27 again. All participants will be offered the opportunity to take part in an interview post intervention to explore how they felt about receiving the texts. Interviews will be audio-taped and transcribed in full.

Analysis

Thematic analysis will be used to analyse qualitative data. Pre and post intervention scores on the 4 dimensions of KIDSCREEN 27 will be analysed using dependant t tests. Mean and median scores of post intervention Visual Analogue Scale (VAS) will be reported and correlations between factors assessed using Spearman's rho correlation.

Results of the study will be submitted as part of a Doctoral Thesis. It is hoped that findings will also be peer reviewed and presented in a relevant journal.

Appendix 7. Focus group schedule

FOCUS GROUP SCHEDULE

INTRODUCTION TO GROUP

- Ice breaker activity
- Agree ground rules
- Explain purpose of study
- Explain purpose of focus group

FOCUS GROUP

Question 1

How would you feel about receiving text messages to promote positive wellbeing?

Question 2

What type of messages would you find helpful?

Prompts: For example quotes, prompts, thought of the day, questions, links to websites other support.

Question 3

How often would you like to receive these messages?

Prompt: Daily, twice weekly, weekly.

Question 4

What time of day would you like to receive these messages? When are you most likely to check your phone?

Question 5

Who would you like to receive messages from? Is it important that this is from someone you know or would you prefer texts to be anonymous?

Question 6

Is there anything else that would be helpful to know about sending you text messages to young people?

END FOCUS GROUP

- Debrief (how is group feeling? How did they find the group? Explain what happens next?)
- Intervention Recruitment. Eligible young people invited to participate.

Thank you for taking the time to answer these questions today. I would encourage you to talk with your Youth Support Officer, friends or family about how you could support your wellbeing.

Appendix 8. Focus group consent form

CONSENT FORM

Title of study: A text a day to live the upbeat way

Name of researcher: Karla Goodman

Name of young person:

1. I understand I am participating in a focus group to help with the development of a text message intervention to improve young peoples' wellbeing.
2. I confirm that I have had the opportunity to ask questions.
3. I am aware that the focus groups will be recorded so that notes can be written up at the end of the group.
4. I understand that the information gathered will be used as part of Karla's studies but that I will not be identified in any way. I understand the information obtained may be looked at by authorised individuals from the University of Nottingham, Karla's supervisors and regulatory authorities where it is relevant to my taking part in the study. I give permission for these individuals to have access to the information gathered and to collect, store, analyse and publish anonymous information obtained from my participation in this study. I understand that my personal details will be kept confidential, which means that I will not be identified.
5. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason and this would not have any effect on the care that I receive from the YSS.
6. I understand that should I withdraw from the study then the anonymous information collected so far cannot be erased and that the information may still be used in the project analysis.
7. I agree to take part.

Signed _____

Name:

Date: _____

Appendix 9. SMS Schedule

Day	Time	Text Message	Rule
Mon	P.M	Hey. Your thought for today: To make a difference in someone's life you don't have to be brilliant, rich, beautiful or perfect, you just have to care! Have a good day!	3pm
Wed	A.M	Hey. Just remember- it doesn't matter how slowly you go as long as you don't stop. Remind yourself of this when things are getting a bit much! Enjoy your day!	10am
Fri	P.M.	Afternoon. Do one thing today that your future self will be proud of. Keep a note of this somewhere if you can. Have a good one!	4pm
Sat	A.M.	Here's a quote for helping you or those around you through tough times: H.O.P.E Hold On Pain Ends! Remember to talk to someone you can trust if you're finding things difficult. Don't forget the Youth Support Service is here to help. Take care, YSS.	11am
Mon	A.M.	Hey. What one thing are you good at? See if you can find some time to do this at some point today. Speak with a friend or your Youth Support Officer about this if you need to. Have a good day!	10am
Wed	P.P.M	Hey. Did you know that helping others is a good way of helping yourself? Be kind, everyone you meet is battling something. Enjoy the rest of your day!	6pm
Fri	A.M.	Hey. Remember to surround yourself with people who will support you to be the best version of yourself. Have a good day!	12 pm
Sun	P.M	Hey. Remind yourself that the only person you should try to better than is the person you were yesterday. Make today a good day!	2 pm
Tues	A.M	Hey. Nothings Impossible. The word itself says I'm Possible. What do you want to achieve in the coming days. Set yourself a small goal and work towards the IM possible. Talk this through with your Youth Support Officer. Have a good one!	11 am
Thurs	P.M.	A quote to get you thinking.....You can't always control your thoughts but you can choose how to respond to them. Save this somewhere and remind yourself when things get tricky. Have a good one!	3 pm
Sat	P.P.M	When you see your Youth Support Officer next, talk to them about your 3 of your strengths. Write these down somewhere and remind yourself regularly. Have a good one!	5 pm
Mon	P.M.	Hey. This is the last message....hope you've found them useful and thank you for agreeing to take part. Check out the Young Minds website for some tips on keeping your mind healthy. www.youngminds.org.uk/ . Have a great day!	2 pm

