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# A mixed methods investigation into adolescents' use of mental health apps.

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Thesis submitted to the University of Nottingham for the degree of Doctorate in Applied Educational Psychology

# Abstract

The prevalence of mental health needs in children and young people continues to outweigh the availability of support and services (Ford et al., 2007; Vizard et al., 2020). Alongside these systemic barriers, adolescents are identified as a population that may experience personal barriers to seeking mental health support (Radez et al., 2020). With advances in and increased use of technology, research in recent years has explored how technology can be used to support mental health and wellbeing, particularly amongst adolescents and young people (Donker et al., 2013; Hollis et al., 2017). The current study sought to explore older adolescents' use of mental health apps (MHApps) in a real-life context, to increase awareness of how this population are engaging with MHApps and to give direction to future research. An online survey was conducted within sixth form provisions in the East Midlands, with pupils aged 16-to-18 years. Quantitative data gave insight into adolescents' use of MHApps and was triangulated with qualitative data through a content analysis of most-used MHApp features by app function.

Adolescents reported utilising a range of MHApps, with demographic differences in utilisation. Usage was reported to have increased since the outbreak of the Covid-19 pandemic. Results concur with previous research and suggest that there is an association between MHApp use and mental wellbeing. Headspace, Calm and Daylio Journal were identified as the top three MHApps being used by adolescents, a finding which provides a potential direction for future research. The most-used apps shared a range of characteristics which concurred and diverged from those that have been identified in previous research: psychoeducation, mood tracking, sleep and data tracking remerged as preferred characteristics. The potential for MHApps to be used as a preventative mental health and wellbeing strategy is highlighted, with findings illuminating the need for further research in this area.

# Acknowledgments

I would like to take this opportunity to thank everyone that has supported me throughout my doctoral journey so far.

I would first like to thank the Doctorate in Applied Educational Psychology team at the University of Nottingham, specifically Anthea Gulliford for her ongoing supervisory support, encouragement and guidance.

To Cohort 13, there is no better group of people I would have wanted to share this journey with. Thank you for your endless support throughout all the ups and downs on this doctoral voyage; it's nearly time to get off the ship and into our individual sailboats!

Thank you to my placement educational psychology service for their continued support and opportunities for development as a trainee. In particular, my supervisor and my wonderful team who have been a great source of reassurance.

Thank you to the schools and pupils that participated in my research, without you this research would not have been possible.

I would like to thank my family and friends for their patience and continuous cheerleading during what can only be described as a crazy journey. A special thanks to Tom and Arthur, thank you for being a source of comfort and at times distraction.

Finally, I dedicate this thesis to my Nan and Daddan (Grandad) who I am sure would have been so proud to see me achieve my dreams and ambitions.

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# List of Abbreviations

| | |
|---|---|
| **BPS** | British Psychological Society |
| **CAMHS** | Child and Adolescent Mental Health Services |
| **CBT** | Cognitive Behavioural Therapy |
| **cCBT** | Computerised Cognitive Behavioural Therapy |
| **DAEP** | Doctorate in Applied Educational Psychology |
| **DfE** | Department for Education |
| **DHI** | Digital Health Intervention |
| **DoH** | Department of Health |
| **EP** | Educational Psychologist |
| **EPS** | Educational Psychology Service |
| **FSM** | Free-School Meals |
| **GP** | General Practitioner |
| **HCPC** | Health and Care Professional Council |
| **JBI-QARI** | Joanna Brigg Institute - Qualitative Assessment and Review Instrument |
| **M** | Monitoring |
| **MHApps** | Mental Health apps |
| **mHealth** | Mobile Health |
| **M/P** | Monitoring and Psychoeducation |
| **M/SP** | Monitoring and Skill Practice |
| **NHS** | National Health Service |
| **NIMH** | National Institute of Mental Health |
| **ONS** | Office for National Statistics |
| **PHE** | Public Health England |
| **P/SP** | Psychoeducation and Skill Practice |
| **P/SP/M** | Psychoeducation, Skill Practice and Monitoring |
| **SDT** | Self-Determination Theory |
| **SES** | Socio-economic Status |
| **SP** | Skill Practice |
| **SPSS** | Statistical Package for the Social Sciences |
| **UK** | United Kingdom |

| | |
|---|---|
| **UN** | United Nations |
| **UNICEF** | United Nations International Children's Emergency Fund |
| **UoN** | University of Nottingham |
| **WEMWBS** | Warwickshire Edinburgh Mental Wellbeing Scale |
| **WHO** | World Health Organisation |
| **BPS** | British Psychological Society |
| **CAMHS** | Child and Adolescent Mental Health Services |
| **DfE** | Department for Education |
| **DHI** | Digital Health Intervention |
| **DoH** | Department of Health |
| **EP** | Educational Psychologist |
| **FSM** | Free-School Meals |
| **GP** | General Practitioner |
| **MHApps** | Mental Health apps |
| **mHealth** | Mobile Health |
| **NIMH** | National Institute of Mental Health |
| **ONS** | Office for National Statistics |
| **PHE** | Public Health England |
| **SES** | Socio-economic Status |
| **UK** | United Kingdom |
| **UoN** | University of Nottingham |
| **WHO** | World Health Organisation |

# Chapter I Introduction

## 1 Introduction

### 1.1 Personal Interest in the Research Area

The author's personal interest in supporting adolescent's mental wellbeing (referred to as 'wellbeing' hereafter) has developed from professional and educational experiences. The author has worked in a range of settings with young people experiencing poor mental health. The support available through dedicated Mental Health Services to schools and other settings comes at a cost, places are limited, and there is often a long waiting list. Whilst studying for the Doctorate in Applied Educational Psychology (DAEP) the author had the opportunity to complete a systematic literature review on suicide prevention strategies for adolescents in schools, finding the importance of whole-school approaches talking about mental health as a key protective factor against suicidal behaviours. There is also significant literature and government policies that considers the importance of systemic support for mental health in schools (DoH & DfE, 2017). Therefore, the author felt that her position as a postgraduate researcher lent itself to exploring cost-effective strategies that could be implemented in schools as a universal strategy to support the wellbeing of young people.

The author also has an interest in mental health apps from personal experiences. Whilst studying for the DAEP, the author experienced a range of personal challenges and turned to Headspace and other mental health-based apps as a support strategy. The author became interested in the research underpinning these apps and began to search the literature in this area. Unfortunately, given the number of apps available to download the evidence base in comparison is limited, and most researchers focus on developing the research of their own specific app. Therefore, the author wanted to use this unique research opportunity to explore the research area further and address the significant challenge in the area: what MHApps should be prioritised in research, in particular for young people?

The current study therefore presents an investigation into adolescents' use of MHApps. Specifically, whether adolescents are utilising mental health apps, which apps they are using and whether there is relationship between usage and mental wellbeing. An outline of the structure follows.

## 1.2 Structure of the Thesis

The research thesis is presented in five chapters, including this introduction. These chapters are as follows:

Chapter I **Introduction**

The introduction chapter has summarised the researcher's personal interest in the area and outlined the purpose of this research and offers an overview of the structure of the thesis.

Chapter II **Literature Review**

The chapter outlines the background relevant to the constructs explored in this research including adolescent wellbeing; technology in mental health; adolescents' use of technology; and mental health smartphone apps. The current study is then discussed in the context of existing research, analysed through a systematic literature review. Finally, the implications of the literature review are explored detailing the original contribution of this research thesis and the research question is presented.

Chapter III **Methodology**

The methodology chapter outlines the philosophical assumptions of psychological and educational research, identifying the assumptions and the research paradigm underpinning this current study. The chapter goes on to discuss research designs, with particular focus on mixed methods research, before outlining the quantitative and qualitative design in turn. The measures used, the data analysis approaches and lastly, the recruitment process and ethical considerations are addressed.

Chapter IV **Results**

The quantitative and qualitative investigations are presented in turn, in relation to the research questions and hypotheses.

Chapter V **Discussion**

The chapter discusses and evaluates the key findings in relation to existing research, highlighting possible interpretations. The chapter goes on to critique the reliability, validity and trustworthiness of the research method and findings, and explores possible implications of the current research. Finally, the chapter concludes with a summary of the findings and personal reflections from the researcher.

# Chapter II Literature Review

## 2 Literature Review

### 2.1 Aim and Structure of the Literature Review

The literature review aims to explore, define and critically appraise existing research relevant to the current research study. First, the review examines the national context of the research area, presenting an overview of the mental wellbeing of children and young people, and the mental health and wellbeing support available in educational settings, as a result of political and public agendas. Thereafter, an in-depth consideration of mental wellbeing in adolescents is offered, considering the impact of the Covid-19 pandemic on young people's wellbeing, before moving into an exploration of adolescents' use of technology and the use of technologies in mental health services. Finally, the literature review examines the use of mental health apps (MHApps) as the focused technology, following the rapid increase in smartphone access amongst adolescent populations. It considers the different types of MHApps available in regard to four key functions: assessment, monitoring, psychoeducation and skill practice, which have been identified and emerged in previous research.

Following this, a systematic literature review of the current evidence base is reported, exploring adolescents' perspectives of MHApps. The findings are synthesised and the implications explored. Lastly, the chapter summarises the rationale and original contribution of this current research study and the research questions that this research thesis aims to explore are outlined.

### 2.2 Mental Wellbeing in Educational Settings: The Current Context

#### 2.2.1 Mental Health of Children and Young people

The World Health Organisation (WHO) defines mental health as "a state of wellbeing in which the individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (WHO, 2012, p.32). Short term stress and worry is a typical part of a child or young person's life. However, when these difficulties persist over time, or a number of these difficulties are experienced at the same time and the child or young person experiences a range

of emotional or behavioural difficulties through these, the child or young person is described as having a mental health 'disorder' (Department for Education [DfE], 2018).

A mental disorder is clinically defined as a behavioural or psychological syndrome or pattern of behaviour that is associated with significant distress or disability of the individual. It impairs functioning or increases risk of suffering pain, disability, death, or loss of freedom, which is not an expectable response to a common stressor (American Psychiatric Association, 2013; Stein et al., 2010). Most recent survey data on the mental health of children and young people in England estimates that one in six (16%) 5-to-16-year-olds have a probable mental health disorder (Vizard et al., 2020), these rates increase with age, with one in four (25%) 17-to-22 years olds being identified as having at least one probable mental health disorder. The prevalence of children and young people experiencing mental health disorders has increased in England (Matthews-King, 2018; Siddique, 2018). In 2017, the Mental Health of Children and Young People survey identified one in eight 5-to-19-year-olds as having at least one mental health disorder, and measures over time indicate that the rates of emotional disorders, including anxiety, depressive and mania and bipolar affective disorders have increased, while other disorder types have remained stable (Green et al., 2005; Sadler et al., 2018).

Mental health disorders in children and young people are associated with significant distress and impairment and an increase in the likelihood of adverse psychosocial outcomes and subsequent mental health problems in adulthood (Public Health England [PHE], 2016; Woodward & Fergusson, 2001). It is suggested that children and young people's mental health has a significant impact on the trajectory towards positive life outcomes in adulthood (Department of Health [DoH], 2015). The likelihood of a child or young person becoming involved with substance misuse and crime are significantly increased (Hooven et al., 2010), and educational and employment prospects, positive social relationships (Hooven et al., 2010) and life expectancy are decreased (Mercy & Saul, 2009; PHE, 2016), if a child or young person with a mental health disorder does not have access to adequate mental health support. This data

has prompted political and public agendas that focus on the promoting and protecting of children and young people's mental health within educational settings, to foster positive life outcomes (DfE, 2018).

It should be acknowledged that there is a critical dilemma in discussion of mental health, whereby what is a continuum (Keyes, 2002) can become categorical, through the terminology of 'disorders' (DfE, 2018; Sadler et al., 2018; Vizard et a., 2021). This is acknowledged, together with the relative view of experiences, that mental health is something that can fluctuate for individuals. There is also an imperative to understand the issues of mental health through a preventive lens and understand mental health promotion as an important part of intervention, prior to offering support to 'disorders'. These are the positions adopted within this study. When discussing prevalence of mental health in this study, the term '*mental health disorder*' is used, as this is what is typically used within the literature (DfE, 2018; Sadler et al., 2018; Vizard et a., 2021). However, when considering issues of mental health through the preventative lens, the terms '*experiencing poor mental health*' and '*mental health needs'* are used, to reflect the continuum and fluctuation of mental health.

### 2.2.2 Mental Health Support in Educational Settings

Currently, there is a significant gap between the need for mental health services and mental health provision, worldwide (WHO, 2013); it is estimated that in the United Kingdom (UK) one-quarter of children and young people (25.2%) experiencing mental health disorders receive specialist treatment (Ford et al., 2007) from mental health support specialists (Sadler et al., 2017). In fact, teachers were the most commonly cited source (48.5%) for mental health support, followed by primary care professionals (33.4%) such as General Practitioners (GPs) (Sadler et al., 2017). This data contributes to the rationale for educational settings offering a safe place to support and promote positive mental health and wellbeing, which is strongly backed by evidence (Vostanis et al., 2013) recognising the value of educational settings.

Positive correlations have been found between mental health and school belonging (Papayiotou et al., 2019). It is argued that educational settings offer

pupils a safe and affirming environment which can foster the development of protective factors against psychosocial adversity, including experiences of poor mental health (DfE, 2018). Research exploring variability in response to psychosocial adversity and risk factors has highlighted variance in individual outcomes (Fergusson & Lynesky, 1996; Gough & Gulliford, 2020), demonstrating the complex interplay between risk and resilience (Masten & Tellegen, 2012). Early research into resilience found that positive school experiences and secure and supportive personal relationships can promote resilience in children and young people (Rutter, 1999), where resilience is seen as a process of adaptive change from successfully engaging with risk (Luthar et al., 2000). Also, through safe and effective safeguarding (DfE, 2019), opportunities for sport and leisure activities and social opportunities in educational settings, children and young people are more likely to be resilient to risk and psychosocial adversity (DfE, 2018; PHE, 2016).

Subsequently, educational settings have been acknowledged as having a pivotal role in promoting and supporting children and young people's mental health and wellbeing (Vostanis et al., 2013; Weare & Nind, 2011). Therefore, governmental policies are increasingly targeting the promotion of mental health in schools to support children and young people towards a positive life trajectory (DfE, 2018; PHE, 2016). For example, the No Health Without Mental Health (DoH, 2011) framework, the Closing the Gap: Priorities for Essential Change in Mental Health (DoH, 2014) initiative, and the Transforming Children and Young People's Mental Health Provision: a green paper (DoH & DfE, 2017).

Nonetheless, despite political and public agendas highlighting the opportunity and need for mental health and wellbeing provision in educational settings, there are many barriers to this being implemented (DfE, 2017). The findings from a survey conducted by the DfE, of 2780 educational settings in the UK, found that whilst settings felt they were in a unique position to support mental health and wellbeing and fostered an ethos that promoted wellbeing, 74% reported difficulties commissioning local services and 71% reported lack of funding as major barriers to providing effective mental health provision (DfE, 2017). There is a need for external agencies to support staff in educational settings with early

identification of mental health needs, targeted and specialist work, and continuous training (Sharpe et al, 2016). Also, the responsibility placed on school staff could lead to stress and challenge their sense of perceived competence and expertise (Ekornes, 2015). Therefore, supporting staff in educational settings to promote mental wellbeing is necessary to reduce the barrier of internal capacity: a lack of staff's awareness and skills required to identify and support mental health and wellbeing (DfE, 2017).

### 2.2.3 Mental Wellbeing in Educational Settings: Summary

The rate of identified mental health disorders in children and young people has steadily increased in England (Green et al., 2005; Sadler et al., 2018; Vizard et al., 2020) and with identified disorders prevalent in one in six 5-to-16-year-olds, and one in four 17-to-22-year-olds. The prevalence of mental health needs currently outweighs the availability of specialised mental health support and services in the UK (Ford et al., 2007) and worldwide (WHO, 2013). Therefore, educational settings have long had a pivotal role in supporting children and young people's wellbeing and mental health (Vostanis et al., 2013); yet despite political and public agendas highlighting the mental health initiative, recognising the need to promote and improve mental health provision for children and young people, the funding and staff capacity in schools are considered significant barriers to providing universal and targeted mental health support in these settings (DfE, 2017).

## 2.3 Adolescent Mental Wellbeing

The previous section considered the prevalence of mental health disorders amongst children and young people in the UK and explored the role educational settings have in providing mental health and wellbeing support.

When examining the prevalence of mental health disorders in children and young people, a rationale for focusing on an older adolescent population emerged. The results, from the mental wellbeing survey discussed above, indicate that rates of mental disorders were highest in adolescents aged 17-to-22-years, with one in four (25%) experiencing at least one probable mental health disorder, and the most at-risk group was identified as young women aged 17-to-22-years, with

27.2% experiencing a probable mental health disorder (Vizard et al., 2020). Further evidence to support the rationale of focusing on an adolescent population in this current study, is that within this at-risk group, nearly half (46.8%) of 17-to19 year olds identified as having a mental health disorder had self-harmed or made a suicide attempt (Sadler et al., 2018).

It is therefore important to explore adolescent mental wellbeing in further detail, to provide a well-evidenced rationale for focusing on this population in the current research study. The following section discusses the difficulties defining adolescence, explores the importance of promoting positive mental health in adolescence and discusses the impact of the Covid-19 pandemic on adolescent's wellbeing.

### 2.3.1 Defining Adolescence

Adolescence is the period of transition an individual makes from childhood to adulthood (Dumontheil, 2016). There is no internationally accepted definition of adolescence as it is often associated with the onset of puberty and engagement in activities preserved for adulthood (UNICEF, 2011). The United Nations (UN) have adopted the definition that adolescence begins when individuals enter the second decade of their lives and ends when they attain an independent role in society (Dumontheil 2016), which falls between the ages of 10 and 19 years (UNICEF, 2011). Whilst it is useful to have a recognised definition of adolescence, it a difficult term to define precisely and any definition should be treated with caution. The definition above does not take into consideration individual characteristics and cultures which may prevent an individual attaining an independent role in society by the age of 19 years, or that an individual may have attained an independent role before the age of 19.

Attaining 'adult status' is not a biological stage (Arnett, 1997). Whilst the onset of adolescence is often associated with the period of time in which individuals experience the physical changes associated with puberty (UNICEF, 2011), westernised cultures often place value on the development of autonomy, independence and self-sufficiency as defining characteristics of late adolescence (Surrey, 1991). Therefore, societal and economical changes over the last several

decades have significantly impacted the length of adolescence and the process of transition from adolescence into adulthood (Osgood et al., 2005). For example, the increase in the formalised education leaving age in the UK to 18 years in 2015 has resulted in the pursuits often seen as traditional bridges to adulthood: parenting, full time work, and marriage, occurring at a later stage (Clark, 2007). Consequently, the distinction between adolescence and adulthood is not definitive and is continuously evolving with society.

Nevertheless, the period of adolescence, particularly in western cultures, is associated with significant periods of change and transition into an independent, adult world. Subsequently, adolescence can be seen as a unique and challenging period of development.

### 2.3.2 Promoting Positive Mental Wellbeing in Adolescence

Adolescence has been described as '*the age of opportunity'* to reduce the likelihood of poor adulthood outcomes (UNICEF, 2011). Promoting mental wellbeing in adolescence has positive implications for health, academic and social outcomes in adulthood (WHO, 2007), there is a positive association between adolescent's experiences of protective factors against mental health risks and their resilience to challenges and setbacks that might occur (WHO, 2007), resulting in sustained wellbeing in later life (Sameroff, et al., 2003). Experiences of poor mental health in adolescence can result in short- and long-term negative outcomes, therefore, promoting wellbeing, early identification and access to professional support is important during adolescence (Radez et al., 2020) to promote resilience.

However, whilst adolescence has been identified as a critical age to build resilience (Sameroff et al., 2003; WHO, 2007), for those adolescents with significant need indicating external professional help would be valuable, research has found that less than two-thirds access professional help (Sadler et al., 2018) and adolescents, particularly males, appear to show a preference to rely on themselves when experiencing poor mental health rather than seek professional help (Radez et al., 2020). A systematic review exploring young people's views of the barriers to accessing mental health support found that

young people fail to seek support due to the lack of available services, difficulties recognising symptoms of mental health disorders and poor mental health, concerns about confidentiality, embarrassment, stigma and the desire to manage the problem themselves (Gulliver et al., 2010). Also, societal views and attitudes towards mental health and help seeking, and negative experiences of and towards professional help are commonly reported barriers amongst adolescents (Radez et al., 2020). It is widely recognised that limited availability and long waiting lists are key barriers to accessing mental health services but increasing services to meet the demand negates the specific barriers adolescents face (Moore & Gammie, 2018): stigma, embarrassment and attitudes towards professionals.

Therefore, promoting wellbeing and discussions around mental health with adolescents is important to increase their knowledge about and challenge the attitudes and stigma towards experiences of poor mental health, and to increase their awareness of the support available.

### 2.3.3 Covid-19 and Adolescent Mental Wellbeing

In March 2020, the UK entered a national lockdown as a measure to reduce the transmission rate of a novel Coronavirus, Covid-19. As part of the measures, the government closed schools to the majority of pupils and advised individuals to stay at home. The restricted school access remained in place until September 2020, with formal examinations cancelled and replaced by teacher assessments. Restricted school access was implemented again in January 2021 due to a further increase in transmission of Covid-19. The impact of the measures in place during periods of national lockdown on the mental wellbeing of adolescents has been explored.

Initial research hypothesised that the national lockdown may have had a particular impact on adolescents due to the closure of schools and disruption of social relationships (Widnall et al., 2020). Yet initial findings indicated that the lockdown decreased the risk of anxiety and increased wellbeing, particularly in adolescents who were experiencing poor mental health before the lockdown (Widnall et al., 2020). However, further research found that symptoms of depression and anxiety (Bignardi et al., 2020) increased and there was an overall

decrease in wellbeing amongst young people (Kwong et al., 2020), and incidences rates in mental health problems increased since 2017, with 20% of adolescents (17-to-22 years) reporting experiencing at least one probable mental health disorder (Vizard et al., 2020). In addition, more than one quarter of adolescents reported disrupted sleep and feelings of loneliness (Newlove-Delgado et al., 2021) as a result of the Covid-19 pandemic. Also, in regard to adolescents' help seeking behaviours, initial data suggests that around one in five (21.7%) adolescents, aged 17-to-22-years with a probable mental health disorder decided not to seek help due to the Covid-19 pandemic (Vizard et al., 2020). This indicates that the pandemic may have contributed as a further barrier, to those discussed previously, to adolescents seeking mental health support.

Understanding the impact of the Covid-19 pandemic on adolescents' mental wellbeing is in its infancy, as the pandemic is ongoing, and uncertainty continues to prevail. However, it appears that adolescent populations may have been disproportionately affected by the Covid-19 pandemic (Kwong et al., 2020). When considering the transitional nature of adolescence, disruption to school access and cancelled examinations have impacted the traditional pathway towards adulthood, resulting in additional stressors at an already challenging period of development.

### 2.3.4 Adolescent Mental Wellbeing: Summary

Adolescence is a period of time associated with transitional changes and challenges as an individual moves towards adulthood (Osgood et al., 2005). It has been noted as a critical period in an individual's life where experiences of poor mental health can have short- and long-term impacts on adulthood outcomes (WHO, 2007). However, adolescents experience a range of significant barriers to accessing mental health support, with societal views and attitudes towards mental health problems negatively impacting their willingness to seek support and the Covid-19 pandemic has also resulted in less adolescents seeking support. Consequently, promoting wellbeing, addressing stigma and increasing the conversation around mental health in educational settings during adolescence continues to be important, especially following the Covid-19 pandemic which

appears to have disproportionately affected adolescents' wellbeing (Kwong et al., 2020) and help seeking behaviours (Vizard et al., 2020).

## 2.4 Technology, Adolescents and Mental Wellbeing

Given the significant barrier of availability when accessing mental health services (Cliffe et al., 2019; Moore & Gammie, 2018), technology-based tools are being used by the National Health Service (NHS) in England to digitise health care and support the growing demand on services (NHS England, 2017). Also, as stigma and embarrassment are significant barriers to adolescents accessing professional mental health support, technology is being considered as a cost-effective, accessible alternative for adolescents who may otherwise not have access to psychological support (Linardon et al., 2019).

The following section explores adolescents' use of technology, mental health services use of technology, and considers this as a possible avenue for mental health support in educational settings for the identified adolescent population.

### 2.4.1 Adolescents and Technology

The use of technologies such as computers, smartphone and tablets to access the internet has grown exponentially over the last two decades, with most recent figures identifying that 93% of households in the UK had access to the internet in 2019 (Office for National Statistics [ONS], 2019). Adolescents are considered the most connected age group worldwide, with a significantly higher proportion of adolescents aged 15-to-24-years online (71%) in comparison to the total population (47%) (UNICEF, 2011). The way in which adolescents are accessing the internet has also changed over more recent years: tablet and smartphone usage in children and young people has nearly doubled since 2015 as the main devices used to access the internet, making internet access easier and enabling adolescents to be online almost constantly (UNICEF, 2011). Figures show that 83% of adolescents in the UK by 12-to-15-years of age have their own smartphone and 59% have their own tablet device, and 81% of adolescents use a smart phone and 69% a tablet device to go online (ONS, 2019).

However, whilst the vast majority of adolescents have access to the internet (ONS, 2019), a 'digital divide' exists in internet usage at home among adolescents in the UK. Those from middle class families are more likely to have access to the internet at home on a range of devices, in comparison to adolescents from families of lower socio-economic status (SES), and benefit from higher quality and more consistent access to the internet (Livingstone et al., 2005). Yet, internet access in educational settings is near universal. These settings therefore have an important role in ensuring all adolescents have the ability to access, make effective use of, and develop a critical understanding of technology and the internet (Elwick et al., 2013).

Ensuring all adolescents have equal opportunities to use and understand technology and the internet is growing ever more necessary as services, such as health care, move towards online platforms (NHS England, 2017). The digital divide was highlighted during the Covid-19 pandemic, with some children and young people unable to access online learning due to not having the technology or access to the internet. Thus, to ensure equal access to services, it is essential to acknowledge the digital divide.

### 2.4.2 Mental Health Service's use of Technology

In recent years, the use of technology has improved mental health support and data collection for members of the public, doctors and researchers, with mobile devices, including smartphones and tablets, giving new ways to access support, monitor progress and increase understanding of wellbeing (National Institute of Mental Health, [NIMH], 2017). Common technologies currently drawn upon amongst mental health services include websites, helplines, computer games, computerised Cognitive Behavioural Therapy (cCBT) and Attention Bias Modification Treatment (ABMT) (Cliff et al., 2019; Grist et al., 2019; Hollis et al., 2017) and more recently app-based technologies (Firth et al., 2017a; Firth et al., 2017b; Gindidis et al., 2019).

Research into the effectiveness of digital health interventions (DHIs) in healthcare settings found that there are clinical benefits, particularly cCBT for depression and anxiety in adolescents and young adults (Hollis et al., 2017). In

regard to mobile health (mHealth) and MHApps, this continues to be an area that lacks research focus and quality evidence supporting the effectiveness of these technologies to support mental health and wellbeing (Hollis et al., 2017; Lecomte et al., 2020). However, early studies in this area have found that MHApp interventions can lead to a reduction of symptoms of anxiety (Firth et al., 2017a) and depression (Firth et al., 2017b), which is in line with previous reviews of other mHealth and DHIs (Kerst et al., 2020). Existing research in the area of DHIs suggests that this area of healthcare delivery is growing and they offer the potential for widening access, increasing efficiency and improving mental and physical health outcomes (Hollis et al., 2017). Notwithstanding, the overall cost-effective potential for digitising mental health services is high (Huang et al., 2019). However, despite the potential and cost-effectiveness recognised in early research, digitalised health care is yet to be widely adopted and further research is needed to develop a robust evidence-base for this method of service delivery (Hollis et al., 2017).

A service beginning to adopt the use of technology in their service delivery is Child and Adolescent Mental Health Services (CAMHS). Professionals working within these services in England reportedly perceive technology to be helpful in their clinical work as it increases accessibility, convenience and appeal, particularly for adolescents, and can be used as an early preventative measure and psychoeducational tool (Cliff et al., 2019). Also, technology can be used to address personal and societal barriers to accessing mental health services by supporting children and young people who struggle to engage with face-to-face interventions (Cliff et al., 2019). However, despite these noted advantages there are concerns amongst health professionals about the use of technology, DHIs and mHealth. The impact of displacing contact with and replacing helping professionals (Fleming & Merry, 2013; Stallard et al., 2010) is unknown and the safety of individuals experiencing poor mental health in regard to data protection and online safety (MacLeod et al., 2009; NIMH, 2017), is yet to be explored.

Therefore, despite research evidence and positive attitudes towards the perceived benefits of technology in services supporting individuals experiencing poor mental health, technology and particularly newer technologies including

MHApps are reportedly rarely used by CAMHS professionals in England (Cliffe et al., 2019). A key factor potentially contributing towards the slower uptake in newer technologies may be a lack of a robust evidence base (Hollis et al., 2017; Lecomte et al., 2020). The technologies available are growing at a rate in which research cannot keep up with. For example, the amount of MHApps available to download onto smartphones and tablets has grown over the last few years (Torous et al., 2018), with the NHS also developing its own and promoting certain MHApps on their website. However, the research supporting the use of these MHApp interventions is limited, with few apps having rigorous evidence demonstrating their efficacy (Neary & Schueller, 2018). Nevertheless, research has taken a particular focus on the use of these newer technologies in adolescent and young adult populations.

### 2.4.3 Use of Technology for Supporting Adolescents' Mental Wellbeing

The utilisation of mHealth and DHIs has particularly focused on adolescents and young adult populations in recent years (Hollis et al., 2017). This focus has partly been due to adolescents' growing access to and efficient use of technology (ONS, 2019) and also the significant barriers that prevent adolescents seeking professional help or support when they are experiencing poor mental health (Radez et al., 2020; Vizard et al., 2020). In fact, findings suggest 84% of adolescents turn to the internet for health information (Wartella et al., 2016). Therefore, the potential and appropriateness of technology-based interventions for adolescent mental health services is being recognised (Aschbrenner et al., 2019). Furthermore, with approximately 83% of adolescents in the UK having access to a smartphone by 15 years of age (ONS, 2019), DHIs and mHealth provide promising methods for preventative mental health support and interventions for adolescents (Cavazos-Rehg et al., 2020) experiencing barriers to accessing professional mental health support.

An extensive literature review conducted by Liverpool and colleagues (2020) explored the modes of delivery being used to engage adolescents in DHIs. They identified six modes of delivery: websites, computer-assisted programmes, apps, robots, virtual reality and mobile text messaging. Website interventions and computer-assisted programmes were the most common DHIs identified in the

literature search, with them both aiming to disseminate information, and computer-assisted interventions, such as cCBT, were used to support skill development and psychoeducation (Liverpool et al., 2020). Research exploring robots, virtual reality and mobile text messaging interventions was very limited in the search. Whilst the search did not recognise app-based technology as a commonly used DHI, these are a newer technology that are emerging in the field and a research base is beginning to emerge.

Researchers indicate that MHApps are useful tools when engaging with adolescents due to their smartphone access. It is assumed that smartphone apps are likely to be widely accepted by adolescents (Kenny et al., 2016) as a tool to increase their knowledge of mental health disorders and practice skills to manage experiences of poor mental health, without replacing the need for mental health professionals and face-to-face support (Gindidis et al., 2019). A survey of adolescent girls aged 11-to-16-years found that 51% reported they would use an app if they were experiencing poor mental health, whilst 49% reported that they would not (Grist et al., 2018). Previous findings in Australia found that 76% of young adults expressed interest in using MHApps for mental health monitoring and self-management (Proudfoot et al., 2010), indicating that MHApps may be more appropriate and appealing to older adolescents and young adults (Grist et al., 2018; Proudfoot et al., 2010). A factor contributing to this may be the limited amount of MHApps designed specifically for children and young people (Grist et al., 2019). However, a recent systematic review evaluating the current literature concerning the use of apps in the detection, management and maintenance of mental health and wellbeing in young people found that there is not currently enough evidence to support the widespread adoption of these technologies within mental health services (Punukollu & Marques, 2019).

### 2.4.4 Technology, Adolescents and Mental Wellbeing: Summary

The move towards digitalising health care to support the growing demand on services is being recognised (NHS England, 2017). Services such as CAMHS in England are increasing their use of technology and DHIs to improve accessibility and appeal, particularly for adolescents (Cliff et al., 2019). However, research into DHIs is in its infancy, subsequently they are not yet widely utilised.

Interestingly research into DHIs has focused on adolescent and young adult populations, who are recognised as the most connected age group in terms of access to technology and the internet (UNICEF, 2011). Initial research findings indicate the potential technology may have in improving access to mental health support, especially amongst a population that experience barriers seeking professional mental health services when necessary (Radez et al., 2020).

## 2.5 Mental Health Smartphone Applications

Research into the use of technology to support adolescents' wellbeing is limited and is unable to keep pace with the advances in technological development (Grist et al., 2019). In particular, there is a lack of scientifically rigorous research into MHApps (Grist et al., 2019), the most common and fastest growing digital technology being developed (Anthes, 2016; Batra et al., 2017).

A large-scale systematic review of research exploring the effectiveness of MHApps targeting poor mental health for all ages found that they have the potential to be effective in reducing depression, anxiety and stress in individuals experiencing these difficulties (Donker et al., 2013). Three of the MHApps identified across four of the included studies targeted depression and were found to reduce symptoms of depression and anxiety at post-test; a partially guided CBT app was found to significantly reduce symptoms of depression over time; three of the identified papers reviewed a stress inoculation-based app, with significant decreases in state and trait anxiety being reported in the three papers (Donker et al., 2013). These results provide promising evidence to support the use of MHApps to support mental health and wellbeing. However, with over 10,000 MHApps available to download and new apps being regularly developed (Torous et al., 2018) research is unable to keep pace: there are challenges in providing an evidence-base for all the MHApps available and little is known about whether and what MHApps are being utilised to provide direction to the research.

The following section continues to explore MHApps, considering their unique positioning in supporting mental health and wellbeing, and examines the different types of MHApps that are available.

### 2.5.1 The Unique Positioning of Smartphone Applications

Smartphones lend themselves to mental health support as they are usually carried on the person most of the time, are personal devices, and have access to the internet, they are also widely used across ages, incomes and cultures (Proudfoot, 2013). Given the widespread use of smartphones, MHApps are believed to have the potential to improve and increase the accessibility and quality of mental health support (Giota & Kleftaras, 2014); they offer a unique opportunity for accessing health information and support, and self-management interventions are available when and where they are needed (Kenny et al., 2019; Proudfoot, 2013). Users of MHApps report that the most common reason for their use is to learn and practise skills and build habits to support their wellbeing (Rubanovich, Mohr, & Schueller, 2017). Thus, MHApps offer a platform to improve and manage the mental health of any smartphone user (Bakker, Kazantzis, Rickwood, & Rickard, 2016), placing MHApps in a unique position compared to other interventions.

A highlighted advantage of MHApps over other DHIs is that MHApps are easily and immediately accessible at any time and in any environment (Bakker & Rickard, 2019), thus offering the opportunity to expand the availability of evidence-based mental health support (Chandrashekar, 2018). Also, most MHApps are free to download, offering all or some of their content for free, and are designed to be used independently without the need for professional guidance (Qu et al., 2020); making them cost-effective (Hollis et al., 2017) and widely accessible. The NIMH recognises the usability and advantages of MHApps as an anonymous, low cost, accessible, objective and consistent way to access help, monitor progress, and increase understanding of wellbeing (NIMH, 2017). The anonymity obtained through using MHApps has been identified as a factor that may improve help-seeking behaviours in people for whom stigma remains a significant barrier to accessing mental health support (Kenny et al., 2019).

However, the rise in internet and smartphone usage (ONS, 2019) has led to an increase in the number of apps being developed in the field of mental health over the last decade (Cavazos-Rehg et al., 2020; Giota & Kleftaras, 2014: Grist et al., 2018), and given the positioning of apps there is not an expected standard for the

developed apps to be well-evidenced and researched. Therefore, the effectiveness for many of the MHApps available is unknown (Grist et al., 2019; Lui, Marcus & Barry, 2017; Sucala et al., 2017). Research has found that a very small percentage of MHApps available have published research on their effectiveness (Marshall et al., 2019), however many claim to be designed using validated psychological treatments (Qu et al., 2020). Also, it is important for professionals to consider that MHApps that are free to download depend on advertising for funding and thus personal information provided to an app may be shared to third-party sites (Giota & Keltaras, 2014). Therefore, whilst MHApps are in a unique position to offer a low-cost option for increasing the availability and access to mental health information and support (Hollis et al., 2017), further research is needed, and caution needs to be taken by individuals and professionals when using and recommending MHApps (Giota & Keltaras, 2014).

### 2.5.2 Categorisation of Mental Health Applications

The function and content of MHApps vary between apps (Anthes, 2016). Research, systematically reviewing published MHApp studies has identified four key functions of MHApps used in adolescent mental health treatment: assessment, monitoring, psychoeducation and skill practice (Ginidis et al., 2019). These functions of MHApps are not mutually exclusive and MHApps can fulfil multiple functions. The four functions identified by Ginidis and colleagues (2019) will be explored in turn.

#### 2.5.2 (i) Assessment apps

Assessment apps are those in which individuals complete surveys and questionnaires on an online app to collect data for services, such as CAMHS, GPs or other mental health support professionals, replacing the more traditional methods of pen and paper or a face-to-face consultation (Ginidis et al., 2019). These type of MHApps are mostly used by professionals to collect data from psychosocial assessments and are not used by individuals in day-to-day life, as their purpose is to collect data to support in treating the individual most appropriately. For example, 'MyAssessment' is an app that has been used to collect data for intake at a youth mental health service (Bradford & Rickwood,

2015). Research indicates that assessment apps can be helpful at increasing rates of truthful self-disclosure in adolescents, compared to face-to-face consultations, providing a more comprehensive overview of the adolescent's needs, supporting them to receive the most appropriate intervention, treatment and support (Bradford & Rickwood, 2015).

### 2.5.2 (ii) Monitoring apps

Monitoring apps are those in which individuals track information about themselves, such as recording and monitoring thoughts, feelings and behaviours, mood and information about recent events (Ginidis et al., 2019). These apps in their purest form are only used for recording and monitoring events and symptoms, for example 'mobiletype' (Reid et al., 2011). Research has found that monitoring mental health symptoms using 'mobiletype' can increase emotional self-awareness which, when utilised alongside a face-to-face mental health intervention, improved mental health outcomes (Reid et al., 2011). Monitoring apps are also used more regularly for supporting physical health interventions, for example 'DailyBurn Tracker' and 'MyFitnessPal' are often used for weight management (Jensen et al., 2016). However, the monitoring functionality is also a common feature of MHApps but is often used alongside other functions such as skill practice.

### 2.5.2 (iii) Psychoeducation apps

Psychoeducation apps are those that provide individuals with information related to psychological wellbeing, including clinical symptoms of mental health disorders and information on strategies to support the individual (Gindidis et al., 2019). Again, like the monitoring function, psychoeducation is common and used alongside other functions such as monitoring: to the author's knowledge the psychoeducation function is always used alongside a monitoring or a skill practice function, or both. For example, apps such as 'CopeSmart' combine the function of psychoeducation and monitoring together (Kenny et al., 2015), which has been found to promote positive mental health and wellbeing. MHApps such as Headspace offer psychoeducational features, such as courses which focus on managing anxiety, handling sadness and managing work stress, alongside skill practice (Mani et al., 2015). These courses offer sessions to learn

about different aspects of psychological wellbeing (psychoeducation) before learning and practising coping strategies, including guided breathing and mindfulness.

### 2.5.2 (iv) Skill Practice apps

Finally, skill practice apps are those in which individuals are supported to practice skills such as guided breathing (Ginidis et al, 2019). Common types of skill practice apps include mindfulness-based apps (MBapps) such as 'Headspace' or 'SmilingMind' (Mani et al., 2015), and Cognitive Behavioural Therapy based apps (CBTapps), such as 'MoodMission' (Bakker & Rickard, 2019). Skill practice apps commonly include psychoeducation and monitoring functions alongside their main content of practising a specific skill. Research has found that MBapps can be effective at reducing stress and improving mindfulness and self-compassion (Huberty et al., 2019), and are a promising self-management tool for adults with anxiety (Firth et al., 2017a) and depression (Firth et al., 2017b). Recent findings also indicate that using MBapps can significantly improve depressive symptoms and resilience in university students (Flett et al., 2019). Research into the 'MoodMission' CBTapp has found that engagement with the app can increase coping self-efficacy, which in turn was related to improvements in mental wellbeing (Bakker & Rickard, 2019), indicating that CBTapps can also effectively improve wellbeing.

Alternatively, some skill practice apps combine different strategies. For example, 'BlueIce' in which strategies are based on CBT, mindfulness and behavioural activation (Grist et al., 2018) and 'ReZone' which is based on CBT, mindfulness and Attention Bias Modification Treatment (Edridge et al., 2019). Research into 'BlueIce' and 'ReZone' has found that using skill practice apps can result in positive changes and development of skills (Edridge et al., 2019), including slowing thoughts down, reframing thinking, distraction techniques and identifying triggers of negative moods (Grist et al., 2018), which overall improved the adolescent's wellbeing.

### 2.5.3 Mental Health Smartphone Applications: Summary

MHApps are one of the fastest growing digital technologies (Anthes, 2016; Batra et al., 2017) and are widely accessible (Hollis et al., 2017) and uniquely positioned as potentially effective interventions to improve the wellbeing of the user (Chandrashekar, 2018; Rubanovich et al., 2017). Initial research into MHApps appears positive with reductions in symptoms of depression, anxiety and stress being reported (Donker et al., 2013; Firth et al., 2017a; Firth et al., 2017b; Flett et al., 2019). However, there are over 10,000 MHApps available to download, with differing features widely covering the functions of assessment, monitoring, psychoeducation and skill practice, and research has been unable to keep pace with the advances in MHApp technology. Subsequently, only a small percentage of MHApps have research on their effectiveness (Marshall et al., 2019), potentially limiting their uptake amongst mental health services as evidence-based interventions.

## 2.6 Systematic Literature Review

### 2.6.1 Introduction to the Systematic Literature Review

Increasingly, research into DHIs, including MHApps, has focused on adolescent and young adult populations (Donker et al., 2013; Firth et al., 2017a; Firth et al., 2017b; Hollis et al., 2017), identifying MHApps as particularly attractive to young people (Cliffe et al., 2019). This seems based on assumptions that adolescents are efficient users of smartphones and the internet (ONS, 2019) and that there are many barriers that prevent adolescents seeking traditional face-to-face mental health support (Gulliver et al., 2010; Radez et al., 2020; Sadler et al., 2018; Vizard et al., 2020), which could be negated through the use of technology. Authors, such as Kenny and colleagues (2016), have identified the need to gain adolescents' perspectives in regard to their views, preferences and use of MHApps, to support the rationale for using MHApps to support their mental health and wellbeing. The aim of this review is to explore studies that have sought to gather the perspectives of adolescents in regard to using MHApps: the researcher performed a systematic search and review of the literature.

### 2.6.2 Purpose of a Systematic Literature Review

A systematic review is recognised as a scientifically rigorous method to comprehensively identify, evaluate and synthesise existing literature to ascertain what is known in regard to a specific research question (Pettigrew & Roberts, 2008). The process enables a researcher to develop an understanding into what the current conclusions are within the research base (Pettigrew & Roberts, 2008) and establish the consistency of findings across the research area, supporting the development of hypotheses (Mulrow, 1994). Historically, systematic reviews were used in the domain of quantitative research, following a rigorous scientific process. However, qualitative syntheses have an equal place in evidence informed practice.

The literature base exploring the views of adolescents in regard to MHApps is limited, and most research is based on assumptions that adolescents *will* embrace digital technology for mental health purposes (Hollis et al., 2017). The current review aims to identify the research available on the views of adolescents in regard to MHApps, to gain an insight into what existing research has concluded about adolescents' perspectives and whether it can support the assumptions made in the literature (Cliffe et al., 2019). Therefore, the aims of this review will require the systematic synthesis of qualitative research.

### 2.6.3 Qualitative Research in a Systematic Review

Systematic reviews of quantitative research (Dixon-Woods, 2010) typically follow a rigorous structure with a minimum set of items required when reporting the review, such as the PRISMA checklist (Moher et al., 2015). Direction on the best methodology to critically appraise qualitative research, however, with similar rigour to quantitative reviews, has not yet been conclusively established (Campbell et al., 2012; Dixon-Woods, 2010).

There is no 'gold-standard' methodology to synthesise qualitative data and a number of different methods exist (Barnett-Page & Thomas, 2009) including: thematic synthesis (Thomas & Harden, 2008), cross-case analysis (Miles & Huberman, 1994), case survey method (Yin, 1989), meta-narrative (Greenhalgh et al., 2005) and meta-ethnography (Noblit & Hare, 1988). As the meta-

ethnographic approach is considered one of the most well-developed methods for synthesising qualitative data (Britten et al., 2002; Campbell et al., 2003), has been established within educational research (Nobilt & Hare, 1988), and shares origins with qualitative research in the interpretive paradigm (Britten et al., 2002), the current review selected a meta-ethnographic approach framework.

Without an established 'gold-standard' methodology, the prominence of transparency when reporting the search and synthesis processes of a qualitative review is critical (Savin-Baden & Major, 2010); the current review will endeavour to convey such transparency throughout the following sections.

### 2.6.4 Qualitative Synthesis

The term qualitative literature review is synonymous with other terms including qualitative synthesis, meta-synthesis and meta-ethnography, all referring to synthesising understanding from ethnographic accounts (Noblit & Hare, 1988). This review is reported as a qualitative synthesis, applying a meta-ethnographic approach framework. The following sections will discuss the meta-ethnographic framework providing a rationale for its use, together with advantages and limitations.

#### 2.6.4(i) Meta-ethnographic Methodology Overview

The meta-ethnographic framework was developed by Nobilt and Hare (1988) as a method to synthesise understanding of qualitative education research. The method pursues a new interpretation of the research, going beyond the findings of the individual primary studies (Campbell et al., 2003; Campbell et al., 2012), through a formalised analysis of existing findings, following seven identified phases, as follows:

1. Getting started: identify a focus question that qualitative research might inform (termed as Review Question).
2. Describing what is relevant: define the focus of the synthesis, set inclusion criteria, locate relevant studies, and assess quality of identified studies (termed as Study Selection).

3. Reading the Studies: repeatedly read accounts and note interpretive metaphors, concepts or themes, paying extensive attention to the details in the account (termed as Data Extraction).
4. Relationship between Studies: determine the relationship between the studies to decide how they should be synthesised; are the accounts:
    a. Directly comparable
    b. In relative opposition to each other
    c. Dissimilar but related
5. Translation: systemically compare the meaning of metaphors, concepts or themes and their relations across study accounts to identify the range of themes.
6. Synthesising Translations: a 'second level of synthesis' in which the translations from phase 5 are compared to identify common concepts to develop new interpretations.
7. Expressing the Synthesis: communicate the synthesis to the audience in a suitable format.

(Noblit & Hare, 1988)

The method is distinct from systematic literature reviews or meta-analyses that operate within a positivist epistemology (Moher et al., 2015). Meta-ethnography is based in the interpretive paradigm (Noblit & Hare, 1988), concerned with deriving understanding from multiple accounts and was designed specifically to take into account the unique contexts of the primary studies (France et al., 2019). The method is widely adopted in health and social care research (France et al., 2014; Hannes & Macaitis, 2012) and is gaining further popularity in education research (France et al., 2019).