Appendix 10. Participant Information Sheet version 2.0 (29.10.15)

Title of Study: A text a day to live the upbeat way.

Name of Researcher(s): Karla Goodman and Cris Glazebrook/ Shihning Chou

We would like to invite you to take part in our research study. Before you decide we would like you to understand why the research is being done and what it would involve for you. One of our team will go through the information sheet with you and answer any questions you have.

What is the purpose of the study?

Most young people in the UK have a mobile phone and are able to access messages at any time of the day. We think that receiving text messages which are fun and supportive and encouraging could make young people feel better about themselves and encourage them to change their behaviour in a positive way.

Current research suggests that the use of text messaging can have a promising impact on health behaviour. Improving psychological wellbeing (which means feeling better about how you think and feel about things) in young people has been linked with more positive -social behavior such as helping others. The aim of this study is to explore whether sending supportive text messages to young people who have been in trouble with the police, improves their psychological wellbeing and ability to deal with some of the stresses that life can bring.

Why have I been invited?

You are being invited to take part because you are currently working with Surrey Youth Support Service having recently been in trouble with the police and you have a mobile phone. We are inviting all young people in Surrey like you to take part.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. However, if you decide to withdraw at any stage the information collected so far cannot be erased and may still be used in the project analysis. This is because once the data has been entered onto the secure computer system it has been made anonymous.

Prize draw

Participants will be entered into a prize draw and will have the opportunity to win £20 or £10 high street gift voucher.

We will provide travel warrants or re-pay you for any money you have had to spend travelling to and from our appointment.

What are the possible benefits of taking part?

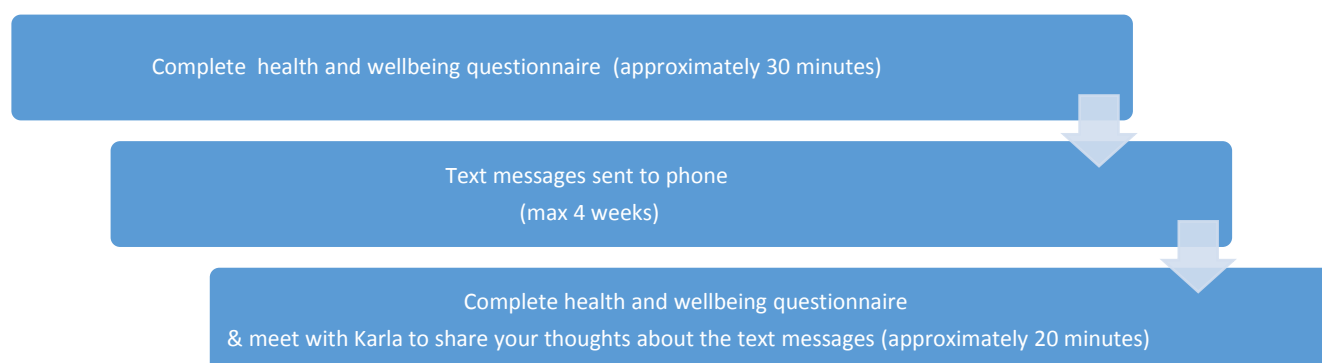
We hope that you will enjoy taking part in the study but it may not help you directly. The information from the study could help to improve services for young people like you.