The researcher hoped that the meta-ethnographic approach would provide a rigorous framework for the synthesising of existing qualitative research in the area of adolescent perspectives of MHApps, making meaning from multiple accounts in a range of contexts. The following review will structure itself around the seven phases outlined above.

#### 2.6.4(ii) Advantages

Whilst qualitative syntheses can not draw confident conclusions about the effectiveness of interventions, practices and policies (Campbell Collaboration, 2014), and do not have a standardised approach (Dixon-Woods, 2010), they do have a number of advantages. The systematic synthesis of qualitative research has more reflexivity than quantitative research (Dodgeson, 2019), thus can help to deepen the understanding and advance the theory of a research base (Campbell et al., 2003). It also provides a rigorous methodology to potentially research the 'lived experience' of study participants; this was advantageous to the current qualitative synthesis, concerned with the perspectives of adolescents using MHApps.

#### 2.6.4(iii) Limitations

A qualitative synthesis, however, is not without its limitations. First, given the nature of qualitative data, the interpretation is drawn by the researcher, and thus is potentially subject to biases (Savin-Baden & Major, 2010). To overcome this, transparency is required when reporting the methodology and results of a qualitative synthesis. In addition, limited qualitative research may restrict the questions that can be answered using a qualitative synthesis (Savin-Baden & Major, 2010).

### 2.6.5 Phase 1: Review Question

Following the review of the current literature base, identifying a particular focus on adolescent populations in MHApp research, which appears to be based on a number of assumptions, the following research question was identified:

- What are the perspectives of adolescents, aged 15-to-19-years, towards using MHApps to support their mental health and wellbeing?

### 2.6.6 Phase 2: Study Selection

#### 2.6.6(i) Eligibility Criteria

A set of eligibility criteria were created to identify study characteristics that are appropriate for the aims and purpose of this review. The SPIDER (Sample, Phenomenon of Interest, Design, Evaluation and Research type) formulation was used as a tool to identify eligibility criteria suitable to answering a qualitative

research question (Cooke et al., 2012). The search was also limited to papers published between 2010 and 2020, due to newer app-based technology being the area of interest. The following inclusion criteria, outlined in Table 2.1, were applied when conducting the literature search.

*Table 2.1: Inclusion and exclusion criteria for literature search.*

| Characteristic | Inclusion Criteria | Exclusion Criteria |
|---|---|---|
| *Sample* | Participants' mean age, or age range, is aged 15-to-19 years.<br><br>Any setting e.g., schools, hospital, community | Participants mean age is outside this specified 15-to-19-year age range. |
| *Phenomenon of Interest* | App-based technologies to support mental health; specifically, in terms of anxiety, depression, suicidal thoughts, stress, or self-harm, or combinations thereof. | App-based technology to support mental health was a secondary focus.<br><br>App-based technology to support weight management, sleep, chronic illness, diabetes and relationships.<br><br>Focus on other technologies including websites and text messaging. |
| *Design* | Qualitative or mixed methodology. | Quantitative design only. |
| *Evaluation* | Descriptions of adolescents' perspectives. | Unsupported descriptions.<br><br>Quantitative data with no raw descriptions. |
| *Research Type* | Peer reviewed journal article. | Other publications (i.e., systematic review, article, book). |

### 2.6.6(ii) Rationale for Eligibility Criteria

***Sample:***

The current review seeks to explore the perspectives of participants in late adolescence, defined here as 15 to 19 years of age (UNICEF, 2011). This age range is based on recent figures indicating the increase in probable mental health disorders in this population (Sadler et al., 2018; Vizard et al., 2020), who may

potentially benefit from digital mental health support. Also, previous research has recognised higher rates of willingness to utilise MHApps in older adolescents and young adults (Grist et al., 2018; Proudfoot et al., 2010). Both the mean age and age range are identified in the inclusion criteria, as from initial scoping searches the age-ranges in the limited research were variable: participants were drawn from a pool of 12-to-21 years, extending outside of the "late adolescence" age-range on either side.

All settings were included in the criteria. The scoping searches identified that MHApps were being used in a range of settings including schools and healthcare provisions such as hospitals and mental health services. Given that qualitative research is limited, it was important not to limit the eligible research further.

***Phenomenon of Interest:***

The current review seeks to answer the following question:

- What are the perspectives of adolescents, aged 15-to-19-years, towards using MHApps to support their mental health and wellbeing?

Therefore, only studies that focused on the use of app-based technologies to support mental health and wellbeing, specifically in terms of anxiety, depression, suicidal thoughts, stress, or self-harm, or combinations thereof, were sought for this review. Studies that focused on the use of app-based technology to support individuals with other health-related conditions, such as chronic illness, diabetes and weight management, were excluded, as this is not the focus of the current study.

***Design:***

Since the current review is concerned with the perspectives of adolescents using app-based technology to support mental health and wellbeing, only studies that contained qualitative data were included: mixed methods research was included.

***Evaluation:***

In order to conduct a meta-ethnographic synthesis, which is embedded in the interpretative paradigm, rich qualitative data containing descriptions and

quotations is required (Noblit & Hare, 1988). Therefore, only studies presenting original descriptive data were included.

***Research Type:***

The current review is interested in the raw accounts of adolescents in regard to the use of app-based technology to support their mental health and wellbeing. Therefore, only peer-reviewed journal articles were included in this review, as these publications present raw data. Other publications such as systematic reviews, meta-analyses, and book chapters often synthesise findings and therefore were excluded.

Grey literature was not explicitly excluded from the review, neither was it specifically searched for. Grey literature can make important contributions to systematic literature reviews and therefore not specifically searching for it may have limited the scope of the review by missing valuable data that is not found within published literature. This should be considered as a limitation of this qualitative synthesis.

### 2.6.6(iii) Search Strategy and Identification of Studies

A systematic literature search was conducted in August 2020 on the following databases: PubMed, Web of Science and Scopus. The initial search was widely construed and yielded many results which were not relevant to the research question:

- Apps OR Applications OR Smartphone Apps OR Mobile Apps
- AND: adolescen*
- AND: Mental Health
- AND: Perspective*

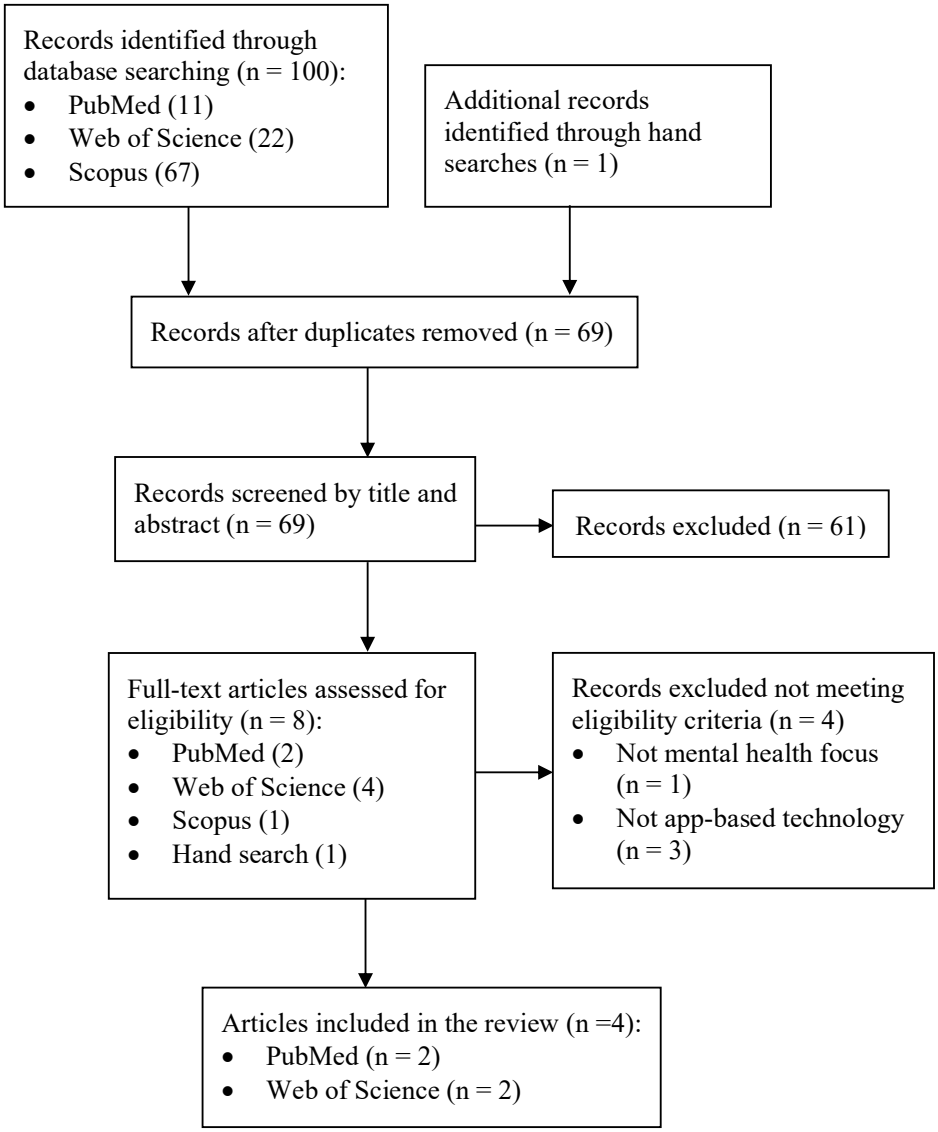
Further scoping searches refined the search terms, using a thesaurus and mapping tools. Table 2.2 presents the resulting search terms used as a result of the process discussed.

*Table 2.2: The search terms for the systematic search.*

| Concept | Search Terms |
|---|---|
| *App-based technology* | (“mobile health" OR "digital health intervention*" OR app OR apps OR smartphone OR "smartphone app" OR "mobile app" OR tablet OR "smartphone application*" OR "mobile application*") |
| **AND** | |
| *Adolescence* | (Teenage* OR adolescen* OR “young per*” OR youth*) |
| **AND** | |
| *Mental Health* | (depress* OR self-harm OR suicid* OR anxi* OR “mental health*" OR stress) |
| **AND** | |
| *Perspective* | (perspective* OR view* OR viewpoint OR accept*) |

The more refined search strategy led to the retrieval of 100 results across the three databases searched; the search strategy and terms for each database search are outline in Appendix A. Figure 2.1 depicts the screening process the researcher employed to identify relevant studies, in accordance with the eligibility criteria, and the results of the process.

*Figure 2.1: Flowchart of systematic search screening process and search results based on PRISMA study identification process (Moher et al., 2015).*




### 2.6.6(iv) Results of Screening Process

In total, 100 relevant articles were identified in the systematic searches of three databases. The titles and publication type were screened in reference to the eligibility criteria, and in cases where the relevance of the study was not clear from the title, a screening of the abstract was undertaken. After screening, 93 articles were removed as either duplications or for not meeting the eligibility criteria. Of these, many explored the relationship between mobile phone usage and mental health or were the use of app-based technology for managing physical health conditions such as obesity and diabetes. Other excluded articles

focused on: the perspectives of professionals and parents not adolescents, other technologies such as websites and text messaging, or were detailing the protocol of a longitudinal study which had yet been completed; Appendix B details the reasons for exclusion of each article.

Full text copies of the remaining seven articles were then downloaded for consideration against the eligibility criteria. At this stage, reference harvesting was undertaken as part of the search: the reference lists of the articles were checked against the eligibility criteria, resulting in one further article being identified. Further cross-referencing checks were undertaken on Google Scholar: no new articles were identified. Overall, this process increased the number of articles for full text review from seven to eight.

The full text for the final eight articles were screened, and four removed as failing to meet eligibility criteria; two were removed as the digital health technology referred to in the abstract was not app-based technology, but text messaging. A further study was omitted as the app-based technology was not the focus of the research, and finally one focused on app-based technology to support relationships.

### 2.6.6(v) Quality Appraisal

There is currently no single widely accepted method to critically appraise the quality of qualitative research included in a synthesis (Munn et al., 2014). Notwithstanding, qualitative syntheses can have an important role in addressing questions which can not be answered with quantitative research and data (Pearson, 2004), thus the confidence of qualitative research included needs to be established. The ConQual approach has been developed as one method to establish dependability and credibility, and then assign an overall ranking to rate the confidence of the qualitative findings (Munn et al., 2014). The ConQual approach was utilised to appraise the quality of the included studies in this qualitative synthesis as the systematic, pragmatic approach fits with the meta-ethnographic approach, establishing the trustworthiness of the overall synthesis. First, the researcher initially ranked the paper high, moderate, low or very low based on the type of research; qualitative studies rank high and expert opinion

ranks low. Next, the dependability of the research was determined by answering the following five dependability questions taken from the JBI-Qualitative Assessment and Review Instrument (JBI-QARI) (Joanna Briggs Institute, 2014):

1. Is there congruity between the research methodology and the research question or objectives?
2. Is there congruity between the research methodology and the methods used to collect data?
3. Is there congruity between the research methodology and the representation and analysis of data?
4. Is there a statement locating the researcher culturally or theoretically?
5. Is the influence of the researcher on the research, and vice-versa, addressed?

If the answers were yes to 4-to-5 of the questions then the ranking remained unchanged, if the answer was yes to 2-to-3 the ranking moved down by one, and if 0-to-1 were answered yes, the ranking moved down by two.

The credibility of the research is established by assessing the congruency between the author's interpretation and the presented data, using three creditability ratings, which also impact the overall ranking shown in Table 2.3, to evaluate the research.

*Table 2.3: Rating schedule to establish credibility of research findings (reproduced from Munn et al., 2014).*

| **Credibility rating** | **Measurement** | **Impact on overall ranking** |
|---|---|---|
| *Unequivocal* | Findings are accompanied by an illustration that is beyond reasonable doubt and therefore, not open to challenge. | No change to ranking (0) |
| *Equivocal* | Findings accompanied by an illustration lacking clear association with it and therefore open to challenge. | Mix of unequivocal/equivocal (-1)<br><br>All equivocal (-2) |
| *Unsupported* | Findings are not supported by the data | Mix of plausible/unsupported (-3)<br><br>No supported findings (-4) |

The ConQual approach was applied to the papers identified in the current qualitative synthesis, Table 2.4 depicts the dependability and credibility ratings, and the overall confidence ranking of the papers.

*Table 2.4: Summary of included studies and quality appraisal (further detail of the studies is included in Table 2.5)*

| Authors | Synthesised Finding | Type of Research | Dependability | Credibility | Confidence Ranking |
|---|---|---|---|---|---|
| Forchuk, Reiss, Eichstedt, Sindh, Collins, Rudnick, Walsh, Ethridge, Kutcher & Fisman, 2016 | Adolescents using a web-based application to create and manage their personal health information and integrative tools to manage their health care, such as a mood tracker, generally accepted the usability of apps to support their mental health care. They reported that the app increased self-awareness and autonomy, improved communication with care providers and fitted well with their treatment requirements. | Mixed methodology; focus groups, questionnaire. | 1. Yes<br>2. Yes<br>3. Yes<br>4. No<br>5. No | Unequivocal | Moderate |
| Gindidis, Stewart & Roodenberg, 2019 | Adolescents' experiences of using apps alongside face-to-face therapy suggest that they have the potential to add value to face-to-face interventions. Adolescents reported that the apps promote a sense of ongoing support and connectedness between sessions and encouraged the practice of mindful meditation. | Qualitative; interviews. | 1. Yes<br>2. Yes<br>3. Yes<br>4. No<br>5. Yes | Unequivocal | High |
| Kenny, Dooley & Fitzgerald, 2016 | The participants responded positively to the experience of using a mental health app protype and reported the tool to be acceptable to adolescents. The participants reported confidentiality and cyber-bullying as key concerns about using apps, in particular apps with social interaction features. The adolescents reported that apps needed to be interesting and relevant for them to engage with the technology. | Qualitative; focus groups. | 1. Yes<br>2. Yes<br>3. Yes<br>4. No<br>5. Yes | Unequivocal | High |
| McManama, LeCloux, Ross, Gironda & Wharff, 2017 | Adolescents endorsed the usability of an app designed to be used in the context of a suicidal crisis. Adolescents reported that the functionality of personalising the app and the variety of content on the app were appealing features. | Mixed methodology; questionnaire, verbal feedback. | 1. Yes<br>2. Yes<br>3. Yes<br>4. No<br>5. No | Equivocal | Moderate |

### 2.6.7 Phase 3 & 4: Data Extraction and Relationship between Studies

The meta-ethnographic approach describes phases for the systematic synthesis of data. Phase three included the reading of studies and extracting data in regard to the concepts and themes of the studies, paying particular attention to the thick descriptions in the accounts (Noblit & Hare, 1988). Phase four involved determining the relationship between studies and whether they were directly comparable, in relative opposition, or dissimilar but related (Noblit & Hare, 1988). Authors of qualitative syntheses are advised to tabulate a summary of the included papers to conveniently allow for a relative comparison of the studies, in terms of the topic, setting, participants, methodology, and data. from each paper (Savin-Baden & Major, 2010).

The tabulation for the current synthesis is presented in Table 2.5, combining phase three and four of the meta-ethnographic approach.

*Table 2.5: Data extraction of included studies in this qualitative synthesis.*

| **Authors, Year, Country, Allocated Number** | **Sample/Setting** | **Topic - Relevant to Review Question** | **Methodology** | **Data Collection** | **Main Concepts and Themes** | **Relationship between Studies** |
|---|---|---|---|---|---|---|
| Forchuk et al., 2016<br><br>Canada<br><br>1 | Adolescents *(N=41)* 16-21 years (*M=17)* with depressive symptoms receiving care from acute and tertiary care facilities for youth. | Exploring adolescents' and mental health care providers' perspectives of the use of a web-based app to provide mental health care to adolescents with mental illnesses. | Descriptive mixed methodology design<br><br>Descriptive statistics and Leininger's qualitative data analysis | Questionnaire and focus groups | • Therapeutic relationship<br>• Engaging<br>• Symptom tracking<br>• Personalisation<br>• Autonomy<br>• Self-awareness<br>• Accessibility<br>• Integration<br>• Simplification | Dissimilar but related to studies 2, 3 and 4. |
| Gindidis et al., 2019<br><br>Australia<br><br>2 | Adolescents (*N=7, Male=1, Female=6*) 12-18 years (*M=15.8*) from an Australian secondary school. | Exploring adolescents' perspectives of the use of apps alongside face-to-face therapy. | Qualitative exploratory design<br><br>Thematic analysis | Semi-structured qualitative interviews | • Access to professional support<br>• Psychologist's age<br>• Engaging<br>• Skill practice<br>• Monitoring and tracking<br>• Relaxing music<br>• Personalisation<br>• Self-care<br>• In control<br>• Availability | Directly comparable to study 3.<br><br>Dissimilar but related to studies 1 and 4. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | • Accessibility | |
| Kenny et al., 2016<br><br>Ireland<br><br>3 | Adolescents (*N=34, 60% male*) 15-16 years from two single-sex secondary schools in Dublin. | Adolescents' views of mental health technologies and their perspectives on a mental health app prototype. | Qualitative exploratory design<br><br>Thematic analysis | Small single sex focus groups (6-8 participants) | • Access to professional support<br>• Community<br>• Engaging<br>• Social acceptability<br>• Safety and confidentiality<br>• Reminder setting<br>• Functionality<br>• Personalisation<br>• Young people in control<br>• Easy to use<br>• Accessible | Directly comparable to study 2.<br><br>Dissimilar by related to studies 1 and 4. |
| McManama et al., 2017<br><br>Northeast United States<br><br>4 | Adolescents (*N=20, Male=4, Female=16*) aged 13-18 years *(M=15.7)* from an outpatient psychiatry department at a general paediatric hospital. | Exploring adolescents' and their parents' perspectives of a web-based app designed to support adolescents with a history of suicidal thoughts. | Descriptive mixed methodology<br><br>Descriptive statistics and theme categorisation | Questionnaire with closed and open-ended questionnaires and participant feedback. | • Access to professional support<br>• Community<br>• Engaging<br>• Personalisation<br>• In control<br>• Easy to use<br>• Accessibility | Dissimilar but related to studies 1, 2 and 3. |

### 2.6.8 Phase 5: Translation

The next phase of the meta-ethnographic approach was translation, in which the studies were systematically compared to identify the range of themes, both common to the studies included in this qualitative synthesis and those that appeared less frequently (Noblit & Hare, 1988). Key themes identified in phase 4 were collated and categorised into key common overarching themes, in preparation for the synthesis of translations in phase 6 and to answer the review question in phase 7; Appendix C demonstrates the method for translating the themes. The range of identified concepts were translated into 10 key themes including:

- Access to professional support
- Sense of community
- Engaging
- Social Acceptability
- Safety
- App function
- Personalisation
- Control
- Self-awareness
- Accessibility

### 2.6.9 Phase 6: Synthesising Translations

Before reporting the synthesis, the translations from phase 5 and identified common concepts were compared to develop new interpretations (Noblit & Hare, 1988). The 10 key themes were translated into five new interpretations; Appendix C demonstrates the method in developing these new themes:

- Relationships and Support
- Acceptability
- Functionality
- Sense of Control
- Accessibility

### 2.6.10 Phase 7: Reporting the Synthesis

The final stage of a meta-ethnographic approach is reporting the synthesis; the following sections report the synthesis in relation to the five themes.

#### 2.6.10(i) Relationships and Support

The relationships and support theme encompassed adolescents' perspectives across three of the four papers synthesised in this review. In broader terms, this theme includes both access to professional mental health support and the sense of community.

***Access to Professional Mental Health Support:***

The importance of MHApps enabling adolescents access to professional support was somewhat apparent in the included studies. Adolescents accessing MHApps alongside face-to-face therapy sessions reported that using the app improved the communication between themselves and their therapists, positively impacting their face-to-face sessions, as the therapist was already aware of the adolescents' experiences (Forchuk et al., 2016). Likewise, adolescents accessing MHApps outside of clinical settings reported that apps should provide easier access to professional help (Kenny et al., 2016) and adolescents were found to respond positively to apps where this function was available (McManama et al., 2017).

***Sense of Community:***

A sense of community was referenced by adolescents in two of the four papers synthesised. Adolescents reported that MHApps themselves can give a sense of community and the feeling of not being alone (McManama et al., 2017), and some adolescents conveyed a preference that MHApps may enable social interactions with peers or others who are going through similar experiences (Kenny et al., 2016), which may enhance the sense of community.

#### 2.6.10(ii) Acceptability

The acceptability theme incorporated a range of concepts identified in the papers, mostly involving adolescents' views that MHApps need to be engaging, safe and accepted by adolescents at a societal level. The concepts were

categorised into three sub-ordinate themes: engaging, social acceptability and safety.

***Engaging:***

The adolescent participants across all four of the synthesised papers referenced the preference for MHApps to be fun and engaging for them to be accepted and used by adolescents. In particular, adolescents shared that gamification could make MHApps more appealing (Forchuk et al., 2016), and varied media content is important (Gindidis et al., 2019; McManana et al., 2017). It appears that MHApps that are repetitive and lack engaging and varied content are not likely to appeal, be accepted or widely used by adolescents (Gindidis et al., 2019).

***Social Acceptability:***

A theme emerging briefly in two of the papers was social acceptability. In Kenny, Dooley and Fitzgerald's (2016) research, adolescents shared that if MHApps are advertised on platforms regularly used by adolescents, such as social media platforms, they may become more socially acceptable, and if more peers are using and talking about MHApps that too is likely to increase their social acceptability. Gindidis and colleagues (2019) found adolescents were more accepting of using MHApps recommended by psychologists who were more similar in age to themselves, indicating the potential importance of social acceptability for adolescents to accept and utilise MHApps.

***Safety:***

Safety and confidentiality were only mentioned in one of the four papers. Adolescents reported the potential risk of cyber-bullying, social stigma and confidentiality when using MHApps (Kenny et al., 2016), due to their connection to the internet and the app accessibility to anyone that owns a smartphone. Thus, it would be helpful for MHApps to demonstrate safety and ensure user data is confidential, to ensure adolescents perceive them as an acceptable support strategy.

### 2.6.10(iii) Functionality

The functionality theme comprises of adolescents' perspectives about functions they found particularly useful on MHApps and functions they would like to see, to make them more appealing to the adolescent population. The concepts were categorised into two sub-themes: app function and personalisation.

***App Function:***

App function was referenced in three of the four included studies; adolescents' perspectives across the studies varied, reflecting the differing nature of MHApps being used in the studies. In one study, the mood tracking feature of the app was reportedly appealing to the adolescents (Forchuk et al., 2016; Gindidis et al., 2019), whereas in another study the meditation skill-practice was identified as a potentially helpful function (Gindidis et al., 2019). An adolescent also expressed the usefulness of MHApps having the function to play relaxing sounds and music (Gindidis et al., 2019). In general, it appears that adolescents are accepting of the various and differing functions and features of MHApps.

***Personalisation:***

Personalisation of MHApps was one of the most widely referenced concepts by adolescents across the four papers synthesised. Adolescents shared that being able to personalise MHApps backgrounds (Forchuk et al., 2016) and content (Gindidis et al., 2019; McManana et al., 2017) would make MHApps more appealing to them. In one study, an adolescent expressed that MHApps need to "stand out" (Kenny et al., 2016), and in another an adolescent shared that they'd like to be able to change the time of reminders to better suit their lifestyle (Gindidis et al., 2019).

### 2.6.10(iv) Sense of Control

The sense of control theme includes adolescents' perspectives across all four of the synthesised papers which referenced MHApps giving autonomy and control to the adolescent in managing their mental health needs. The concepts were categorised into two sub-ordinate themes: control and self-awareness.

***Control:***

Control was another concept that was widely referenced by the adolescents across the four papers synthesised. Adolescents commented on the MHApp being available when they needed it and had control over when they could access support (Forchuk et al., 2016; McManana et al., 2017) and could use it as much or as little as they wanted (Gindidis et al., 2019). The concept of control differs from accessibility in that adolescents perceived themselves as having control over when and how much they used the MHApps and whether they wanted to use the app at all (Kenny et al., 2016). In general, it appears that the autonomy MHApps can give to adolescents in accessing mental health support strategies is appealing.

***Self-awareness:***

Self-awareness was referenced in one of the papers. An adolescent expressed how MHApps can improve self-awareness by supporting them to think more explicitly about how they feel (Forchuk et al., 2016). Again, it seems that adolescents may perceive MHApps as giving them a sense of control over their thoughts and feelings, and access to strategies to manage these.

### 2.6.10(v) Accessibility

Accessibility was by far the most widely referenced concept by adolescents when sharing their perspectives of MHApps in the four papers synthesised. In particular, adolescents commented on the ease of use and access to MHApps (Forchuk et al, 2016; Kenny et al., 2016; McManana et al., 2017) and their availability at anytime, anywhere (Gindidis et al., 2019). The importance of MHApps being simple to use was also referenced (Forchuk et al., 2016), with an adolescent making reference to irrelevant features on the app which made it more difficult to navigate. Adolescents appear to engage well with MHApps as the apps are available on smartphones, which are mostly always on their person, enabling access to support and skill practice wherever they are (Gindidis et al., 2019; McManana et al., 2017).

However, adolescents did reference that whilst MHApps are almost always available, most rely on a stable internet connection, available storage on the

smartphone (Gindidis et al., 2019), and some MHApps are not free and adolescents shared that they are unlikely to access MHApps if they come at a cost (Kenny et al., 2016). Therefore, it appears that accessibility is potentially crucial if adolescents are going to utilise MHApps.

### 2.6.11 Synthesis Interpretation

#### 2.6.11(i) Summary

The theme of accessibility was by far the most commonly cited concept by adolescents, in the included studies. Adolescents appear to perceive having access to MHApps on their smartphones, wherever they want or need them, to be an important and positive aspect of MHApps. Similarly, it appears that the accessibility of MHApps also gives adolescents a sense of control over their mental health support, which adolescents across all four of the papers perceived as another important aspect. Adolescents seemed to enjoy having more control over when, where and how much they could access the MHApps, to fit in with their own daily routines, and many adolescents in the included studies commented on the importance of personalisation of MHApps. It appears that personalisation is an important feature to make MHApps more appealing to adolescent population and increasing their appeal to adolescents may potentially improve their social acceptability, which some adolescents also perceived as a key contributor to whether or not they accessed MHApps.

#### 2.6.11(ii) Theoretical Insights

The interpretation of this qualitative synthesis could be understood in the context of Self-Determination Theory (SDT), a theory of human motivation (Deci & Ryan, 1985). The theory postulates that the context for supporting an individual's experience of competence (the need to master or control the outcome), relatedness (the need to interact and be connected with others), and autonomy (the need to be causal agents), are required for autonomous motivation and engagement in activities (Gagné & Deci, 2005). These three psychological needs were all referenced by the adolescents when gaining their perspective of MHApps. The relevance of SDT has been recognised in research as a theory which can provide a foundation for the development of interventions within physical and mental health-care contexts (Ng et al., 2012), as a conceptual

framework to explore antecedents and outcomes of motivation for health-related behaviours.

#### 2.6.11(iii) Limitations of Qualitative Synthesis

Aforementioned, a key limitation of qualitative syntheses is the interpretation is subject to researcher bias (Savin-Baden & Major, 2010; Soilemezi & Linceviciute, 2018). In this review, only one reviewer has been involved in the synthesis process due to practical limitations and time constraints. Thus, it is important to acknowledge that the researcher's experiences and views based upon personal experiences, working with young people in educational settings, and epistemological standpoint of this current research, as a critical realist (see Section 3.2.1), have shaped this current review and interpretation. Additionally, another key limitation of this qualitative synthesis is the small number of studies included in the review, which makes the extent of publication bias unclear.

## 2.7 Rationale for the Current Study

### 2.7.1 Conclusions, Unique Contribution and Aims of this Study

Most recent data indicate that one in four adolescents aged 17-to-22-years have a probable mental health disorder (Vizard et al., 2020), and the current prevalence of mental health disorders outweighs the availability of specialised mental health support and services (Ford et al., 2007; Sadler et al., 2018; WHO, 2013). In fact, educational settings are recognised as having an important role in supporting and promoting mental health and wellbeing (UNICEF, 2011). Teachers are the most commonly cited source for mental health support amongst children and young people (Sadler et al., 2017), and educational settings have been at the centre of governmental strategies for mental health and wellbeing over recent years (DfE, 2018; DoH, 2011; DoH, 2014; DoH & DfE, 2017; PHE, 2016). However, funding and staff capacity in educational settings remain significant barriers to providing universal and targeted mental health support in these settings (DfE, 2017), and the Covid-19 pandemic appears to have had a disproportionate impact on the wellbeing of adolescents (Kwong et al., 2020; Widnall et al., 2020).

With the capacity of mental health services and educational settings being overrun by demand (Sadler et al., 2018), research in recent years has focused on the use of technology to support mental health and wellbeing (Cliffe et al., 2019; Hollis et al., 2017; NIMH, 2017). There has been a particular focus on adolescent and young adult populations in this research, potentially due to their efficient use of and access to technology and the internet (ONS, 2017) and research highlighting significant barriers that prevent adolescents accessing traditional systems of mental health support (Radez at al., 2020; Vizard et al., 2020). MHApps have been one emerging technology in the recent research and initial findings have shown promising results into the effectiveness of MHApps at improving wellbeing (Bakker & Rickard, 2019; Firth et al., 2017a; Firth et al., 2017b; Hollis et al., 2017), and adolescents appear to have a favourable attitude towards utilising MHApps (Forchuk et al, 2016; Gindidis et al., 2019; Grist et al., 2018; Kenny et al., 2016; McManana et al., 2017; Proudfoot et al., 2010).

However, with continuing technological advances in app-based technology and over 10,000 MHApps available to download (Torous et al., 2018), research into the effectiveness of the available MHApps can not keep up and many have a limited evidence base, if one at all (Marshall et al., 2019). The lack of an evidence base for many MHApps appears to be one of the significant barriers to the uptake of MHApps and similar technologies by mental health support services (Cliffe et al., 2019).

Subsequently, the researcher aims to conduct the first known study to explore whether adolescent populations aged 16-to-18-years are accessing MHApps, what MHApps are popular amongst adolescents and whether there is a relationship between MHApp use and mental wellbeing, using a mixed method, online survey design. It is hoped that the results from this research will give direction to future research in the field, to develop an evidence base for MHApps, that are likely to be accepted and utilised by adolescents. This may then impact their uptake by mental health services and educational settings, as a credible, widely accessible, cost-effect strategy to promote mental health and wellbeing.

### 2.7.2 Research Questions

Therefore, the current study aims to answer the following, overarching research question:

- What MHApps, if any, are being utilised by adolescents aged 16-to-18 years in sixth form provisions, and is there a relationship between app usage and mental wellbeing?

This will be answered through investigating the following sub research questions:

1. Are adolescents utilising MHApps and are there demographic differences in utilisation?
2. Is there an interrelationship between type of app, frequency of usage, duration of usage, and mental wellbeing?
3. Has the Covid-19 pandemic had an impact on adolescents' utilisation of MHApps?
4. What MHApps are popular amongst 16-to-18-year-olds?
5. What are the shared characteristics of MHApps used amongst adolescents?

# Chapter III Methodology

## 3 Method

### 3.1 Aim and Structure of Method

This chapter aims to describe and critique the methodology adopted in the current study. It begins with an examination of philosophical assumptions which underpin research paradigms within psychological and educational research, and identification of the paradigm that underpins this study. Research methods are then discussed, identifying the mixed methods design of this research. The characteristics of the current study will then be presented, including the stakeholders, sample characteristics and sample size. The quantitative and qualitative designs of the current study are then discussed in turn. Finally, the recruitment and implementation processes and ethical considerations are discussed.

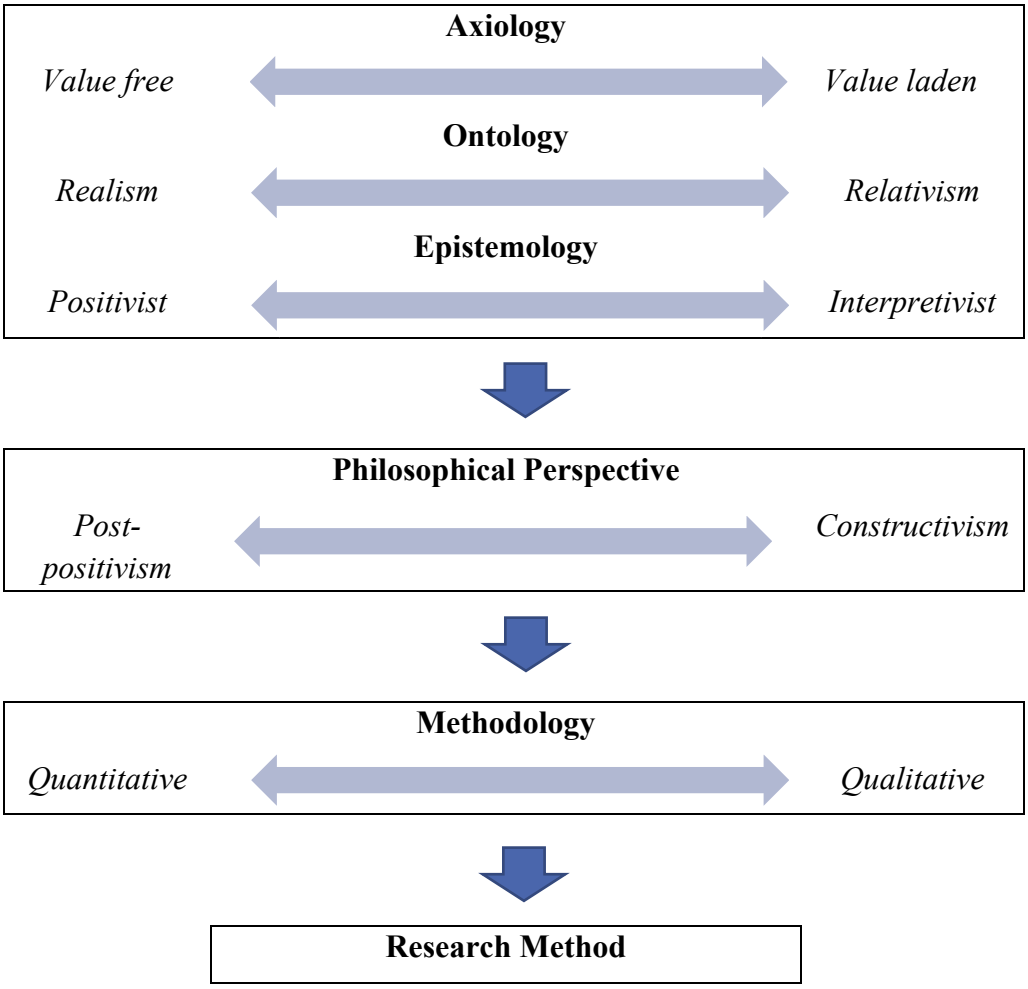
### 3.2 Philosophical Assumptions and Paradigms

Research practices in psychological and educational research exist within different philosophical paradigms depending on the researcher's basic assumptions and beliefs regarding the axiology, ontology and epistemology of the research (Al-Ababneh, 2020; Mertens, 2014):

- **Axiology:** the nature of ethical behaviour.
- **Ontology:** the basic assumptions made about the nature of reality, falling on a continuum between realism and relativism.
- **Epistemology**: a philosophical concept that refers to the assumptions made about what knowledge is, and how knowledge is generated.

Understanding philosophical paradigms is an important part of research. This positioning impacts the researchers' motivations and intent (Robson & McCartan, 2016), affecting methodological decisions and the methods adopted throughout the research process (Crotty, 1998): Figure 3.1 demonstrates the relationship between the core beliefs, philosophical perspective, methodology and research method.

*Figure 3.1: Relationship between axiology, ontology, epistemology, philosophical perspectives, methodology and research methods (adapted from Crotty, 1998).*




As a researcher's philosophical stance influences the perspective and methodology of the research, it is important to explore the major paradigms and identify the paradigm underpinning the current study. In psychological and educational research there are four major paradigms: post-positivism, constructivism, transformative and pragmatic (Mertens, 2014). Post-positivism and constructivism are two polarising paradigmatic standpoints, and transformative and pragmatic are standpoints that attempt to reconcile the opposing assumptions of the two polarised paradigms (Mertens, 2014). Each paradigm has a set of basic assumptions in regard to the axiology, ontology and epistemology: Table 3.1 describes the basic assumptions of the four major paradigms.

*Table 3.1: Major research paradigms in psychological and educational research (adapted from Mertens, 2014).*

| | **Post-positivism** | **Constructivism** | **Transformative** | **Pragmatic** |
|---|---|---|---|---|
| *Axiology* | Informed consent; minimal harm; equal opportunity | Balanced representation of views; raise participant's awareness. | Respect for cultural norms; promotion of human rights; increase in social justice; reciprocity. | Researchers' values and politics influence the knowledge gained and desired end. |
| *Ontology* | One reality exists but can only be known imperfectly within a specific level of probability. | Multiple, socially constructed realities exist; reality is not an objective truth. | Accepts various versions of reality are based on social positioning; conscious to the consequences of privileging one version of reality over another. | Individuals have their own unique interpretation of reality. |
| *Epistemology* | Objectivity is important; knowledge is limited to what can be observed; observed knowledge can be influenced by knowledge held by the researcher. | Knowledge is interactive and is constructed through social discourse; outcomes are rooted in the context; researcher has a role in the construction and interpretation of knowledge. | Interactive link between researcher and participants; addresses positioning of power and trust. | Relationships in research are determined by what the researcher deems appropriate to the research question. |
| *Methodology* | Quantitative data; deductive reasoning; controlled designs; quasi-experimental. | Qualitative data; inductive reasoning; flexible research designs; naturalistic settings. | Primarily qualitative data, but quantitative and mixed methods can be used. | Mixed methodology: method is driven by research purpose and questions. |

### 3.2.1 The Selected Paradigm: Critical Realism

The researchers philosophical positioning as a pragmatist is reflected in the use of a mixed methodological design, explained in Section 3.3.3. Research questions exploring the relationship between MHApp usage and mental wellbeing were addressed through quantitative approaches and a questionnaire design. An additional qualitative investigation was conducted into the MHApps being utilised by adolescents, using secondary data, to gain further insight into the factors that may impact adolescents' utilisation of MHApps. As this study uses a combination of approaches, the complexity of the ontology and epistemology needs to be addressed by adopting a perspective that can manage the problems that may arise when amalgamating paradigmatic assumptions. Therefore, the researcher adopted the approach of critical realism to answer the research questions of this study.

Critical realism is a relatively new philosophical approach based largely on the work of Bhaskar in collaboration with other social theorists (Gorski, 2013). It is often seen as a middle-ground approach that attempts to overcome the polarising nature of the assumptions held in positivism and constructivism (Archer et al., 2013; Zachariadis et al., 2013), with ontological assumptions spread across three domains:

- the real; mechanisms and structures that have generated actual events,
- the actual; events generated by the mechanisms,
- and the empirical; experiences and observations of events (Archer et al., 2013; McEvoy & Richards, 2006).

Critical realists argue that the real world operates as a multi-dimensional system where effects arise due to interactions between social structures, mechanisms and human agency (McEvoy & Richards, 2006). Therefore, from a critical realist perspective, the research question is central to the research project and the choice of methods should be dictated by the nature of this.

Historically, critical realists have been sceptical of quantitative methodologies and statistical analyses, often referring to them as simplistic and failing to consider the complexities of social systems (Archer et al., 2013). However, mixed method research is increasing in popularity and the value of adopting a

critical realist perspective to this research is being recognised (Pratschke, 2003; Zachariadis et al., 2013). The ontological assumptions of critical realism and the placing of the research question at the centre of the project lends itself to a mixed methodological design.

Whilst it is recognised that pragmatism is often the adopted approach for mixed methodology research, the proposed research aims to understand adolescents' use of MHApps in a realist manner. Previous research has explored the attitudes of adolescents towards MHApps (Grist et al., 2018; Kenny et al., 2016), the effectiveness of MHApps in clinical settings (Donker at al., 2013), and focus has been given to a specific app in some research (Grist et al., 2018). This research is interested in whether adolescents are utilising MHApps in real-life settings and what MHApps adolescents are engaging with, to uniquely contribute to and give direction to further research the field. Therefore, considering the research questions and purpose of this study, a critical realist perspective was adopted.

## 3.3 Research Designs

### 3.3.1 Quantitative Designs

Quantitative research involves the collection and analysis of numerical and categorical data, aiming to confirm or reject a hypothesis or theory in an attempt to explain a phenomenon (Robson & McCartan, 2016). Quantitative research designs can either be experimental or non-experimental:

- Experimental designs are controlled and involve measuring the effects of a manipulated independent variable on a dependent variable, whilst controlling the effects of extraneous variables (Mertens, 2014). Randomised-control trials are deemed the 'gold-standard' of experimental designs; however, these designs lack ecological validity and are not always the most appropriate for research in psychology and social contexts (Breakwell et al., 2012).
- Non-experimental designs do not require the independent variable to be manipulated and can be comparative or correlational. Comparative designs focus on comparing two or more groups on different variables to establish whether there are differences between the groups, and correlational designs examine the strengths and direction of

relationships between or among variables within a selected population (Mertens, 2014).

### 3.3.2 Qualitative Designs

Qualitative research involves the exploration of concepts, such as experiences and beliefs, that are not receptive to measurement and quantitative methodologies, in an attempt to explain a phenomenon in context (Breakwell et al., 2012). There are many different types of qualitative designs that are used in educational and psychological research including the following outlined by Denzin & Lincoln (2011):

- Ethnographic research "asks questions about the social and cultural practices of groups of people" (Buch & Staller, 2007, p.187).
- Case studies thoroughly investigate a complex phenomenon within an identified case.
- Phenomenological research focuses on an individual's subjective, lived experiences (Knaack, 1984).
- Grounded theory is a methodology where data is simultaneously collected and analysed in search for themes that develop into a theory (Mertens, 2014).
- Participatory action research is a collaborate approach undertaken by researchers and participants, that aims to improve practice by involving the individuals that will continue to implement the actions.

### 3.3.3 Mixed Methods and Applied Research

Mixed methodology has been defined as an approach "in which the investigator gathers both quantitative and qualitative data, integrates the two, and then draws interpretations based on the combined strengths of both sets of data to understand the research problem" (Creswell, 2015, p.2).

As illustrated in Figure 3.1, methodology can be seen as a continuum between quantitative and qualitative methods. Mixed methodologists are positioned within the centre of this continuum and the combination of designs can be advantageous in research (Venkatesh et al., 2013). Addressing confirmatory questions through the use of quantitative methodologies and deductive reasoning

and addressing exploratory questions through the use of qualitative methodologies and inductive reasoning (Leppink, 2017), can result in a deeper understanding of the investigated phenomenon, and has the potential to reduce threats to validity that may arise using a single methodology (Wilson, 2016). Mixed methods have been found to be particularly valuable in complex educational and social research contexts (Tashakkori & Teddlie, 2009).

Within mixed methodology research, there are multiple designs which have been identified depending on: the timing of the quantitative and qualitative data collection, how this data is integrated and whether any one methodology has taken a more dominant stance in the research (Creswell, 2014). Creswell (2014; 2015) classified and identified three basic and three advanced designs, described in Table 3.2.

Table 3.2: Creswell's (2014) identified designs in mixed method research.

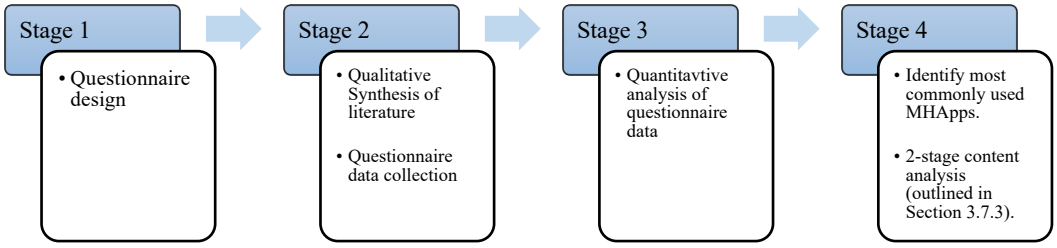
| **Basic Mixed Method Designs** | |
|---|---|
| *Convergent parallel* | A researcher collects quantitative and qualitative data in parallel. Both sets of data are analysed separately and then the findings are compared to provide an interpretation to answer the research question. |
| *Explanatory sequential* | A researcher collects data in two phases: quantitative data is collected first, this is analysed, and then the results lead onto a qualitative phase, which is designed to help to explain the quantitative results in more detail. |
| *Exploratory sequential* | The research begins by collecting and analysing qualitative data, then using these findings to inform the quantitative phase. This design is often used to develop better measures within specific populations and test whether these can be generalised to a larger population. |
| **Advanced Mixed Method Designs** | |
| *Embedded* | This design nests one or more sets of data (qualitative and/or quantitative) within a larger design, such as an experiment. The supplementary data can be collected during, before or after the main data collection. |
| *Transformative* | The researcher uses a social justice theory as a framework for the research, and the theory frames many aspects of the study. |
| *Multi-phase* | Researchers conduct several mixed method projects, with varying designs, in a longitudinal study with a common objective for the multiple projects. |

## 3.4 Research Design of the Current Study

The current study used an embedded mixed method design to answer the exploratory research questions presented in Section 2.7.2. A non-experimental questionnaire design was used to collect data, to answer confirmatory questions about adolescents' use of MHApps and their mental wellbeing. To further explore the MHApps being utilised by the adolescents, secondary data were collected in the form of MHApp descriptions from the Apple App Store (Apple, n.d). The purpose of the secondary data and qualitative analysis was to provide a greater insight into adolescents' use of MHApps, including the types of MHApps adolescents are engaging with and the characteristic of the most used MHApps.