What are the possible disadvantages and risks of taking part?

There should be no disadvantages or risks of taking part in this study. Any text messages sent to the researcher will not be received or replied to. If during the study you feel that you are having difficulty with your wellbeing then you should let your Youth Support Officer know. They will be able to support you to access appropriate help and will talk with you about whether you wish to continue receiving messages. Alternatively, in an emergency you should contact your Doctor, the out of hours Emergency Duty Team on 01483 517898 or visit your local Accident and Emergency Department.

What will happen if I take part?

If you decide to take part you will be asked to complete a short questionnaire about yourself and how you are feeling about things at the moment. Karla can read the questions to you if that is better for you. After that we will send you regular text messages for up to 4 weeks. These messages will be sent by an automated secure system from the Youth Support Service. After that you will complete the questionnaire again. At this time Karla will also ask you if you would like to take part in a short interview about how you found taking part in the study and what you thought about the text messages. It is up to you whether you take part in the interview which should only take about 20 minutes and will be audio recorded.



All young people who take part in the study will be entered into a prize draw with the chance of winning a high street voucher.

What if there is a problem?

If you have a concern about any aspect of this study, you should ask to speak to the researchers (contact details at the bottom of this form) who will do their best to answer your questions. If you are still unhappy and wish to complain formally, you should then contact the Research Ethics Committee Administrator, c/o The University of Nottingham, School of Medicine Education Centre, B Floor, Medical School, Queen's Medical Centre Campus, Nottingham University Hospitals, Nottingham, NG7 2UH. E-mail: louise.sabir@nottingham.ac.uk.

Will my taking part in the study be kept confidential?

Interviews will be recorded using a handheld device and will be written up word for word. Each participant will be given a unique code so that we don't need to record your name against your information.

All information which is collected about you during the course of the research will be kept **strictly confidential**, stored in a secure and locked office, and on a password protected database. Any information about you which leaves the institution will have your name and address removed (anonymised) and a unique code will be used so that you cannot be recognised from it.

If you join the study, some parts of the information collected will be looked at by appropriate staff from the University of Nottingham who are organising the research or checking that the research is being carried out correctly. All will have a duty of confidentiality to you as a research participant and we will do our best to meet this duty.

Your personal information (address, telephone number) will be kept for 6 months after the end of the study so that we are able to contact you about the findings of the study *and possible follow-up studies* (unless you advise us that you do not wish to be contacted). Your contact details will be removed from the automated system. All of the other information collected as part of the research will be kept securely for 7 years. After this time your data will be disposed of securely. During this time all precautions will be taken to keep your information confidential, only members of the research team will have access to your personal data.

We will only share information about you if you tell a member of the research team that you are at risk of hurting yourself or someone else or if you are at risk of being hurt by someone else.

What will happen to the results of the research study?

The results of the study will be sent to the University of Nottingham as part of my Doctorate in Forensic Psychology qualification and are likely to be available after September 2016. Please contact lpkkg2@nottingham.ac.uk if you would like to receive a copy of the results or indicate that you would like to receive these on the consent form. You will not be identified in the report.

Who is organising and funding the research?

This research is being organised by the University of Nottingham and is being funded by Surrey Youth Support Service.

Who has reviewed the study?

All research in the University of Nottingham is looked at by independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by the School of Psychiatry and Applied Psychology Research Ethics Committee.

Further information and contact details

Karla Goodman. Tel No: 07814483684, Email Karla.goodman@surreycc.gov.uk/ or lpkkg2@nottingham.ac.uk

Cris Glazebrook, Tel No: 0115 82 30420, Email Cris.glazebrook@nottingham.ac.uk

Shihning Chou, Tel No: 0115 846 6623, Email: Shihning.chou@nottingham.ac.uk.

Appendix 11. Consent Form (Young person)

A text a day to live the upbeat way.