The study was conducted across four stages, as illustrated in Figure 3.2 and discussed in further detail across Sections 3.6 and 3.7.

*Figure 3.2: An illustration of the embedded mixed methods design of this current study.*




## 3.5 Characteristics of the Current Study

### 3.5.1 Stakeholders

A number of stakeholders were considered when planning and implementing the current research. During the process, the needs and rights of the stakeholders were considered and managed in line with the British Psychological Society's ethical codes of practice (2014). The main stakeholders are outlined below:

- Participating schools and sixth form pupils; the schools and pupils dedicated time to support this research, with the hope at developing a greater awareness of the overall wellbeing of the sixth form pupils, allowing for interventions to be targeted towards the needs of the pupils.

- The Local Authority and Educational Psychology Service (EPS) funding the researcher through a bursary placement; practical considerations will include the impact and benefit of this research to educational psychologist (EP) practice, which will be disseminated to the placement EPS.
- The University of Nottingham (UoN); the current research was completed as a required part of the DAEP.
- Educational Psychologists and other professionals working within a mental health context; the aim of this research was to develop a clearer understanding on the impact of MHApps on mental wellbeing and whether young people are likely to accept this technology, impacting on evidence-based practice.
- The wider educational and psychological research communities; it is hoped that the aim and contribution of this research will extend and give direction to further research in the field of MHApps.

### 3.5.2 School Characteristics

Six state funded secondary schools within the East Midlands participated in the research. All had a sixth form provision for pupils aged 16-to-18-years. School characteristics are outlined in Table 3.3 below, and further details of the recruitment process are presented in the recruitment and implementation section (Section 3.9).

*Table 3.3: Characteristics of participating schools.*

| School | Sixth Form entry requirements | Most recent OFSTED grading and year | % Pupils whose first language is not English | % Eligible for free school meals | % Girls on Roll |
|---|---|---|---|---|---|
| *A* | Minimum GCSE Grade 4 maths, Grade 5 English Language, plus specific-subject entry criteria | Outstanding 2020 | 9.9% | 7.8% | 97.3%* |
| *B* | Five GCSEs at a minimum of Grade 4, including Maths and English. | Good 2019 | 19.9% | 36.7% | 50.2% |
| *C* | Five GCSEs or equivalent at a minimum of Grade 4, including Maths and English, plus specific requirements for subjects. | Requires Improvement 2018 | 9.9% | 30.4% | 51.7% |
| *D* | A GCSE average point score of greater than 4.5, from all GCSE results, and either Maths Grade 4 and/or Grade 4 in English language or literature. | Good 2017 | 9.4% | 20.6% | 48.1% |
| *E* | A minimum of five GCSEs at Grade 4 or above, including maths and English language. | N/A** | 8.4% | 28.9% | 49.5% |
| *F* | For general entry, 330 points from 8 best GCSEs, including Maths and English literature or language at a Grade 5 or above: to access all subjects 360 points are needed, | Outstanding 2011 | 6.7% | 17% | 48.1% |

**Girls school with mixed sex sixth form.*

*** School recently moved to academy status and has not yet had an OFSTED inspection.*

### 3.5.3 Pupil Characteristics

From the six secondary school sixth from provisions recruited a total of 305 pupils provided informed consent to participate in the research (see Table 3.4). Following data cleaning procedures, as explained in Section 3.6.5(i), full questionnaire data from 253 pupils (67.2% female), aged 16-to-18 years ($M$ = 16.68; $SD$ = 0.652) was included in the study's analysis.

*Table 3.4: Pupil characteristics.*

| School | Total participating pupils | Mean age | Male:Female Ratio | Ethnic Group % White* |
|---|---|---|---|---|
| *A* | 46 | $M$ = 16.65<br>$SD$ = 0.640 | 7:34 | 93.5% |
| *B* | 80 | $M$ = 16.54<br>$SD$ = 0.615 | 27:52 | 87.5% |
| *C* | 62 | $M$ = 16.79<br>$SD$ = 0.681 | 23:39 | 93.5% |
| *D* | 5 | $M$ = 16.20<br>$SD$ = 0.447 | 0:4 | 100% |
| *E* | 41 | $M$ = 16.90<br>$SD$ = 0.625 | 13:28 | 92.7% |
| *F* | 19 | $M$ = 16.6<br>$SD$ = 0.684 | 6:13 | 68.4% |

*A full breakdown of the participants ethnicities can be found in Section 4.2.1

### 3.5.4 Selection of Pupil Participants

Eligibility criteria were outlined in the information letter (Appendix D) to participating schools. The eligible pupils from the six sixth forms were invited to participate in the research (opt-in) and were advised that participation was totally voluntary. The rationale for recruiting sixth form pupils (16-to-18-year-olds) was linked to a number of key factors explored in Chapter 2, Sections 2.3 and 2.4. First, recent survey data of children and adolescent's mental wellbeing indicates that probable mental health disorders increase in prevalence in adolescents aged 17-to-22-years, with one in four (20%) experiencing at least one probable mental health disorder (Vizard et al., 2020), and the majority do not seek professional help (Kazdin & Rabbitt, 2013). Also, the utilisation of mobile health technology has particularly focused on adolescents and young

adult populations in recent years (Hollis et al., 2017), due to their growing access to and efficient use of technology (ONS, 2019).

## 3.6 Quantitative Research Design of the Current Study

### 3.6.1 Quantitative Research Questions

The purpose of the quantitative design was to answer the main research question, in particular the following confirmatory questions in regard to adolescents' use of MHApps:

1. *Are adolescents utilising MHApps and are there demographic differences in utilisation?*
2. *Is there an interrelationship between type of app, frequency of usage, duration of usage, and mental wellbeing?*
3. *Has the covid-19 pandemic had an impact on adolescent's utilisation of MHApps?*

### 3.6.2 Quantitative Research Design

In line with a critical realist perspective, the research question is central to this study, and considering the research question, a non-experimental, correlational design appeared to be the most suitable design. This will now be discussed.

#### 3.6.2(i) Data Collection Method: Questionnaire

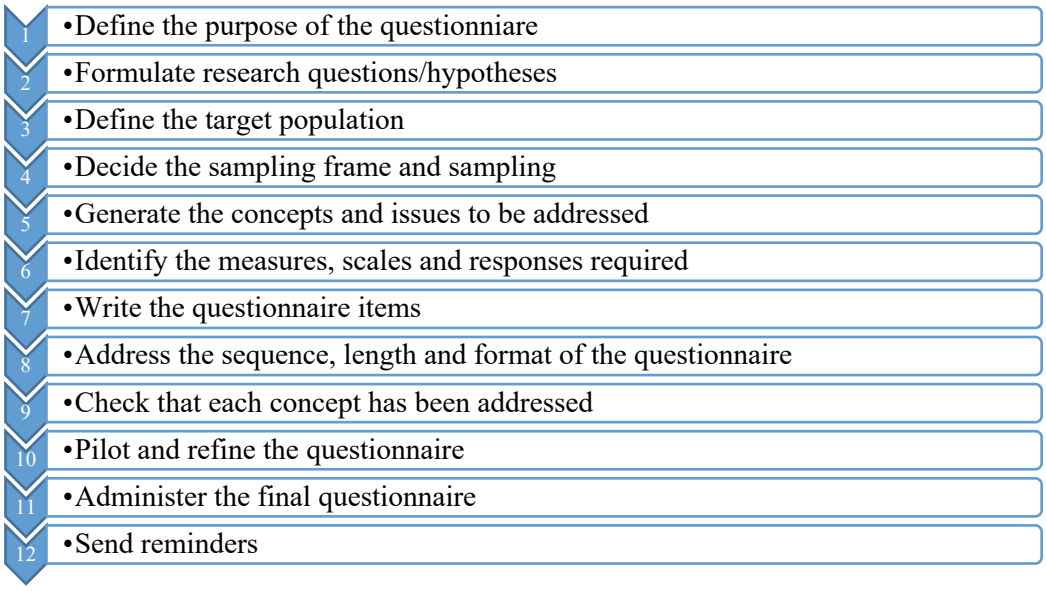
Questionnaires are a well-established, widely used data gathering technique in psychological and social research and are almost always used in non-experimental deigns (Robson & McCartan, 2016). Many advantages of web-based questionnaires (Jones et al., 2008) have been identified. First, questionnaires can be efficient at gathering large amounts of data about attitudes, beliefs, values and motives, over a short period of time at a very low cost. They allow for anonymity which can improve honesty in responses, especially when the nature of the research is sensitive. Also, given the standardised nature of the questionnaire and its administration procedure, threats to reliability can be limited, whilst obtaining high amounts of standardisable data (Jones et al., 2008).

However, questionnaires have a number of disadvantages. The self-reported nature of a questionnaire can threaten reliability, as results may be skewed by

participant error or their want to give socially desirable responses (Jones et al., 2008) which may not be detected by the researcher. Also, data may be affected by the participants' motivation, experience, knowledge and personality (McDonald, 2008). Questionnaires also yield low response rates, which can put into question whether the collected data is representative of the whole population it was distributed to (Robson & McCartan, 2016).

Cohen and colleagues (2018) propose a twelve-stage planning approach to questionnaire design, as depicted in Figure 3.3, in an attempt to maximise the benefits of questionnaire designs in research. The twelve-stage approach was utilised in this study when planning and developing the questionnaire, Section 3.6.3(i) details the steps taken by the researcher at each of the twelve stages.

*Figure 3.3: The questionnaire planning approach (adapted from Cohen et al., 2018).*




### 3.6.2(ii) Variables

The variables and their corresponding constructs used in this arm of the study are shown in Table 3.5. The measures used for each of the variables are detailed in Section 3.6.4.

*Table 3.5: The study's variables.*

| Variable Function | Construct |
|---|---|
| *Predictor* | Type of MHApp<br>Frequency of MHApp use<br>Duration of MHApp use |
| *Outcome* | Mental Wellbeing |
| *Covariate* | Gender Identity<br>Ethnic Group<br>Eligibility for Free School Meals (FSM) |

### 3.6.2(iii) Quality of Research

It is important to consider reliability and validity to ensure rigour in the research process and trustworthiness in the findings and the conclusions (Robson & McCarten, 2016). Conclusions from quantitative research can have a real-world impact and therefore need internal reliability: the extent to which the findings observed are due to the effect of the independent variable, not an unknown extraneous variable (Mertens, 2014).

Therefore, when developing and conducting this non-experimental study, the following key factors were considered:

- Reliability is concerned with the stability or consistency in which something is measured. Internal consistency is important when utilising a questionnaire, to ensure that items on the measure give consistent results.
- Construct Validity is concerned with whether the construct being investigated is measuring what it intends to and is being measured accurately. It is typically determined by the actual results following data collection and analysis. A pre-existing mental wellbeing measure with good internal consistency and therefore construct validity (Clarke et al., 2010) was used, (as discussed in Section 3.6.4(iii)) and a pilot study was implemented to ensure the questionnaire had construct validity before distributing to a larger population.
- External Validity is concerned with the degree to which findings can be generalised to the wider population outside of the particular groups studied and the context in which the study took place. If the conclusions

can be applied to a wider population, the results are said to be externally valid and generalisable.

### 3.6.3 Research Procedure

#### 3.6.3(i) Questionnaire Design

The twelve-stage approach recommended by Cohen and colleagues (2018) was followed when designing the questionnaire (Figure 3.3). The following actions were taken by the researcher at each questionnaire planning stage:

**Stages 1 - 4:** The first stages of the questionnaire design were directly influenced by the in-depth review and critique of the literature explored in Chapter 2.

**Stage 5:** The literature review identified concepts and issues to be addressed in the questionnaire.

**Stage 6:** The researcher considered a number of well-established wellbeing questionnaires. The Warwickshire-Edinburgh Mental Wellbeing Scale (WEMWBS) was selected: Section 3.6.4(iii) explores the measures considered and the rationale behind using the WEMWBS.

**Stages 7 - 9:** These stages involved the generation of the questionnaire; careful consideration was given to the wording, accessibility, layout and presentation of the questions, ensuring that it was suitable for the target population identified in stage 4.

**Stage 10:** This stage involved the piloting of the questionnaire; Section 3.6.3(ii) details the procedure and outcomes of the pilot study.

**Stage 11:** The questionnaire was edited in response to the results from the pilot study and influences from the researchers reading (Table 3.7).

**Stage 12** The final stage was to send reminders for completion of the questionnaire sent after one week, and again after two weeks of sending sixth forms the link to distribute to their eligible pupils.

### 3.6.3(ii) Pilot Study

The pilot study formed a fundamental part of both the questionnaire development and recruitment processes, ensuring both were fit for purpose. This phase was undertaken by contacting one secondary school with a sixth form provision to participate in the pilot study: after expressing interest the school was sent the information sheet and consent form. After returning a signed consent form, the school were sent an email to circulate to eligible pupils: for the purpose of the pilot study only the 12 pupils studying psychology were sent the questionnaire. Of these, six pupils provided their consent and completed the questionnaire, which, for the purpose of the pilot study included additional questions about the readability and functionality of the questionnaire; Table 3.6 outlines the pilot questions and participant responses: Appendix E presents the template questionnaire used in the pilot study.

*Table 3.6: Pilot questions and participant responses.*

| Question | Responses |
|---|---|
| Was the questionnaire easy to follow? | Yes (100%) |
| Was this questionnaire easy to read? | Yes (100%) |
| Was this questionnaire's font a good size? | Yes (100%) |
| Were any questions or particular wording of questions unclear or confusing? If so which question(s)? | No (100%)<br>• "No, I feel as if these questions are worded well"<br>• "Everything was good" |
| Do you have any further comments about the readability and accessibility of this questionnaire? | • "No, easily readable and accessible"<br>• "None – all were very well worded, clear and easy to read and understand"<br>• "The questionnaire was accessible however when it told me to note down the apps I used, although I only used one, it made me tick answers for 5 apps in order to continue the questionnaire"<br>• "Examples of apps would be helpful" |

As a result of the pilot study changes were made to the questionnaire, as shown in Table 3.7: Appendix F shows the final version of the questionnaire.

*Table 3.7: Changes made to the questionnaire following the pilot study.*

| Question | Question Post-Pilot | Changes made |
|---|---|---|
| 11 | Please select the option which best describes your ethnic group or background:<br>• White (1)<br>• Mixed/Multiple ethnic groups (2)<br>• Asian/Asian British (3)<br>• Black/African/Caribbean/Black British (4)<br>• Other (5)<br>• Prefer not to say (6) | Ethnicity options were adapted in line with review of government guidance on collecting survey data and ethnicity data (ONS, 2009; ONS, 2015) |
| 13 | Do you have any mental health apps downloaded on your smartphone or tablet?<br>*For example: meditation apps (e.g., Headspace, Calm, Balance) mood trackers (e.g., Daylio Journal, Moodpath, Moodnotes), habit trackers (e.g., Habit Tracker, Flora, Habitify), anxiety and depression managment apps (e.g., Clear Fear, MindShift CBT, Wysa), or mental health support apps (e.g., Replika, Pocketcoach, TalkLife)*<br>• Yes (1)<br>• No (2) | A range of examples were included under the question, to reduce the ambiguity in regard to what may be classed as a MHApp. |
| 15 | Which app do you use most frequently? | The question asked which app was most frequently used; this question was not in the pilot questionnaire. |
| 16 | How often do you use the app? | This question referred only to the most commonly used MHApp, rather than all MHApps the participant may have downloaded. |
| 17 | How long do you typically spend on this app? | See Question 16. |
| 18 | Did you have this app downloaded before the COVID-19 pandemic? | See Question 16. |

### 3.6.4 Measures

#### 3.6.4(i) Demographic Information

The questionnaire asked the pupils to provide the following demographic information:

- Sixth form
- Age
- Gender identity
- Ethnic group identity
- Eligibility for free school meals

#### 3.6.4(ii) Mental Health App Usage

In Chapter 2, the lack of research into adolescents' use of new technologies, such as MHApps, to support their mental wellbeing was discussed. In some cases, research has assumed that app-based technology *will* appeal to adolescents for mental health purposes (Hollis et al., 2017; Kenny et al., 2016), due to their uptake of smartphone technology, with 83% of adolescents owning a smartphone by 12-to-15-years of age (ONS, 2019). Early research indicates adolescents aged 11-to-16-years (Grist et al., 2018) and young adults (Proudfoot et al., 2010) express interest in using MHApps to support their wellbeing. Therefore, the approach of this study was to explore these findings further, investigating adolescents use of MHApps in real-world settings.

The final measure asked participants questions about their MHApp usage: Table 3.8 summarises the questions and the rating scales used. No known studies have previously asked adolescent's specific questions about their usage of MHApps. Therefore, the scales were devised by the researcher.

*Table 3.8: A summary of the questions and rating scales used to measure MHApp usage.*

| Question | Rating Scale | Authors Notes |
|---|---|---|
| Do you have any mental health apps downloaded on your smartphone or tablet? | Yes or No | This question was initially asked to allow for those that do not have any MHApps downloaded to move to the next section of the questionnaire, bypassing questions about their app usage. It also allowed for quantifying MHApp users and non-users. |
| What app or apps do you have downloaded? | Written answer | This question was asked to gather qualitative data around the apps being used by adolescents, to allow for qualitative analysis. |
| Which app do you use most frequently? | Written answer | As mentioned in Section 3.6.3(ii), this question was added to improve the usability of the questionnaire. It also contributed towards gathering an understanding of the most popular MHApps used amongst adolescents. |
| How often do you use the app? | 5-point scale, ranging from "*1-to-3 days a week"* to "*Less than monthly"*. | The scales of these questions were devised by considering the different types of apps available, as discussed in Section 2.5.2. Typically, assessment apps would be used less frequently than monitoring apps, which are designed to be used on a daily basis. Also, psychoeducation and skill practice apps are designed to be used on a frequent basis. Skill practice apps are also likely to be used for a longer duration than monitoring apps, with typical meditation sessions on the apps Headspace and Calm lasting around 10 minutes, but some sessions being 3 minutes and others 20 minutes.<br><br>The scales for both these questions had overlapping categories e.g., daily and 1-to-3 days a week, 1-to-5 minutes and 5-to-10 minutes. The overlap was used to reflect the flexibility of MHApp use. |
| How long do you typically spend on this app? | 7-point scale ranging from "*1-to-5 minutes"* to "*Over 30 minutes"*. | |
| Did you have this app downloaded before the COVID-19 pandemic? | Yes or No | These questions were added to understand the impact that COVID-19 may have had on adolescents use of MHApps. |
| Has your app usage increased since the COVID-19 pandemic? | | |

### 3.6.4(iii) Mental Wellbeing

Mental wellbeing was measured using the WEMWBS, a UK developed scale to enable the monitoring of wellbeing (Tennant et al., 2007). The WEMWBS has two scales, the original 14-point scale and the shortened 7-point scale; the 14-point scale was used as this has been more widely and extensively validated as a wellbeing measure. The 14 items (e.g., "I've been dealing with problems well") are scored along a 5-point rating scale, ranging from *'none of the time'* to *'all of the time'*, and an overall score is calculated by summing all the 14-item scores. Scores range from 14 to 70, with higher scores indicating greater positive mental wellbeing, and scores approximate to normal distribution with average scores typically falling around the score of 50 (Morris & Earl, 2017; Tennant et al., 2007).

The WEMWBS has been extensively validated and is identified as being psychometrically sound amongst adolescent and adult populations in the UK (Tennant et al., 2007). The scale has shown high internal consistency in adolescent populations (McKay & Andretta, 2017; Ringdal et al., 2018, Tennant et al., 2007): Cronbach's alpha of 0.87 (95% CI (0.85-0.88)) (Clarke et al., 2010), which indicates that it is likely to measure the construct it claims to measure, showing good construct validity (Taggart, Stewart-Brown & Parkinson, 2015) and reliability. The scale also positively correlates with The World Health Organisation - Five Wellbeing Index (WHO-5), an alternative, validated measure of wellbeing, indicating good concurrent validity (Clarke et al., 2010): it also negatively correlates with measures of opposite concepts (Ringdal et al., 2018; Tennant et al., 2007) indicating good discriminant validity. The WEMWBS has also been validated for use in different settings including schools and wellbeing projects (Tennant et al., 2007).

## 3.6.5 Quantitative Data Analysis

### 3.6.5(i) Data Cleaning

A total of 305 pupils followed the Qualtrics link and logged in electronically to complete the questionnaire. Of this number, 46 pupils chose to withdraw and not participate after reading the information sheet and following the initial questions, leaving a remaining 259 responses, and a further two responses were removed

due to incomplete data. After this, a total of 257 completed questionnaire entries were downloaded and imported into a Statistical Package for the Social Sciences (SPSS), Version 27 (2020), database for analysis. A final screening of the data was completed to ensure no anomalous data was included; none was found.

### 3.6.5(ii) Data Preparation

The SPSS software coded the data into numerical codes e.g. "Yes" was coded as 1 and "No" as 2, and the WEMWBS as "none of the time" is equal to one and "all of the time" is equal to five, when exported from Qualtrics. An overall wellbeing score was computed by adding together the numerical scores on each of the 14 items.

After this, the data was screened. Two participants had selected "other" for their self-assessed ethnic identity and had provided written responses, both of these answers were re-categorised into their known ethnic group: full information can be found in Appendix G. Four respondents chose "other" for their self-assessed gender identity, these four responses were removed from the data set for as the answers provided were deemed inappropriate (reported in Appendix G); the reliability of the subsequent question responses was questioned and consequently all data for these participants was removed.

The participants that selected 'No' to the question 'Do you have any mental health apps downloaded on your smartphone or tablet?' were categorised as a non-app user. For the non-app user group, the answer of '0 = never' was inputted for 'How often do you use the app' and 'How long do you typically spend on this app", and '1 = No' was inputted for 'Did you have this app downloaded before the COVID-19 pandemic?" and 'Has your app usage increased since the COVID-19 pandemic'.

When examining the participants' data in regard to their use of MHApps, it was found that two participants had stated non-MHApps: "Snapchat" and "TikTok", and two participants named websites as their most commonly used MHApp. Therefore, as the current research is exploring MHApp usage these four

participants data was recategorised into the non-app user group, and their data on app usage was removed.

### 3.6.5(iii) Analysis Procedure: Research Question 1

*Research Question 1: Are adolescents utilising MHApps and are there demographic differences in utilisation?*

This research question reviewed whether adolescents were using MHApps and differences in MHApp use between different demographic groups: Section 4.4.2 details the analysis. As the data was categorical, Pearson's 2x2 chi-square analyses were conducted to compare the groups to establish whether there were gender, ethnic or socio-economical differences in MHApp usage.

### 3.6.5(iv) Analysis Procedure: Research Question 2

*Research Question 2: Is there an interrelationship between type of app, frequency of usage, duration of usage, and mental wellbeing?*

This research question reviewed whether there were any relationships between MHApp usage and mental wellbeing: Section 4.4.4 details the analysis. An initial correlation analysis was conducted to detect any associations between type of app, frequency of usage, or duration of usage and mental wellbeing. It was the researcher's intention to run a regression analysis if significant correlations were identified, but the data was not appropriate for this type of parametric analysis. Therefore, a Pearson's 3x3 chi-square analysis was conducted to explore the association between frequency of MHApp usage and mental wellbeing, as measured by the WEMWBS.

### 3.6.5(v) Analysis Procedure: Research Question 3

*Research Question 3: Has the Covid-19 pandemic had an impact on adolescents' utilisation of MHApps?*

This research question reviewed whether there has been a change in MHApp usage since the start of the Covid-19 pandemic: Section 4.4.5 details the analysis. The percentage of adolescents reporting increased usage in MHApp since the

outbreak of the Covid-19 pandemic was calculated, and a percentage increase was calculated from those reporting utilising MHApps since the outbreak of the Covid-19 pandemic.

## 3.7 Embedded Qualitative Research Design of the Current Study

The current research is interested in investigating the MHApps used by adolescents in real-life environments and sought to examine the nature of the MHApps through qualitative methods. The embedded qualitative investigation is now discussed.

### 3.7.1 Qualitative Research Questions

This element of the design addressed the following research questions:

4. *What mental health apps are popular amongst 16-to-18-year-olds?*
5. *What are the shared characteristics of MHApps used amongst adolescents?*

The apps used by adolescents were identified and characteristics of the most-used MHApps were identified. Findings were compared to the key themes of the qualitative synthesis presented in Chapter 2.

### 3.7.2 Embedded Qualitative Data Collection

#### 3.7.2(i) Qualitative Questionnaire Questions

The questionnaire sought to identify the MHApps being used by adolescents, by asking two questions:

- What app or apps do you have downloaded?
- Which app do you use most frequently?

The questionnaire data relating to the MHApps being used by the participating adolescents was first extracted into a Microsoft Excel Spreadsheet. The MHApps specified by the participants were tallied and ranked from most to least frequently reported: these data are presented in Table 4.14, in Section 4.5.1(i).

### 3.7.3 Qualitative Data Analysis: Content Analysis

A two-stage content analysis (Weber, 1990) was conducted to answer the qualitative research questions:

- Stage 1: All named MHApps were categorised into the four key functions as identified by Gindidis et al. (2019), in order to identify what app *function* is most common.
- Stage 2: A coding frame indicated by the results from the qualitative synthesis was applied to the top three used MHApps individually, to explore the *characteristics* of the top three used MHApps.

Content analysis is a rich and meaningful text analysis technique that relies on coding and categorising the data into mutually exclusive and exhaustive categories: a category is "a group of words with similar meaning or connotations (Weber, 1990, p. 37). Coding can be approached in two ways: emergent or priori coding. Emergent coding uses a 'bottom-up' approach, where codes are established through close examination of the data. Priori coding is a 'top down' approach, where codes are established from theory, prior to analysis, and these codes are then applied to the data. Content analysis was selected as the most appropriate method of analysing the secondary data descriptions of the MHApps as it offers a systematic method to compress large amounts of text into content categories (Krippendorff, 2004; Stemler, 2001).

There is no single method to conduct a content analysis (Weber, 1990), it relies on the researcher's judgement as to what is most appropriate to the research purpose. Therefore, the reliability of content analysis is often criticised, as often the researcher working closely with the project develops the codes, and thus can be subject to bias (Krippendorff, 2004). However, this can be overcome by the researcher detailing a set of explicit recording instructions, which would improve reproducibility. Schreier (2012) suggests a three-step process to conducting a content analysis: (1) build a coding frame, (2) divide data into items for coding, and (3) apply coding frame to data items: this process was used by the researcher in both stages of the content analysis, explored in turn below and presented in Section 4.5.1 and 4.5.2.

### 3.7.3(i) Identifying the MHApp Key Functions

In the first stage of the content analysis, descriptive data for the 22 MHApps identified by the participants were extracted from the Apple App Store (Apple, n.d): the descriptions extracted can be found in Appendix H. The data were used to categorise the MHApps into the four key functions as identified by Gindidis and colleagues (2019):

- Assessment
- Monitoring
- Psychoeducation
- Skill Practice

The coding scheme for the content analysis conducted to categorise the 22 MHApps being utilised by the sampled adolescents is outlined in Appendix I. As noted in Chapter 2, Section 2.5.2, the four main functions are not mutually exclusive; different MHApps fulfil more than one of the four key functions. Mutual exclusivity is the basis of coding and classification, therefore, the researcher created mutually exclusive combinations of the four key functions where there was an overlap e.g., psychoeducation and skill practice: the key functions of the MHApps are presented in in Table 4.14, in Section 4.5.1(i).

### 3.7.3(ii) Identifying the Characteristics of the Top Three Used MHApps

The second stage of the content analysis involved applying a coding frame, as indicated by the results from the qualitative synthesis (Chapter 2, Section 2.6) to the Apple app store descriptions (Apple, n.d) of the top three MHApps being used by the sampled adolescents.

The qualitative synthesis of literature was conducted alongside the collection of questionnaire data in stage 2 of this research design (see Figure 3.2). The purpose of the qualitative synthesis of literature was to answer the question: *what are the perspectives of adolescents, aged 15-to-19-years, towards using app-based technology to support their mental health?* The qualitative synthesis identified five key themes that adolescents appear to perceive as important features for MHApps in order to engage with them. These were:

- Relationships and Support

- Acceptability
- Functionality
- Sense of Control
- Accessibility

These themes were used to inform the analysis of the top three preferred MHApps identified by respondents in this study.

Schreier's (2012) three-step process was used by the researcher to explore the characteristics of the top three used MHApps by the sampled adolescents. The devised coding frame is presented in Figure 4.9 (Section 4.5.2(ii)) and explicit instructions on how the coding frame was applied to the divided items of data is shown in Appendices J, K and L. The coding frame presents the category: the overarching grouping, the subcategory: the small groups within the larger category, and highlights where priori codes have been used: in this content analysis priori codes were used from the qualitative synthesis, as presented in Chapter 2, Section 2.6.10.

## 3.8 Ethical Considerations

The current study adhered to the ethical guidance outlined by the BPS, Health and Care Professional Council (HCPC) and the UoN Ethics Committee, in the following sources:

- Code of Ethics and Conduct (BPS, 2018a).
- Data Protection Regulation: Guidance for researchers (BPS, 2018b).
- Code of Human Research Ethics (BPS, 2014).
- Standards of Conduct, Performance and Ethics (Health & Care Professions Council [HCPC], 2012).
- The UoN Guidance for Educational Psychology Students and Supervisors.

The UoN Ethical Risks Checklist was completed, detailing the aspects of the research which may have posed a risk to ethical conduct and identified actions and procedures taken by the researcher to manage and minimise these potential

risks; Table 3.9 briefly outlines the main ethical considerations undertaken for this study. Full ethical approval from the UoN Research Ethics Committee was secured in June 2020 (Appendix M), after which a pilot phase of the study was undertaken. The pilot phase indicated that the procedure outlined, thus no amendments were required, and the researcher continued onto recruitment and implementation.

*Table 3.9: Outline of the main ethical considerations undertaken for this study.*

| **Ethical Consideration** | **Measures taken by the researcher** |
|---|---|
| *Informed Consent* | • Schools who expressed interest following receipt of an expression of interest letter (Appendix N) were sent the information letter (Appendix D) and consent form (Appendix O). Written consent was obtained from participating school sixth forms to ensure their understanding of the research before contacting pupils.<br>• Participating school sixth forms sent their eligible pupils an information letter (Appendix P) and a link to the online questionnaire. The information letter included the contact details for the research and the research supervisor to ensure the participants were able to ask any questions they had, despite Covid-19 restrictions.<br>• The online questionnaire includes a consent form; the form was set up to direct participants to the end of the survey if they did not give their consent to take part in the research. |
| *Right to Withdraw* | • The questionnaire indicated that participation was completely voluntary, and the participant can exit the survey at any time before submitting their responses at the top of each section of the questionnaire.<br>• The participant information sheet informed participants that due to the anonymity of data it will not be possible to withdraw their responses once submitted as it would not be possible to identify their response form. |
| *Confidentiality* | • All questionnaire data was anonymous, restricting the opportunity for confidential information to be disclosed and translation of data back to an individual participant.<br>• Only the researcher and supervisor had access to the raw data, which was accessed via a password protected Qualtrics account on a password protected computer.<br>• The names of participating schools were coded into letters of the alphabet (e.g., school A) when reporting results. |
| *Debriefing* | • A debrief letter (Appendix Q) was sent to the participating |

| | |
|---|---|
| | schools to circulate to participants two weeks after the questionnaire link was sent to participants.<br>• Whilst it was not possible to trace back responses to individual participants, the questionnaire asked participants to report the sixth form that they attend. Therefore, it was possible to send out an email detailing the overall wellbeing of pupils to the individual sixth forms that participated, and if a questionnaire response was of particular concern, the school were made aware. |

## 3.9 Recruitment and Implementation

The process of recruitment was initiated after receiving ethical approval and undertaking the pilot study.

Expression of interest letters (Appendix N) were sent to secondary schools with sixth form provisions, in October 2020. The sixth forms that expressed interest were followed up with an email detailing further information and provided with the option to arrange a phone call with the researcher. Once discussions had taken place, the Head Teacher or the Head of Sixth Form were sent a consent form to sign and return to express their informed consent for their sixth form pupils to participate. Following this, an email with a link to the online questionnaire and a participant information sheet was then sent to the researcher's main contact within the sixth form to distribute to their eligible pupils. Schools that had expressed interest in the research but had not followed up after being sent further information, were contacted after two weeks.

Questionnaire data was collected from sixth form pupils between October and December 2020. The questionnaire link and information sheet were distributed to the eligible pupils by a member of sixth form staff via email. Before completing the questionnaire, pupils were directed to the information sheet provided (Appendix P) and completed an online consent form in which they had to select "yes" they agreed to participate in the study, if pupils selected "no" they were automatically sent to the end of the questionnaire. The pupils completed the questionnaire electronically, via their mobile phone or a school or personal computer. The questionnaire took approximately 10 to 15 minutes to complete,

and the majority of pupils completed the questionnaire during their tutor time at school, however some responses were also received after school hours.
Following the data collection period, the participating sixth forms were emailed a debrief letter and an overview of their sixth formers wellbeing. The email also informed them that they would be provided a summary of results from the study when these became available, in approximately July 2021.

## 3.10 Methods Summary

The chapter provided an outline and rationale for the methodological approach undertaken in this study. In line with the critical realist perspective, an embedded mixed-method approach was used, employing a questionnaire design for data collection. The quantitative and qualitative aspects of the research were discussed in turn, and the results of the research are presented in Chapter 4.

# Chapter IV Results

## 4 Results

### 4.1 Aim and Structure of Results

The results chapter aims to systematically address the quantitative and qualitative research questions set out at the end of Chapter 2:

- Section 4.2 presents the current study's sample characteristics.
- Section 4.3 discusses the factors considered prior to the quantitative data analysis.
- Section 4.4 reports the quantitative research findings, in relation to research questions 1, 2 and 3.
- Section 4.5 reports the qualitative research findings, in relation to research questions 4 and 5.

### 4.2 Sample Characteristics

#### 4.2.1 Demographic Characteristics

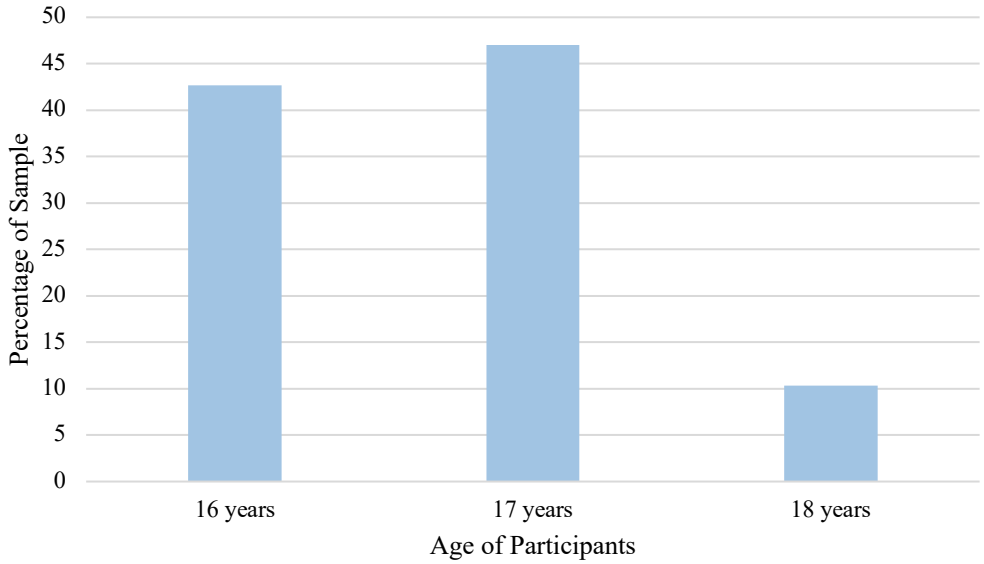
Data from 253 participants were included in the analysis. The majority of participants were female representing over 67% of the sample (Table 4.1).

*Table 4.1: Characteristics of participants by gender identity.*

| Gender Identity | *N* | Percentage of Sample |
|---|---|---|
| Male | 76 | 30% |
| Female | 170 | 67.2% |
| Transgender | 2 | 0.8% |
| Prefer not to say | 5 | 2% |

The sample contained a significant representation of 16- and 17-year-olds, making up 89.7% of the total (*M = 16.68*), as expected given the age range of sixth form pupils at the time in which data was collected (Figure 4.1).

*Figure 4.1: Bar chart to show the percentage of participants by their age.*

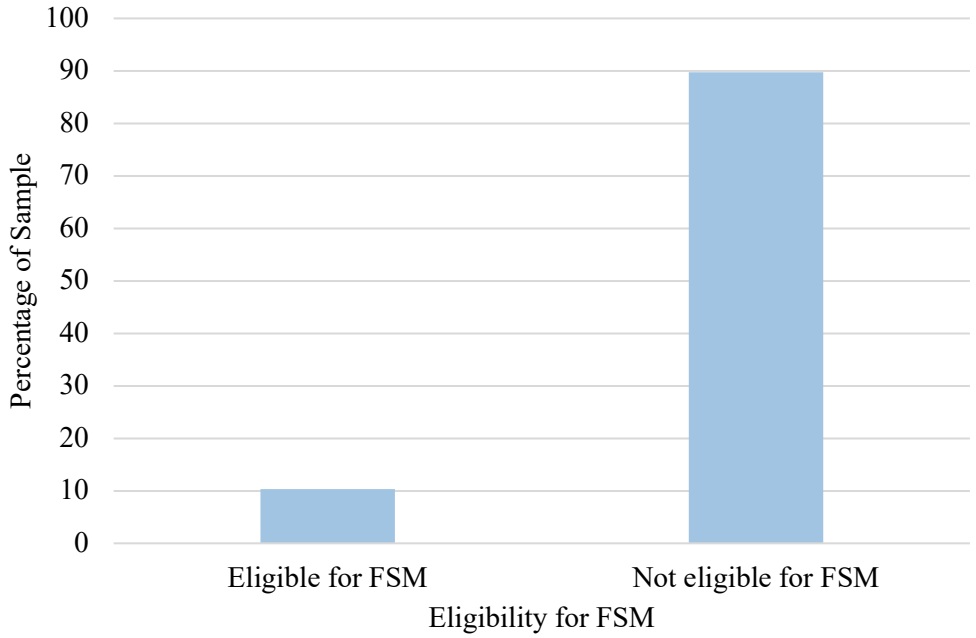



The majority of participants identified themselves as from white ethnic groups (Table 4.2), and 11.3% of the sample were eligible for FSM (Figure 4.2).

*Table 4.2: Percentage of participants by ethnic background.*

| **Ethnic group** | ***N*** | **Percentage of Sample** |
|---|---|---|
| White | 227 | 89.7% |
| Mixed/Multiple ethnic groups | 6 | 2.4% |
| Asian/Asian British | 11 | 4.3% |
| Black/African/ Caribbean/Black British | 8 | 3.2% |
| Prefer not to say | 1 | 0.4% |

*Figure 4.2: Bar chart to show the percentage of participant by eligibility for free school meals.*




### 4.2.2 Participant MHApp Utilisation

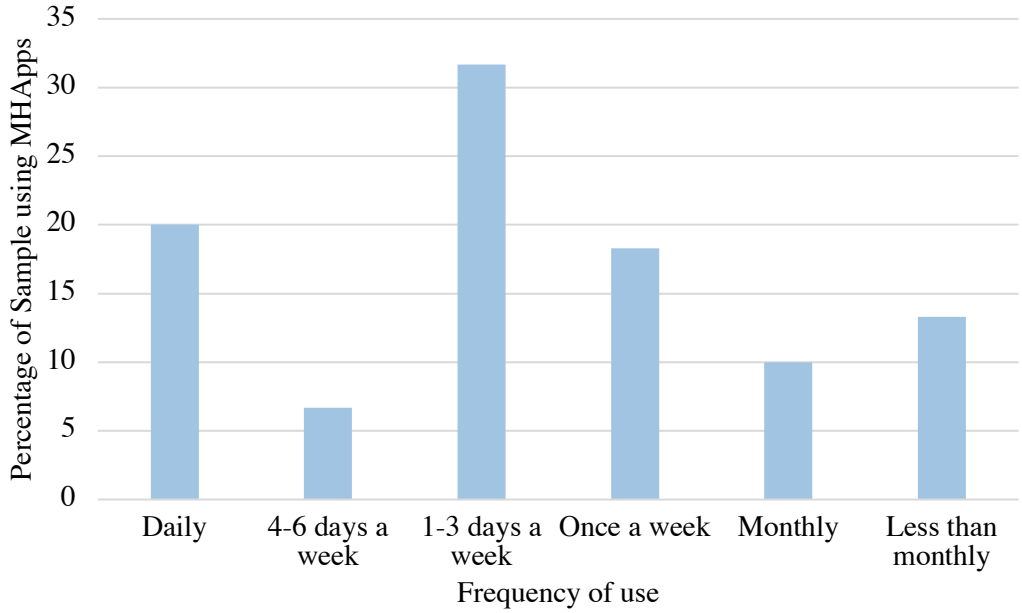
A total of 59 participants had a MHApp downloaded on their smartphone or tablet (Table 4.3).

*Table 4.3: Percentage of participants that have a MHApp downloaded onto their smartphone.*

| Do you have a MHApp downloaded on your smartphone or tablet? | *N* | Percentage of Sample |
|---|---|---|
| Yes | 59 | 23.3% |
| No | 194 | 76.7% |

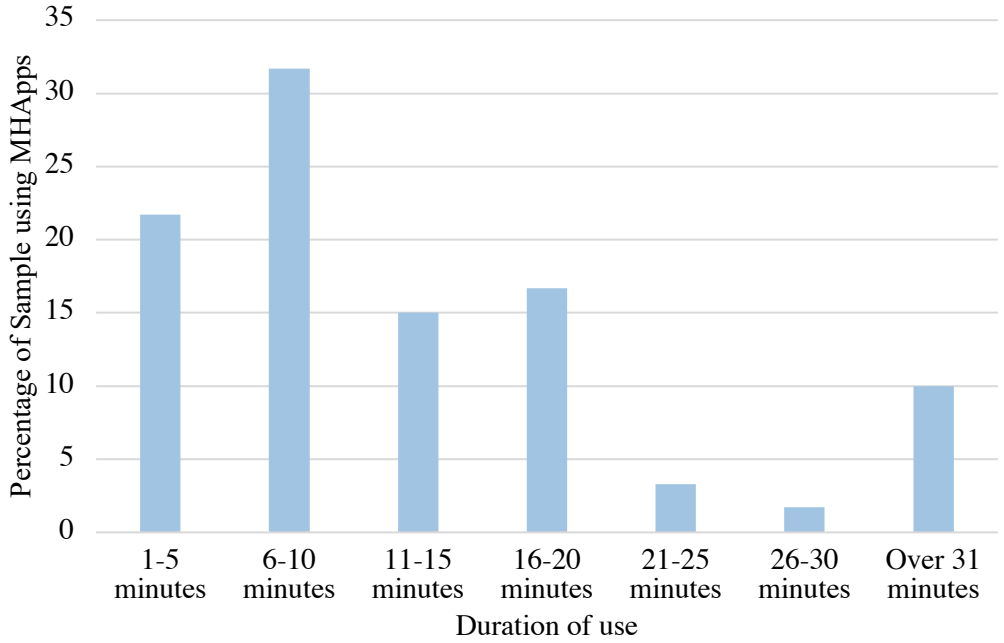
The frequency with which participants utilising MHApps engaged with the app ranged from daily to less than monthly (Figure 4.3).

*Figure 4.3: Bar chart to show the frequency of MHApp use by percentage of participants that use MHApps.*




The duration of time in which participants spent using a MHApp ranged from 1 to 5 minutes a day to over 30 minutes a day (Figure 4.4).

*Figure 4.4: Bar chart to show the duration of MHApp use by percentage of participants that use MHApps.*



## 4.3 Quantitative Data Analysis

### 4.3.1 Planning Quantitative Data Analysis

The choice of statistical test to analyse quantitative data is influenced by three main factors (Cohen et al., 2017):

1. The objective of the analysis (Section 4.3.1(i))
2. The level of data (Section 4.3.1(ii))
3. Whether data meets assumptions for parametric tests (Section 4.3.1(iii))

#### 4.3.1(i) Objective of Data Analysis

The objective of the quantitative data analysis was to answer the following research questions, in response to each hypothesis (Table 4.4):

*Research Question 1: Are adolescents utilising MHApps and are there demographic differences in utilisation?*

The objective of research question 1 was to test the differences in MHApp utilisation between different demographic groups: gender, ethnicity and SES. Therefore, an inferential statistical test was able to determine the difference between groups; the actual test was determined by the level of data and whether the data met assumptions for parametric testing.

*Research Question 2: Is there an interrelationship between type of app, frequency of usage, duration of usage, and mental wellbeing?*

The objective of research question 2 was to examine the relationships between variables, relative to MHApp usage, thus, an inferential test of association was needed. The actual test used depended on the level of data and whether the data met assumptions for parametric testing.

*Research Question 3: Has the covid-19 pandemic had an impact on adolescents' utilisation of MHApps?*

The answer to research question 3 was sought through descriptive statistics, exploring the percentage of participants that self-reported using MHApps before the Covid-19 pandemic and those that reported an increase in MHApp usage since the Covid-19 pandemic.

*Table 4.4: Quasi-experimental research hypotheses*

| Section | Hypothesis |
|---|---|
| | **H1a:** There are gender differences in MHApp utilisation, females are more likely to have a MHApp downloaded on their smartphone. |
| | **H1b:** There are ethnic differences in MHApp utilisation, white individuals are more likely to have a MHApp downloaded on their smartphone. |
| | **H1c:** There are SES differences in MHApp utilisation, those not eligible for FSM are more likely to have a MHApp downloaded on their smartphone. |
| | **H2:** There is a relationship between MHApp usage and mental wellbeing, such that:<br>• **H2a:** The relationship between MHApp usage and mental wellbeing will be strengthened by frequency of app use.<br>• **H2b:** The relationship between MHApp usage and mental wellbeing will be strengthened by duration of app use.<br>• **H2c:** The relationship between MHApp usage and mental wellbeing will not be impacted by the type of MHApp used. |
| | **H3:** There has been an increase in self-reported MHApp use since the start of the Covid-19 pandemic. |

### 4.3.1(ii) Levels of Data

The level of data is one fundamental factor when determining what type of statistical test to apply to data. Data can be categorised into two four different levels of data (Field & Hole, 2002):

- Nominal: a categorical variable where a number is assigned to a category but holds no numerical significance e.g., '0' = female, '1' = male.
- Ordinal: a categorical variable where a number is assigned to reflect a rank or ordering attribute e.g., 'high', 'medium', or 'low'.
- Interval: a continuous variable where the data is numerically meaningful and there are equal intervals between data points, but there is no zero value e.g., temperature.
- Ratio: a continuous variable similar to interval data, the data is numerically meaningful and has equal intervals between data points, however there is an absolute zero.

### 4.3.1(iii) Parametric and Non-Parametric Tests

The use of parametric tests is based on the assumption that the data meets the following assumptions (Pallant, 2020):

- Data is normally distributed: the assumption that the probability distribution is 'normal', as would be presumed in the general population. Normally distributed data follows a 'bell-shaped curve' with the mean at the peak, which can be assessed on a frequency bar chart. Thus, normal distribution needs to be determined before using a parametric test.
- Data is either interval or ratio level data: the assumption that all data emerging from the questionnaire scales are interval or ratio level data. Ordinal and nominal data are considered to be non-parametric, and therefore it is important to consider the level of data when determining which statistical test would be most appropriate.
- Homogeneity of variance: the assumption that comparison groups have the equal variance. Levene's test is often used to test for violation of homogeneity of variance, with a p value $< .05$ indicating that the variances are not equal.