Researcher name:

Participant name:

I have read the study information sheet (version no 2, date 29/10/15) and have had the chance to ask questions.

I understand that the messages will be sent via an automated secure system from the Youth Support Service and am aware that my information will be removed from this database at the end of the study.

I understand that the researcher will access my records to get information about my age, ethnicity, educational achievement, family structure, the type of offence that led me getting into trouble with the police and the consequence of this.

I understand that I am free to withdraw from the study at any time, without having to give a reason.

I understand that if I withdraw from the study I will not be sent any more text messages or be asked to give any more information. The information I have given so far will still be used in the study.

I understand that at the end of the study I will be offered the chance to take part in a face to face interview with Karla to discuss how I found taking part in the study and getting the text messages.

I understand that if I agree to be interviewed, the interview will be audio recorded.

I understand that information about me recorded during the study will be kept in a secure database. All information will only be identified by a study number. Data will be kept for 7 years after the results of this study have been published.

I agree to take part in this study and receive text messages from the automated system to my personal mobile phone.

Name: **DOB:**
.....

Signature **Telephone**
number:.....

Date: Please tick here if you would like to know about research findings

I confirm that I have fully explained the purpose of the study and what is involved to:

.....
I have given the above named a copy of this form together with the information sheet.

Investigators Signature: **Date:**

Investigators Name:.....

Study Volunteer Number:

Correspondence address should participant wish to be informed about research findings

.....
.....
.....
.....
.....

Appendix 12. Supplementary questionnaires (VAS scales)

Participant Info

Unique identifier:

Ethnicity:

Age:

1) How helpful did you find the text messages at supporting your wellbeing? (VAS)

A horizontal line with vertical end caps. Below the left end cap is the text "Not helpful" and below the right end cap is the text "Helpful".

2) How helpful did you find the text messages at helping you to deal with stresses? (VAS)

A horizontal line with vertical end caps. Below the left end cap is the text "Not helpful" and below the right end cap is the text "Helpful".

3) How did you feel after receiving text messages? (VAS)

A horizontal line with vertical end caps. Below the left end cap is the text "Bad" and below the right end cap is the text "Good".

4) How often did you read the text messages? (VAS)

A horizontal line with vertical end caps. Below the left end cap is the text "Never" and below the right end cap is the text "Always".

Appendix 13. Post intervention questionnaire

Rapport building

Confidentiality reminder

Participant Info

Unique identifier:

Ethnicity:

Age:

- 1) How helpful did you find the text messages at supporting your wellbeing? (VAS)
- 2) What did you find helpful?
- 3) What did you find least helpful?
- 4) How helpful did you find the text messages at helping you to deal with stresses? (VAS)
- 5) How did you feel after receiving text messages? (VAS)
- 6) What did you like about the text messages?
- 7) What did you not like about the text messages?
- 8) What do you remember about the messages that were sent?
- 9) Have you saved any of the text messages?
- 10) Did you share any of the text messages with friends or family?
- 11) What advice would you give about sending text messages in the future?
- 12) How often did you read the text messages? (VAS)

Thank you for taking the time to answer these questions today. I would encourage you to continue to work with your YSO to think about ways that you can support your wellbeing.

Appendix 14. Example themes

Theme	Example Quote	Transcript reference (Participant transcript, page no)
Intervention effects		
<ul style="list-style-type: none"> Positive Impact on thoughts 	<p>You actually think positively about yourself- it's really helpful especially if I was in a bad mood.</p> <p>Think about the positives and strength and stuff like that it was definitely helpful</p> <p>Seeing a text message probably makes you feel happy because you know it would give you something to think about for the day</p> <p>It's nice to think about the things you're good at</p> <p>Something to look at and think about in the morning</p> <p>It helped me just having little things in the morning, maybe think a bit better, think a bit different about the day.</p> <p>It would make you think about doing more positive things</p> <p>If they get sent something positive they might start thinking positive like that, if everyone keeps saying it to them, I don't know it might work.</p> <p>It's just when I got my job and like just started my new job then I got that text then I thought yeah, things are changing like, that's what I thought like. I thought if I do it this way this will change.</p> <p>Like reading it and concentrating, don't muck up.</p> <p>They were just distracting me to not keep thinking about the same thing. It made me think about good things I think</p>	<p>2,2</p> <p>3,1</p> <p>3,2</p> <p>3,2</p> <p>5,1</p> <p>5,4</p> <p>9, 1</p> <p>10,11</p> <p>10,17</p> <p>11,6</p> <p>15, 4</p>
<ul style="list-style-type: none"> Positive Impact on mood 	<p>It was a nice like booster</p> <p>Just receiving that little thing is very good to easily change how you feel</p> <p>The quotes would help me through the day making me more happier</p> <p>It was just like uplifting</p> <p>Been more like calm a lot</p> <p>My friend noticed that I was a lot happier</p> <p>It gives you a little bit of inspiration in the morning</p> <p>Gets me out of bed</p>	<p>2, 1</p> <p>2,3</p> <p>4,1</p> <p>4,1</p> <p>4,1</p> <p>4,2</p> <p>5,2</p> <p>5,2</p> <p>5,4</p>

	You're trying to life the mood or something it's better to just like kind of have something that might make you laugh	7,1
	They were like encouraging...gave you motivation of things to make yourself feel better about yourself	7,4
	Some days they made me feel good and then there were days were I didn't really feel anything	9,3
	Some of them did like put me in to like sort of a better mood, like I would look at it and it would like say, I don't know say I was bored at home or something and then I would get a message through and it will be like- give me something positive that you will remember like be proud of in your future self, it did make you think about it but I don't actually remember if I did anything.	10, 18
	When I was chilled out as well I got that text so it was alright, like the end of my day like just put a little cherry on the top so I was really happy and that	11,3.
	It's like encouraging.	14,5
	They was causing me more stress. No different, just normal.	15,1
	Sometimes they just made me feel a bit good.	15, 2
	Sometimes they just came at a good time like when I was ***** off. If I was happy I probably wouldn't even really read them because you don't need to	
• Messages were welcomed as a surprise	Like you don't actually know it's coming that's probably the best thing if you're really killing or if you break up or you're out somewhere and then you just get them.	5,4
	Like they came up randomly it was like unexpected, it's like a nice sort of surprise for someone.	12,3
	If I'm really low I always used to be on my phone.	7,3
	If I was swelling then I would sit on my phone and it pops up I would read it just to distract me- Probably just stop thinking about things and I don't know after reading the message and distracting myself off the subject I could start playing games and then probably go and have a fag. I knew they were going to be messages to make you feel good sort of thing so I would just I thought I would read some of them. I was sort of expecting it so probably helped me, I think it was good for me as well	15, 2
• Messages weren't always memorable	It just went out of my head as soon as I closed the message	1,2
	I suppose you think about it for a few seconds and then there's not really much else you can think about it	1,2
	It was an acronym so it was easy to remember	2,4
	You can think about them throughout the day	4,1
		5, 4

	I can't really explain like I won't think about that message now, probably if I'm stressing about something but at the time when it comes through it might just change my mood	6, 3
	One of those things that would probably be like first one or two days whilst it's still a novelty, like you get something from it but then you don't think it's quite a use after that.	9,3
	For a few like 5 minutes afterwards it would be like alright and that and then it would sort of, where it doesn't come through again or anything you just sort of forget about it and get on with what you were doing	9,1
	You might think about it for like 5 minutes or so but it won't stay in your mind or anything like that.	9,1
	Think about what it says for a couple of minutes and then I don't know just sort of goes out my head to be fair.	12,7
	Just after about an hour I had just completely forgotten about it not even like 10 minutes.	17, 6
	I've got lots on my mind that I forget probably a few hours after. It didn't mean anything to me so I wouldn't, I didn't remember.	
• Messages didn't always have an impact	Words don't really affect the way I feel	1, 1
	I just think from an emotional sense thing you can't probably speak to people like just by text messages sent out	6, 3
	I read them but it didn't really change my opinions.	8, 1
	It didn't make me feel any different.	10,1
	They didn't really make a difference, even like different moods it didn't really make any difference.	11,1
	If I'm in a bad mood I'm in a bad mood or pissed off then pissed off it's not going to change it.	
	Once I was in a bad mood and I got a text and I just thought oh for **** suck, I think I was just already in a bad mood and I was just like moaning about everything. It weren't obviously the actual message it was the fact that I've got a text and I was in a bad mood.	12, 2
	I did like actually read them but they just didn't make a difference. Like if I was proper stressed it's not something that would come to mind like it was just pop into my head I'll just read that text you got or think about it, it just wouldn't come to mind.	12, 3
	It wasn't making things worse I just thought they were a bit useless.	12, 6
	Just annoying.	12,7
	If my mum can't tell me what to do no one is going to, that's just the way it is.	14,1
	Nothing could help with my wellbeing.	15, 10
	You could never help me, what they were saying on them messages.	17, 1
	There's nothing that could help anything you could send me to a phone.	17, 2