In the current study, a mixture of categorical and continuous variables were analysed, therefore parametric tests were not suitable for the data analysis; the variables included in each section of the analysis are explored in turn. As a result, exploratory data analysis did not need to be carried out on the data to check for normal distribution and homogeneity of variance.

### 4.3.2 Tests of Association

In the current study, research questions one and two are concerned with the association between variables. A test of association is used to establish whether an effect is unlikely to have occurred by chance, between a number of variables. A range of tests can be used to test for and explore the direction and strength of relationships between different variables. Table 4.5 describes some of the statistical tests that may be used to test for and explore the association between variables (Field, 2009; Tabachnick & Fidell, 2018).

*Table 4.5: Tests of association (complied from Field, 2009; Tabachnick & Fidell, 2018)*

| Test | Minimum Data Requirement | Type of Test |
|---|---|---|
| T-test | Interval or ratio level data<br>One independent variable<br>Two conditions | Parametric |
| Pearson's Correlation | Interval or ratio level data | Parametric |
| Linear Regression | Interval or ratio level data | Parametric |
| Chi-Square | Nominal or ordinal level data<br>Two independent variables<br>Two conditions | Non-Parametric |
| Spearman's co-efficient | Ordinal level data | Non-Parametric |

### 4.3.3 Statistical Power

Statistical significance indicates that an observed effect is unlikely to have occurred by chance and the null hypothesis can be rejected. However, there are two mistakes that can be made, risking an incorrect inference being made:

- *Type I error*: when the null hypothesis is wrongly rejected (false positive); the researcher reports an effect when there is not one. The probability of a Type I error is the alpha value, represented as α.
- *Type II error*: when the null hypothesis is wrongly accepted (false negative); the researcher reports no effect when there is one. The probability of a Type II error is the beta value, represented as β.

There is a 'trade off' between these two errors when deciding the acceptable probability level: if α is made smaller to reduce the risk of making a Type I error, then there is an increase in making a Type II error (Field & Hole, 2012), and it is typically up to the researcher's own judgement (Field, 2011). In line with the expected standard, statistical significance was established at $p < .05$, indicating the probability that the results were obtained by chance at less than 5%.

In statistical terms, the power of a test is equal to 1 – β (Howell, 2013), and the following factors influence the power of a test:

- *Alpha cut off level* (as discussed above)

- *Whether the test is parametric or non-parametric*: parametric tests being generally more powerful
- *Sample size*

A sufficient sample size is important (Kraemer & Blasey, 2016); Tabachnick and Fidell (2018) recommend a formula for calculating the minimum sample size required, to ensure that the assumption of power is not violated: $N > 50 + 8m$ (N = number of participants, m = number of independent variables).

With six independent variables (self-assessed gender identity, self-assessed ethnic group, self-assessed FSM eligibility, type of MHApp, frequency of use, average weekly usage) and a measure of wellbeing as its outcome, the minimum sample size calculated for this study was 98 ($N > 50 + (8 \times 6)$). The number of participants included in this study's analysis was 253, therefore exceeding the minimum sample size calculated by 155.

#### 4.3.3(i) Effect Size

In addition to calculating statistical power, the effect size allows the researcher to quantify the size of the difference or relationship found between two variables, which is advantageous to statistical significance alone. Calculating and reporting the effect size can allow objective measurement of the importance of an observed effect (Field, 2009). The measures for effect size differ between statistical tests. Cramér's *V* has been reported as the measure of effect size for the analyses in the current study, as this was appropriate to the statistical tests applied to the data: Table 4.6 presents what Cohen (1988) suggests constitutes as a small, medium or large effect size.

*Table 4.6: Cohen's (1988) effect size interpretation for Cramér's V.*

| Effect Size | Interpretation |
|---|---|
| < 0.3 | Small effect |
| 0.3 – 0.5 | Medium effect |
| > 0.5 | Large effect |

The type of test selected, alpha levels, and effect sizes have been presented at each stage of the analysis.

## 4.4 Quantitative Results

### 4.4.1 Data Analysis for Research Question 1

#### 4.4.1(i) Preparation of Raw Data

To prepare the data for analysis some of the groups were combined due to smaller samples sizes (Table 4.7). The two participants that selected transgender and the five participants who selected prefer not to say when selecting their gender identity were combined to create a group. Similarly, an "other" group was also created for ethnicity across the mixed/multiple ethnic groups (6), Asian/Asian British (11), Black/African/Caribbean/Black British (8) and prefer not to say (1) groups.

Once the groups had been established, a third variable was added: the number of participants that fell into the combination of categories (Table 4.7). The frequency data was imputed into a separate SPSS data file for each demographic variable, with one row representing each combination of categories e.g., white and app user, white and no app, other and app user, other and no app. The data was weighted by frequency (Field, 2009) before running a Crosstabs analysis.

#### 4.4.1(ii) Descriptive Statistics

The frequency of participants ($n$ = 59) using MHApps differed between demographic characteristic (Table 4.7).

*Table 4.7: Frequency of participants using MHApps by demographic group.*

| Demographic | Total (N) | Number using MHApps |
|---|---|---|
| *Gender Identity* | | |
| Male | 76 | 10 |
| Female | 170 | 47 |
| Other | 7 | 2 |
| *Ethnic group* | | |
| White | 227 | 57 |
| Other | 26 | 2 |

| *Eligibility for FSM* | | |
|---|---|---|
| Yes | 26 | 5 |
| No | 227 | 54 |

### 4.4.1(iii) Variables and Level of Data

The level of data for the demographic variables and utilisation of MHApps reported for the data analysis for research question 1, are presented in Table 4.8.

*Table 4.8: Level of data for research question 1 variables.*

| Variable | Level of Data | Number of Levels |
|---|---|---|
| Gender | Nominal | Three: male, female, other |
| Ethnic Group | Nominal | Two: white, other |
| Eligibility for FSM | Nominal | Two: yes, no |
| MHApp utilisation | Nominal | Two: yes, no |

## 4.4.2 Results: Research Question 1

### 4.4.2(i) Gender Differences

Pearson's chi-square test (Field, 2009) was used to explore the potential differences in the utilisation of MHApps across gender, as the level of data of both variables was nominal. To meet the assumptions of the chi-square test, the expected frequencies should be greater than five (Field, 2009): the expected frequency for the other gender category who utilise MHApps was 1.63. Therefore, due to a low frequency of MHApp users amongst the limited transgender and other gender categories (reported in Table 4.7 above), the chi-square analysis compared the MHApp utilisation between male and female participants only.

There was a weak (Cramér's $V = 0.159$) association between gender and whether or not the individual had a MHApp downloaded onto their smartphone, $\chi^2$ (1, 246) = 6.194, $p$ = .013. Based on the odds ratio, the odds of a female having a MHApp on their smartphone is 2.101 times higher than that of a male. The null hypothesis was rejected.

#### 4.4.2(ii) Ethnic Differences

Pearson's chi-square test was used to explore the differences in the utilisation of MHApps by ethnicity. Due to small numbers of participants representing some ethnic groups (Table 4.2), chi-square analysis compared the MHApp utilisation of two groups: 'white' and 'other' participants.

There was a weak (Cramér's $V$ = 0.125) association between ethnicity and whether an individual had a MHApp downloaded on their smartphone, $\chi^2$ (1, 253) = 3.958, $p$ = .047. Based on the odds ratio, the odds of an individual from a white ethnic background having a MHApp on their smartphone was 3.265 times higher than that of an individual from another ethnic background. Therefore, the null hypothesis was rejected.

#### 4.4.2(iii) Socio-economic Differences

Pearson's chi-square test was used to explore the relationship between the utilisation of MHApps and eligibility for FSM.

There was no association between eligibility for FSM and whether an individual has a MHApp downloaded on their smartphone, $\chi^2$ (1, 253) = .271, $p$ = .603. Therefore, the null hypothesis was accepted.

### 4.4.3 Data Analysis for Research Question 2

#### 4.4.3(i) Preparation of Raw Data

To prepare the data for analysis for research question 2, the frequency of use variable was converted into low, medium and high categories as follows: daily and 4-6 times a week were categorised as high usage, 1-3 days per week and once a week were categorised as medium usage, and once and less than once per week were categorised as low usage. The purpose of this collapsing of data was to account for any limitation that might have arisen due to the overlap in categories on the questionnaire: this limitation is addressed in Section 5.2.6(ii) and 5.4.1(ii).

A new variable, the average weekly usage score was also computed. The average weekly usage score was computed from the self-reported frequency and duration

of app use scores. An average score was computed from the frequency of use self-report options: daily = 7, 4-6 days a week = 5, 1-3 days a week = 2, once a week = 1, monthly = 0.033, and less than once per week = 0.017. An average score was then computed from the duration of use self-report options: 1-5 minutes = 2.5, 5-10 minutes = 7.5, 10-15 minutes = 12.5, 15-20 minutes = 17.5, 20-25 minutes = 22.5, 25-30 minute = 27.5, over 30 minutes = 30. Finally, to compute the new variable, average weekly usage score, the frequency variable was multiplied by the duration variable. For example, a participant reporting that they use a MHApp daily (7) for 1-5 minutes (2.5) per each use, would have an average weekly usage score of 17.5 minutes per week.

The mental wellbeing scores were also computed into three categories: low, medium and high for further analysis explored in Section 4.4.4(ii). To calculate these categories, a standard deviation (*SD* = 10.107) was subtracted from the mean (*M* = 41.55) to identify the higher range of the low category (31.445), and one standard deviation was added to the mean to compute the lower range of the high category (51.657), the range between these two computed scores was categorised as the medium group. After rounding to the nearest whole number, the categories computed for the mental wellbeing scores were as follows:

- Low = 14 to 31
- Medium = 32 to 52
- High = 53 to 70

### 4.4.3(ii) Descriptive Statistics of Continuous Correlation Variables

The WEMWBS scores ranged between 15 and 69, with a mean of 41.55 (Table 4.9), lower than the typical mean of around 50 (Morris & Earl, 2017; Tennant et al., 2007): data were normally distributed (Appendix R).

*Table 4.9: Descriptive statistics for wellbeing scores, as measured by the WEMWBS.*

| | *N* | Mean | Std. Deviation | Range | |
|---|---|---|---|---|---|
| | | | | Min | Max |
| WEMWBS Score | 253 | 41.55 | 10.107 | 15 | 69 |

The calculated average weekly usage scores for the 59 participants using MHApps ranged from .043 to 210 average minutes per week, with an average of 29.27 minutes per week; data was positively skewed (Appendix S). Given that the standard deviation (39.787) is greater than the mean (29.269), it is likely that the mean does not accurately represent the large spread of data.

*Table 4.10: Descriptive statistics for computed average weekly usage scores.*

| | *N* | Mean | Std. Deviation | Range | |
|---|---|---|---|---|---|
| | | | | Min | Max |
| Average Weekly Usage Score | 59 | 29.269 | 39.787 | .043 | 210 |

Given the skewness of the data, non-parametric analyses were selected.

#### 4.4.3(iii) Variables and Level of Data

The level of data for the variables for research question 2 are presented in Table 4.11.

*Table 4.11: Level of data for research question 2 variables.*

| Variable | Level of Data | Number of Levels |
|---|---|---|
| Frequency of Use | Ordinal | Three: High, Medium, Low |
| Average Weekly Usage Score | Ratio | One |
| WEMWBS Score | Interval | One |

### 4.4.4 Results: Research Question 2

#### 4.4.4(i) Correlation Analysis

Spearman's rank-order correlation was used to investigate the relationships between frequency of app use, average weekly usage, and mental wellbeing of the MHApp users, to determine the strength and direction of any relationships. The bivariate correlations are presented in Table 4.12, and the effect sizes are interpreted using Cohen's (1988) recommendations.

*Table 4.12: Spearman's rho correlation matrix of relationships between variables for MHApp user participant data.*

| Variables | 1 | 2 | 3 |
|---|---|---|---|
| 1. Frequency of app use | - | | |
| 2. Average weekly usage score | .997** | - | |
| 3. Mental wellbeing score | -.090 | -.088 | - |

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis highlighted one significant relationship between frequency of app use and average weekly usage score ($\varrho$ = .997, $p$ = <.001). A strong positive correlation between frequency of app use and the average weekly usage score was expected, as the average weekly usage score was computed using the frequency of app use data[1].

The researcher had intended to conduct a regression analysis following the correlation. However, mental wellbeing was not correlated with MHApp usage scores, and the null hypothesis was not rejected. Therefore, a regression analysis was not appropriate, but the categorical data of the computed mental wellbeing scores and frequency of app use variables was appropriate for a chi-square analysis to explore any associations further.

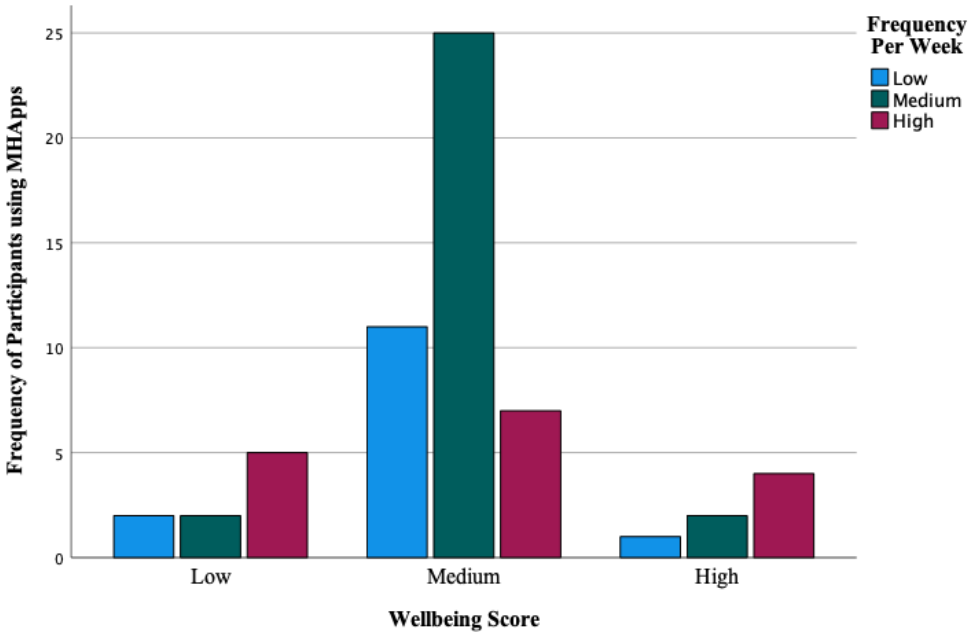
### 4.4.4(ii) Mental Wellbeing and Frequency of App Use - Chi Square Analysis

A negative correlation between mental wellbeing scores and frequency of app use was identified in the correlation analysis, suggesting that whilst not significant MHApp usage may associate with lower mental wellbeing scores on the WEMWBS. This relationship has been further explored using a Pearson's chi-square analysis (Figure 4.5), in light of answering research question 2.

[1] The average weekly usage score was computed from the frequency of app use and duration of app use data. The average weekly usage score and frequency of app use were both included in the analysis to determine whether the duration of use was associated with mental wellbeing: the duration of use data alone was not sufficient for analysis and needed combining with frequency of app use to make it meaningful.

A 3X3 chi-square analysis was used to explore the association between low, medium and high mental wellbeing scores, as measured by the WEMWBS, and low, medium and high frequency of app use scores. The data were weighted by frequency.

*Figure 4.5: Bar chart showing frequency of low, medium and high WEMWBS scores in relation to low, medium and high MHApp use frequency.*




There was a weak association (Cramér's $V = 0.289$) between WEMWBS and frequency of app use, $\chi^2(4, 59) = 9.845$, $p = .043$.

### 4.4.5 Results: Research Question 3

The self-report questionnaire asked two questions about MHApp usage in relation to the Covid-19 pandemic:

- Did you have this app downloaded before the Covid-19 pandemic?
- Has your app usage increased since the Covid-19 pandemic?

Of the 59 participants reportedly utilising MHApp at the time of data collection (October to December 2020), 42 reported that they were using the MHApp before the Covid-19 pandemic and 17 reported they downloaded the app since the outbreak of the Covid-19 pandemic (Figure 4.6). This indicates a 40.48%

increase in MHApp utilisation following the outbreak of the Covid-19 pandemic. In terms of increased MHApp usage, 45.8% of reported an increase in their usage since the start of the Covid-19 pandemic (Table 4.13). These descriptive results indicate a self-reported increase in MHApp usage since the start of the Covid-19 pandemic, rejecting the null hypothesis.

*Figure 4.6: Bar chart showing the frequency change in MHApp use before and after the outbreak of the Covid-19 pandemic.*

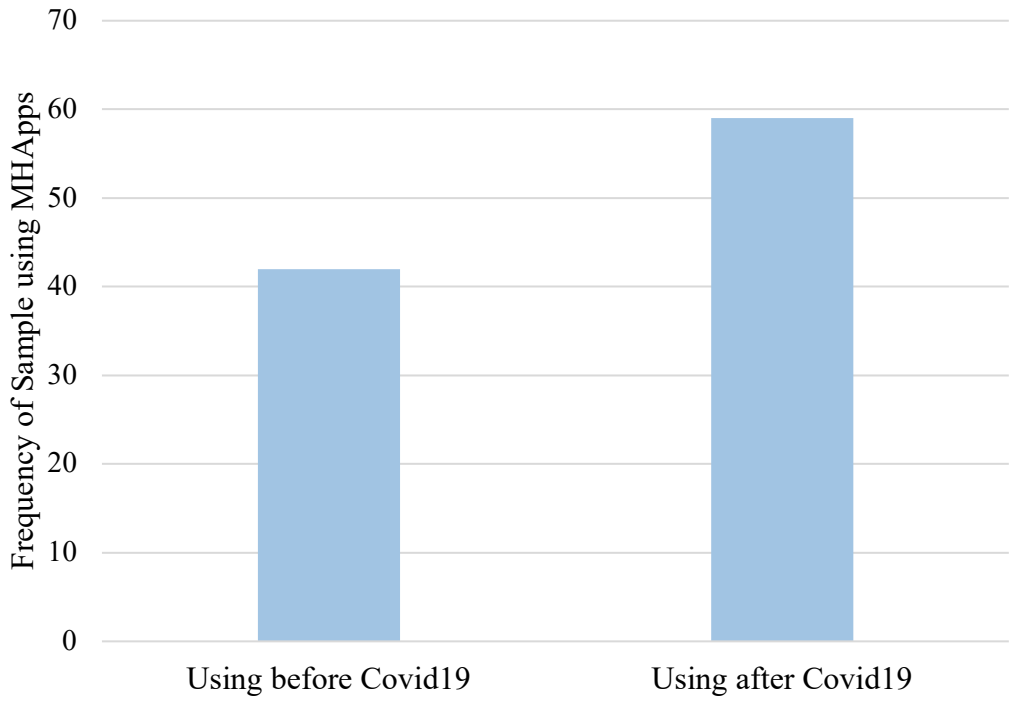



*Table 4.13: Percentage of participants increase in MHApp usage since the Covid-19 pandemic.*

| Has your MHApp use increased since the Covid-19 pandemic? | *N* | Percentage of Sample |
|---|---|---|
| Yes | 27 | 45.8% |
| No | 32 | 54.2% |

### 4.4.6 Summary of Quantitative Results

The majority of the sample were female adolescents, and adolescents from white ethnic backgrounds, and a small minority of participants were eligible for FSM. Amongst the sample of 253 adolescents, 59 (23.32%) were utilising MHApps

on their smartphone or tablet devices. The frequency and duration of MHApp usage amongst the 59 MHApp users varied, with the majority using MHApps 1-to-3 days per week, and for 5-to-10 minutes.

The analysis in regard to research question 1 showed that there were significant differences by gender and ethnicity in MHApp utilisation, although the effect size for both differences was small. There were no significant differences identified in MHApp utilisation between those eligible for FSM or not.

For research question 2 a negative relationship between MHApp usage and mental wellbeing was identified in the correlation analysis. A Pearson's chi-square analysis showed that there was a significant, but weak association between mental wellbeing scores and frequency of MHApp use, with medium frequency of app use (1-to-3 days per week) being associated with medium mental wellbeing scores.

Finally, in regard to research question 3, participants reported an increase in MHApp usage since the start of the Covid-19 pandemic, with a 45.8% increase in MHApp usage and there was 40.48% increase in the number of adolescents that self-reported utilising MHApps after the outbreak of the Covid-19 pandemic.

Having analysed and reported the quantitative investigation, attention will now focus on the analysis and reporting of the qualitative investigation.

## 4.5 Embedded Qualitative Data Analysis

The embedded qualitative analysis addressed the following questions:

- *Research question 4: What MHApps are popular amongst 16-to-18-year-olds?*
- *Research question 5: What are the shared characteristics of mental health apps used amongst adolescents?*

### 4.5.1 Results: Research Question 4

#### 4.5.1(i) Identified MHApps being Utilised by Sampled Adolescents

The MHApps that were reported were recorded and tallied to identify the MHApps being utilised amongst the sampled adolescents (Table 4.14). A total of 22 MHApps were identified by the 59 participants utilising MHApps on their smartphone or tablet devices. The most used MHApp was reported as Headspace (*n*= 12) followed by Calm (*n* = 10).