	None of it was helpful, I didn't take that much notice of it	17, 8
	I didn't care, it didn't bother me at all	17, 11
Messages should be matched according to ind. Preference and need		
• Should be relatable	Some of them are not very applicable to me	1, 1
	Sit down and let them choose quotes	4, 3
	I kind of felt like I related to them	7,2
	Oh my god this is so like relatable	7,4
	It all depends on the people's mentality on how they take the messages	8,2
	It's different for different people.	8,4
	Everyone's different aren't they?	10,2
	It will work on them someday, everyone grows up someday	10, 13
	So if you get girl one's, send them different messages, more emotional.	10, 14
	I didn't like that one, that one was about not needing to be rich or something but I want to be rich so that one was useless.	14,2
	I don't know how people my age could write stuff like that	14, 4
	I knew they weren't going to help, that they were a bit pointless for me I would just put my phone back in my pocket and ignore it	17, 13
• Helpful for those in need	I don't really have any stresses so I couldn't say it was helpful at all	1,1
	If I was in a stressful situation and I had something like that to look at and think about say more of the thought ones then I think it would help	3,2
	I don't really feel it would benefit me because I do feel like I am sort of like in a stable position where I've got friends around me that I can talk to like or my family that I can talk to.	9,3
	It aint really for my group	10,2
	It's like marmite- some people love it, some people won't.	10,2
	I don't really need help.	17, 2
	It didn't help, but as I said I don't need to be helped so it wouldn't.	17,8
	I don't get stressed.	17, 10
	I could see how they would be helpful to other people	1, 1
	I think it would be helpful when they are going through GCSE's and lot of stress at that time.	4,4
	From my perspective I feel like it would benefit someone a lot more sort of if they were in need for it.	9, 1

	Someone going through a hard time or something would probably benefit a lot more. If someone was going through a hard time they would sort of wake up and they would see like a positive message and I suppose that would probably give them a good start to the day...	9,1
	Someone that doesn't have that I do believe that it would just like give them a bright start to the day if they could see that someone's actually sort of not caring about them but like making an effort at least trying to text like something.	9,3
	I know for a fact that would benefit people that were a little bit lonely and not really knowing what they needed to do so if it was every morning and they wake up to it they've been up for say a couple of hours and get a message through just sort of giving them a bit of motivation that would probably sort them out a little bit I would say.	9,10
	If they see them text they're going to start thinking differently.	10, 4
	It could be helpful for some people.	12, 2
• Content needed changes or adaptations	Maybe not so much stuff about their wellbeing and maybe just like tips, like how to make things easier for yourself	1,4
	Just like promoting young children like teenagers just to do like useful things	1,7
	The ones that were telling you what to do would be the better ones	5,2
	I've gone back to this message quite a lot but the one that was talking about your future self, if there was like little examples or something like try one of these see how it makes you feel, if it makes you feel better then keep trying	9,5
	When I got the message through I started thinking about it, I started thinking about what could I do that would like motivate me but obviously if there were examples you can do them basically straight away if you need to.	9,5
	Start sending job links, I would definitely look at them. You see people that claim benefits and that , that's helping them out as well because then at least they don't have to go search on the computer they are getting sent all the links to get their money and it's making the world easier. The whole point of this stuff is to get us on the right track and you send someone a job then it's you know going to and if people want to get on the right track that way they will click on the job inks and they might change their lives around.	10,12
	When they tell me like you've got to go to a meeting and that.	10,13
	You've got to get a job so I might have read it	11,2
	Keep it more to the point	17, 8
	They just went on a bit	3,4
		6,1

	I actually did find it a bit annoying how is every other day	7,7
	I could have done with them every day.	11, 8
	Three weeks is too long- like one week would have been better or something.	14,2
	Not one every day, like 3 days or something.	14,7
	Some of them were so long so I didn't read them.	15,1
	Other than being too long	15, 6
	Any time I'm at college was most helpful that's the most time I get swelling when I'm at college.	15, 7
Encouraged personal reflection and should support personal choice		
• Personal reflection	They were nice to think about to just myself	3,1
	I feel like they're probably a bit more like a personal just for you not showing people	5,5
	You want to send them late at night or early morning because then they wake up and see that or they go to bed thinking oh yeah, no one you know when there's, when the phone aint blinging off with all their mates like.	10, 14
• Autonomy and personal choice	I feel like I'm already a good enough person	1,5
	I was thinking about the quotes more than people trying to yell at me.	4,2
	I know what I want	8,2
	Say something like serious happens that's when I think about things	8,2
	If I wasn't to change things then I will	8,5
	I'd say like I'm quite strong minded so like I know what I want and what works	8,7
	Like something where people can sign up to it if they need it.	9, 10
	I don't find none of this stuff helpful because I just don't want to be on it.	10, 14
	I deal with my own stresses, text messages won't help with any of my stresses.	10,14
	I need to do it myself but a day will come and I will do it.	15, 10
Messages helped to connect with others		
• Provided or encouraged Support network	You kind of remember that you're not alone kinda thing	2,3
	Something to give you like support and advice on what to do	7, 1

	I was going through a bit of family stuff and it was like good to have like that thing to give you advice and go to it for advice.	7,1
	It would probably benefit him a lot more because he would think I've actually got someone sort of not looking out for me but at least having a little bit of acknowledgment that he's there in a sense	9,9
• Interactive communication preferable	I prefer like calling because then you can like hear the person to the reaction.	7,3
	Knowing that you've got someone there that can just answer the phone and you can just talk to them, especially if they are going through a hard time.	9,4
	It's one that I wanted to text back	10,2
	Let them text you back then you will see all the feedback from what you get in a text.	10,9
	You'll have to text back something like this and then they will be thinking of I've got a little mate here. They will think we've got somebody.	15, 10
	Make conversations. I kept forgetting that it was an automated text, I would have chatted. It's weird because there's a text and you normally read back but it won't sort of text that I could sit there and chat but like I don't know I wanted to ask questions, like I don't know, like what they mean by it.	15,11
Identified barriers		
• Automated systems can feel impersonal	If you're sending the same text to lots of different people it's not going to apply to everyone	1, 5
	It was written up to be said	6,2
	If it was sent from an automated service I wouldn't think twice about listening to it, not listening to it	6,5
	Oh that's nice that they've written it out for someone	6,5
	So if you always send something back something positive you're not telling them the actual truth, you're just trying to get them on a path of positive instead of telling them the truth.	10,10
	You want to feel like it's a person that you speak to	10, 22
• Potential to provoke uncomfortable feelings	They were just pretty cheesy to be honest.	6, 1
	Quite cringey.	12, 2
	I found them cringey so I read them because it was funny.	14,3
	That's like embarrassing. I don't really want that on my phone. It's cringey and I don't really want that on my phone.	14,4
	It's just a bit cringey and wasn't going to help me.	17,5

• Could lead to confusion that could go unresolved	Some of them you were thinking how can I do that and that would play on your mind	4,2
	I read them and like didn't understand them when I got them. I didn't understand what they meant.	11,1
	I can remember reading them and getting confused by them.	15, 2
	I didn't really understand them at first until the messages came through	17, 3