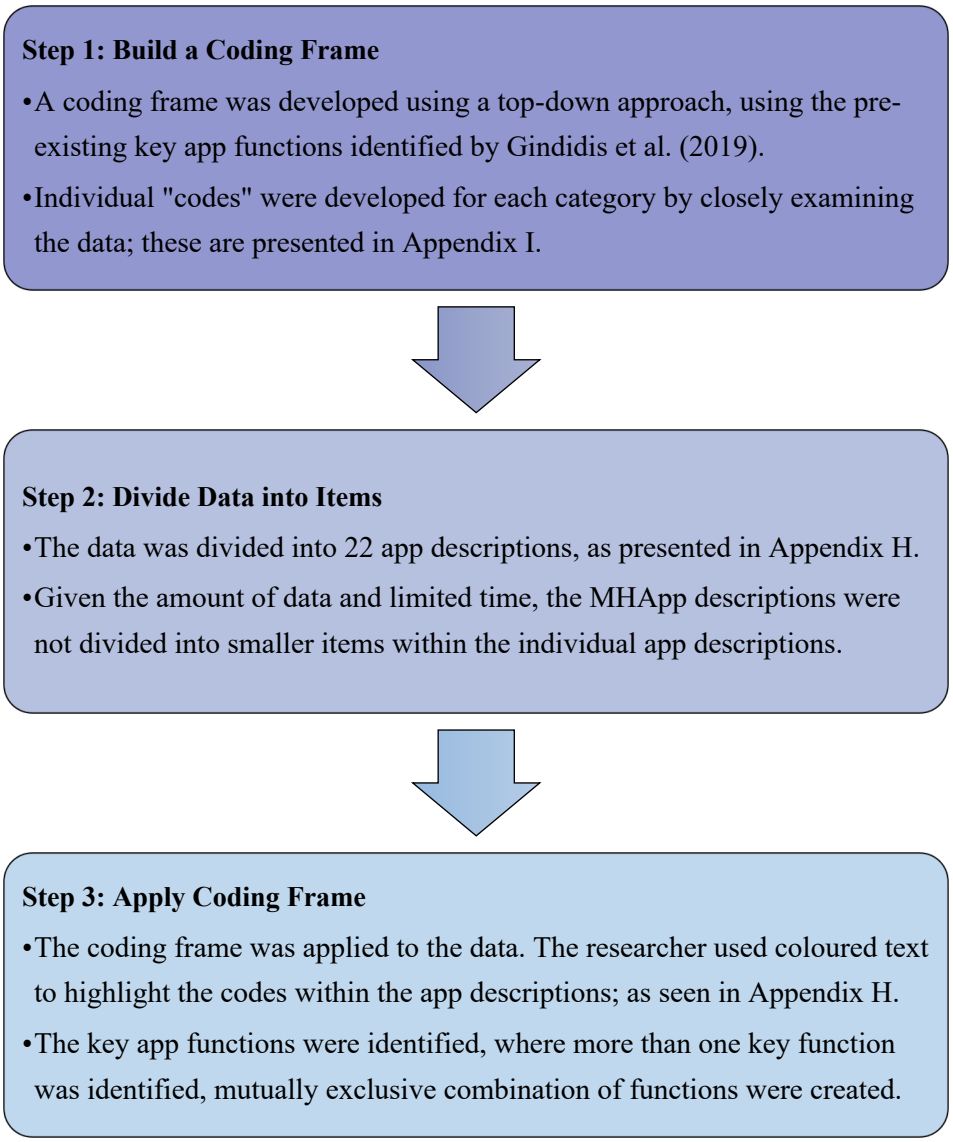
*Table 4.14: MHApps reportedly used in rank order (highest frequency of users to lowest) and their identified function (see Section 4.5.1(ii)).*

| Rank | App Name | App Function | Frequency using MHApp |
|---|---|---|---|
| 1 | Headspace | P/SP | 12 |
| 2 | Calm | P/SP | 11 |
| 3 | Daylio Journal | M/P | 4 |
| =4 | I am sober | M | 3 |
| | Reflectly | P/SP/M | |
| | Calm Harm | P/SP | |
| | Mind Shift | P/SP/M | |
| =5 | Forest | M/SP | 2 |
| | Clear Fear | P/SP | |
| | Flora | M/SP | |
| | Wysa | P/SP | |
| | Meditate | SP | |
| =6 | CBT Thought Diary | P/SP/M | 1 |
| | Jour | P/SP/M | |
| | Pixels | M/P | |
| | Deeply | P/SP | |
| | Habatica | M | |
| | Relax Melodies | SP | |
| | BoosterBuddy | M/P | |
| | The Mindfulness App | SP | |
| | #selfcare | M/SP | |
| | Vent | M | |

### 4.5.1(ii) Stage 1 Content Analysis

In order to categorise the MHApps in relation to the four key functions, as identified by Gindidis and colleagues (2019) (assessment, monitoring, psychoeducation and skill practice) descriptions of each MHApp were retrieved from the Apple App Store (Apple, n.d); these descriptions can be found in Appendix H. As noted in Section 3.7.3, a content analysis (Krippendorff, 2004; Weber, 1990) was conducted following Schreier's (2012) three-step process. Figure 4.7 demonstrates the content analysis process for research question 4.

*Figure 4.7: Stage 1 content analysis procedure conducted to answer research question 4, adapted from the steps outlined by Schreier's (2012).*



#### 4.5.1(iii) Stage 1 Content Analysis Results

The content analysis identified the key functions of the MHApps being utilised by the adolescents, depicted in Table 4.14, with many spanning more than one of the key functions. Six functions were identified, including mutually exclusive combinations:

- Psychoeducation and Skill Practice (P/SP)
- Monitoring and Psychoeducation (M/P)
- Monitoring (M)
- Psychoeducation, Skill Practice and Monitoring (P/SP/M)
- Monitoring and Skill Practice (M/SP)
- Skill Practice (SP)

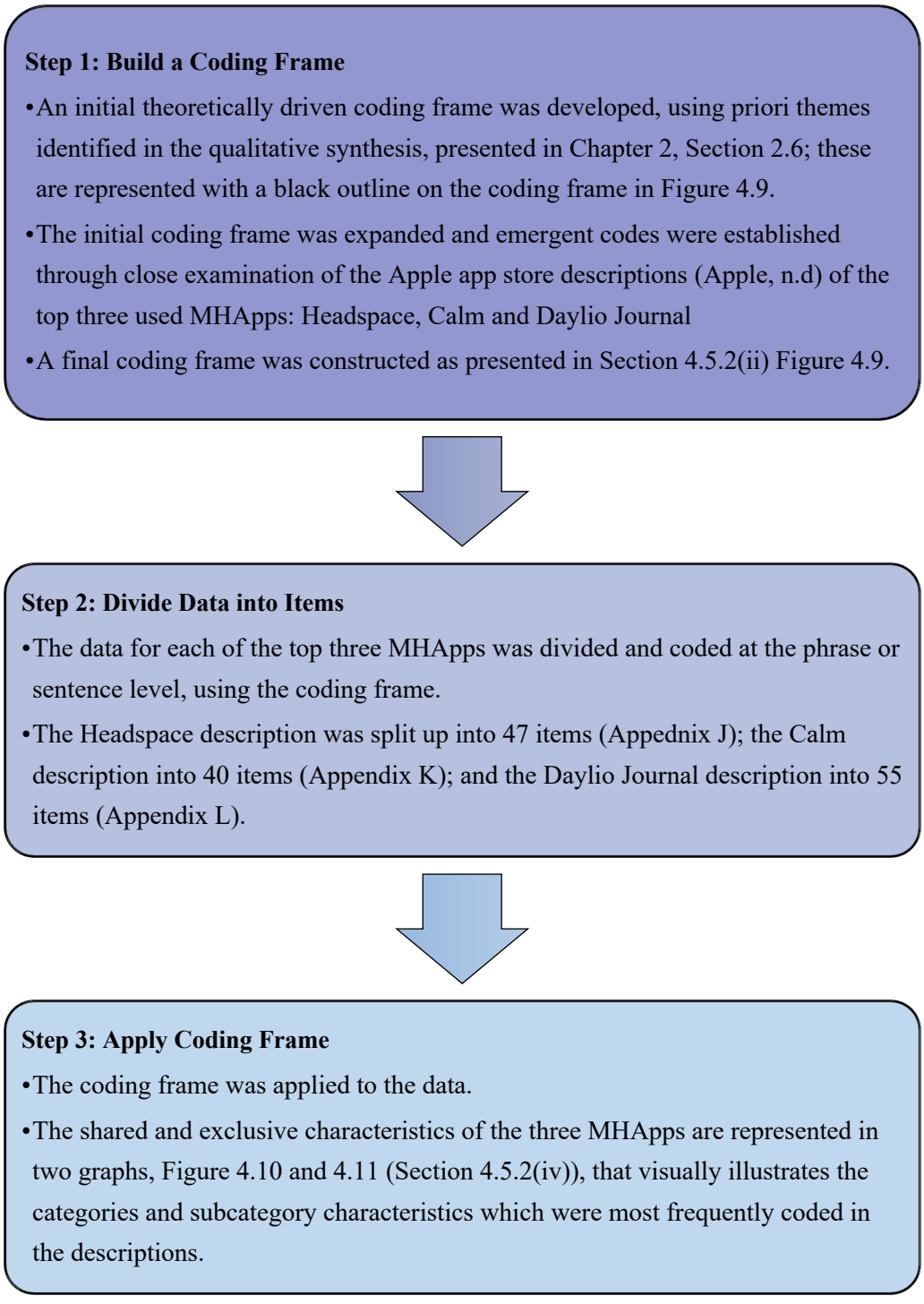
No apps with *assessment* content were identified.

### 4.5.2 Results: Research Question 5

#### 4.5.1(i) Stage 2 Content Analysis

To explore the characteristics of the top three MHApps being used by the adolescents in this sample: Headspace, Calm and Daylio Journal, a content analysis was conducted, as noted, following Schreier's (2012) three-step process. Figure 4.8 illustrates the content analysis process for research question 5, and the coding analysis process for all three MHApps is shown in Appendix J, K and L, to improve the reliability of the content analysis.

*Figure 4.8: Stage 2 content analysis procedure conducted to answer research question 5, adapted from the steps outlined by Schreier's (2012).*



### 4.5.2(ii) Coding Frame

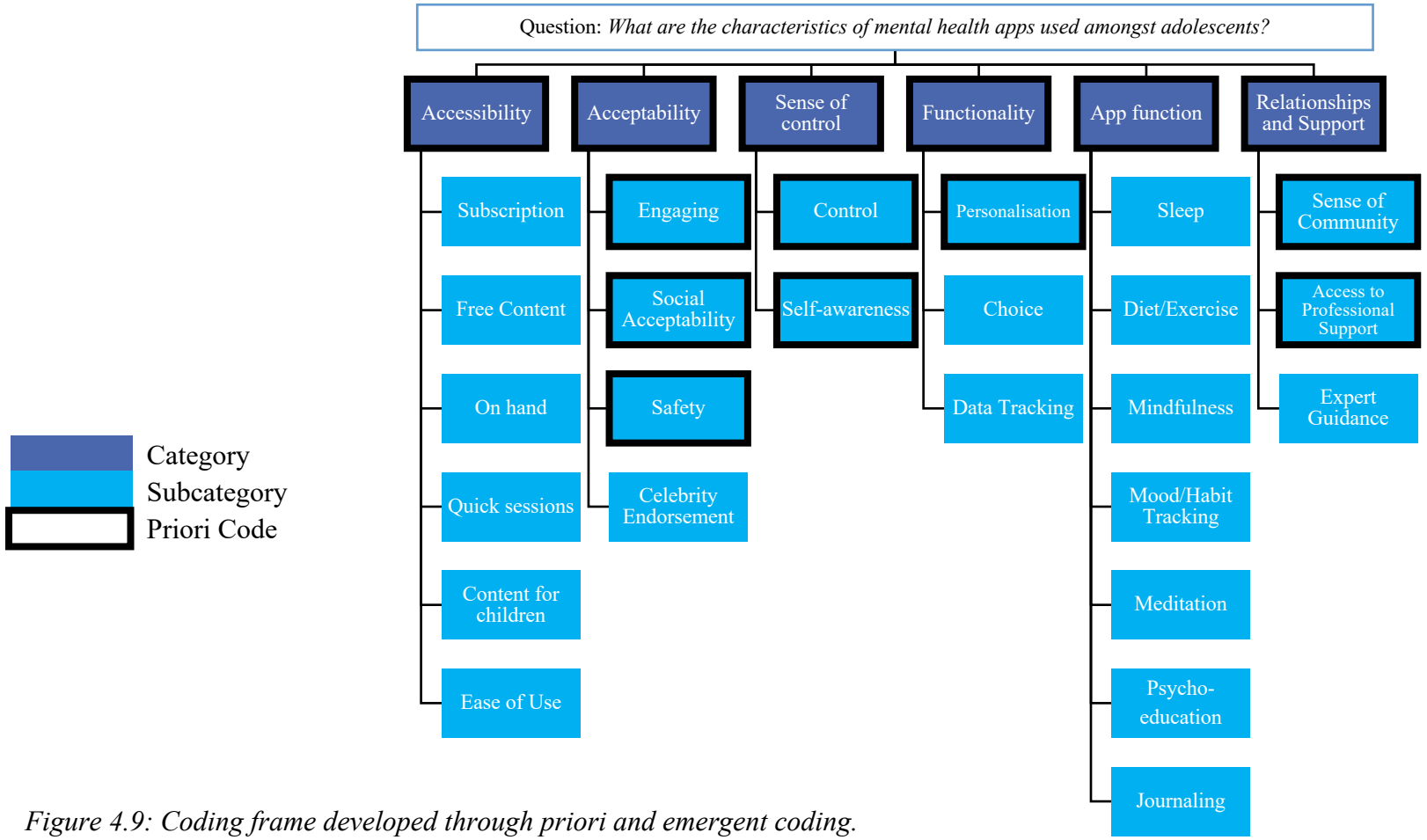



*Figure 4.9: Coding frame developed through priori and emergent coding.*

### 4.5.2(iii) Stage 2 Content Analysis Results: Individual Characteristics

***Headspace:***

App function was the most mentioned category in the text, with mindfulness and sleep the two most referred to subcategories, followed by meditation, psychoeducation and diet/exercise. The second most referenced category was accessibility, with the text referring to the availability of "*short, daily video series*" and "*2-3-minute mini-mediations*", indicating the quick nature of sessions, and information about the subscription costs were made clear. The text also referenced the on-hand nature of the app that can be available "*for moments of panic*", and that there was free content and content suitable for children on the app. Functionality was the third most mentioned category, with the text making reference to the wide variety of choice available e.g., "choose from *hundreds of guided meditations on everything",* and the option to track "*mindful minutes*" on the "*Apple Health app*" (data tracking). Acceptability was also referenced, with the text indicating the engaging nature of the app through availability of different "*music stations*" and "*animations*", and naming celebrities whose music features on the app (celebrity endorsement). Finally, the category of relationships and support is referenced through the text naming *"world-class experts"* and "*expert trainers*" (expert guidance), and the options to "*add friends*" to the app (sense of community). Table 4.15 shows the categories and subcategories of the content analysis and the frequency in which these arose in the text for Headspace.

*Table 4.15: Headspace content analysis; categories, subcategories and frequency.*

| Category | Subcategory | Frequency (N) |
|---|---|---|
| App Function | Mindfulness | 7 |
| | Sleep | 5 |
| | Meditation | 3 |
| | Psychoeducation | 3 |
| | Diet/Exercise | 2 |
| Functionality | Choice | 3 |
| | Data Tracking | 3 |
| Accessibility | Quick Sessions | 4 |
| | Subscription | 3 |

| | | |
|---|---|---|
| | On Hand | 2 |
| | Content for Children | 1 |
| | Free Content | 1 |
| Acceptability | Engaging | 3 |
| | Celebrity Endorsement | 2 |
| Relationships and Support | Expert Guidance | 3 |
| | Sense of Community | 1 |

***Calm:***

The Calm app description mentioned app function most frequently, with sleep and meditation being the most commonly mentioned subcategories followed by mindfulness, diet/exercise and psychoeducation. The second most referenced categories were functionality and accessibility. In terms of functionality, the text makes reference to the range in lengths of meditation sessions and the availability of "*100+ exclusive Sleep Stories*", indicating the range of choice, and the option to "*track…progress*" and save data to the "*Apple Health app*" (data tracking). In reference to accessibility, the text is clear about the subscription costs, references content specific for children, and cites a quick, daily "*10-minute program*" (quick sessions). Acceptability is mentioned in the text, making reference to engaging "*music*" content and celebrities associated with the app including: "*Stephen Fry, Matthew McConaughey, Leona Lewis, and Jerome Flynn*" (celebrity endorsement). Finally, the category of relationships and support is briefly referred to in the text, with reference to the app being "*recommended by top psychologists, therapists, and mental health experts*", and "*classes featuring world-renowned experts*" (expert guidance). Table 4.16 shows the categories and subcategories and the frequency in which these arose in the text.

*Table 4.16: Calm content analysis; categories, subcategories and frequency.*

| Category | Subcategory | Frequency (N) |
|---|---|---|
| App Function | Sleep | 9 |
| | Meditation | 6 |
| | Mindfulness | 3 |

| | | |
|---|---|---|
| | Diet/Exercise | 2 |
| | Psychoeducation | 1 |
| Functionality | Choice | 4 |
| | Data Tracking | 3 |
| Accessibility | Subscription | 4 |
| | Content for Children | 2 |
| | Quick Sessions | 1 |
| Acceptability | Engaging | 1 |
| | Celebrity Endorsement | 2 |
| Relationships and Support | Expert Guidance | 2 |

***Daylio:***

App function was the most referenced category in the text, with mood/habit tracking being referenced most frequently followed by psychoeducation, journaling, mindfulness and then diet/exercise. Functionality was the second most referenced category with the text frequently referencing the ability to "*customise*" and "*personalise activities*" (personalisation) and the option to track "*statistics…on weekly, monthly or yearly charts*" for "*every mood, activity or group*" (data tracking). Accessibility and acceptability were the third most referenced categories. The category of accessibility was mentioned in the text, making reference to the app being available "*whenever*" it is needed (on-hand), the "*simple*" nature of the app where a diary entry can be completed "*without having to type a single line*" (ease of use), and that the content is free. In terms of acceptability, the text focused in on the safety and security of the app and data storage to keep the "*diary safe*" (safety). Sense of control was also referenced, with the text focusing on how "*data are entirely under*" the users "*control at all times*". Finally, the category of relationships and support is briefly referred to in the text, with reference to the ability to share with "*friends*" (sense of community). Table 4.17 shows the categories and subcategories and the frequency in which these arose in the text.

*Table 4.17: Daylio Journal content analysis; categories, subcategories and frequency.*

| Category | Subcategory | Frequency (N) |
|---|---|---|
| App Function | Mood/Habit Tracker | 12 |
| | Psychoeducation | 5 |
| | Journaling | 4 |
| | Mindfulness | 2 |
| | Diet/Exercise | 2 |
| Functionality | Personalisation | 6 |
| | Data Tracking | 5 |
| Accessibility | On Hand | 2 |
| | Ease of Use | 4 |
| | Free Content | 1 |
| Acceptability | Safety | 7 |
| Relationships and Support | Community | 2 |
| Sense of Control | Control | 3 |

### 4.5.2(iv) Stage 2 Content Analysis Results: Shared Characteristics

The content analysis for the top three used MHApps has highlighted some shared subcategory characteristics between the apps, as depicted in Figure 4.10 and 4.11:

- Headspace and Calm exclusively shared nine subcategory characteristics in relation to five of the categories.
- Headspace and Daylio Journal exclusively shared three subcategory characteristics in relation to two categories.
- Six of the subcategory characteristics across five categories were excusive to Daylio Journal.

Both Headspace and Calm fall within the psychoeducation and skill practice (P/SP) app category, which is likely to account for there being more shared subcategory characteristics between these apps, whereas Daylio Journal falls within the monitoring and psychoeducation (M/P) app category.

Of the 22 subcategories, four were commonly shared between the three different MHApps. Three of these shared subcategory characteristics were in relation to the category app function (mindfulness, psychoeducation and diet/exercise), and the last was in relation to the functionality category (data tracking).

*Figure 4.10: Line chart showing the shared and exclusive subcategory characteristics between the top three used MHApps, by frequency coded in the three data sets.*

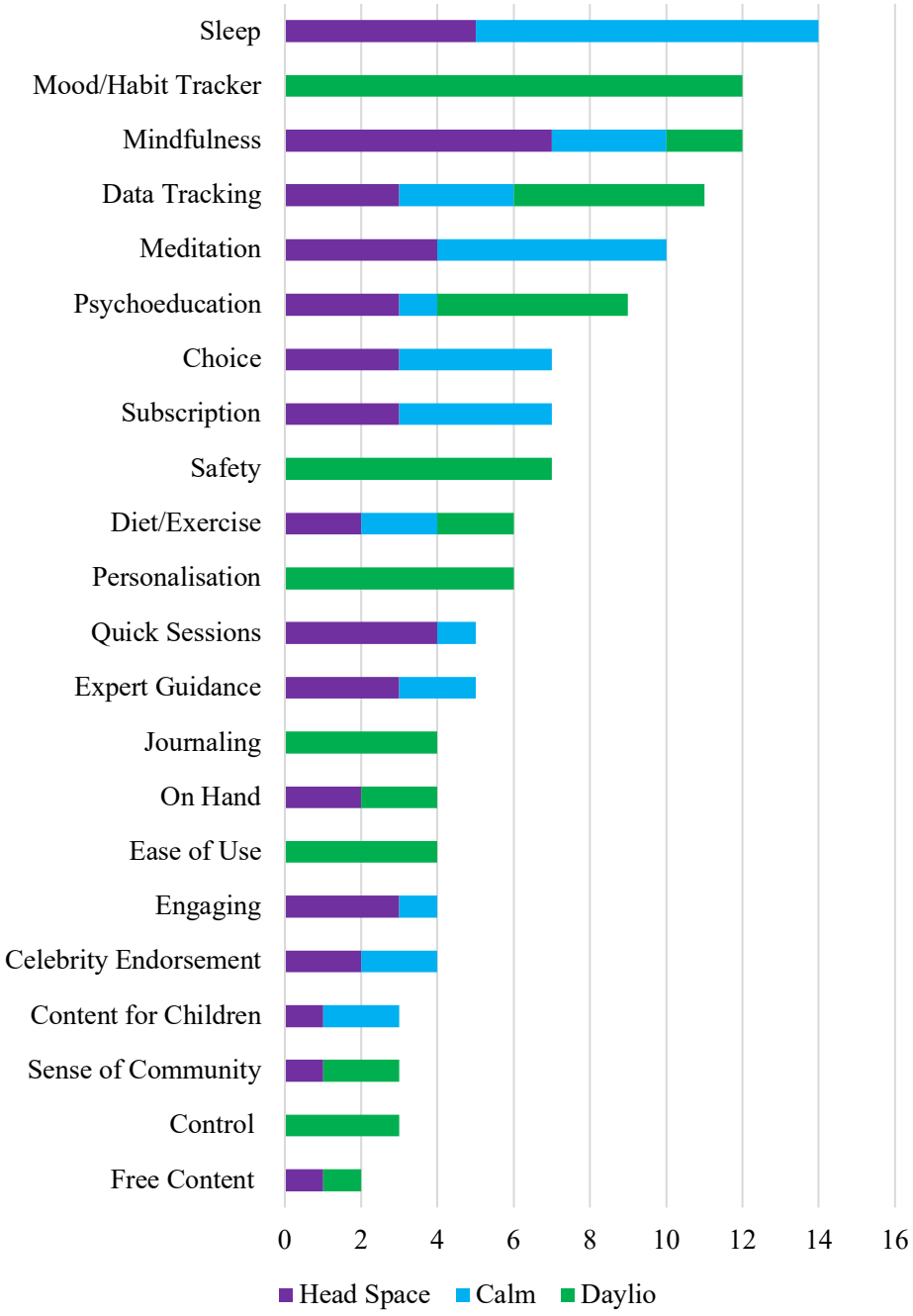
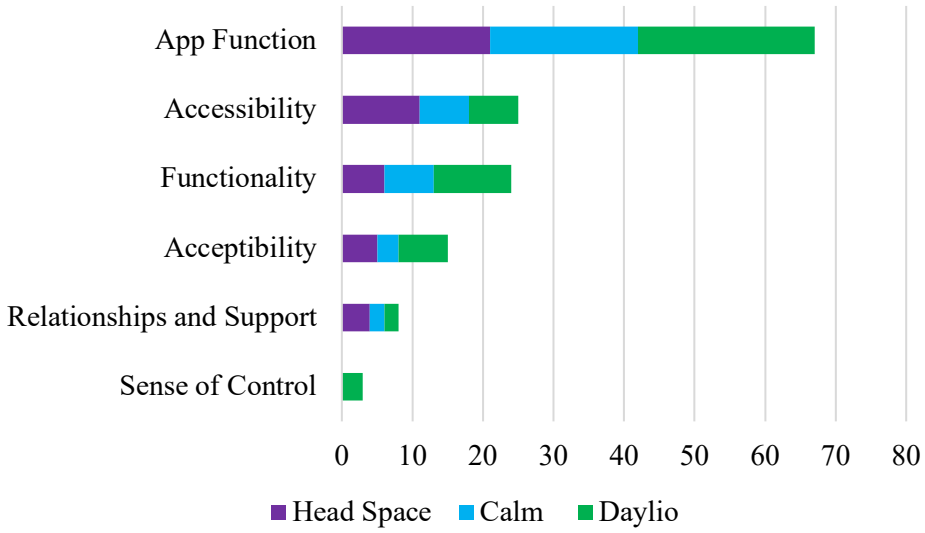


*Figure 4.11: Line chart showing the shared and exclusive categories between the top three used MHApps, by frequency coded in the three data sets.*




### 4.5.2(v) Inter-rater Reliability

To ensure reliability of the researchers coding, inter-rater reliability was sought from three Trainee Educational Psychologists (TEPs) at the UoN. Fifteen items from each of the Headspace, Calm and Daylio Journal data sets were randomly selected (representing 31.69% of the items), using a random number generator. The codes assigned to the data by the researcher were removed and each TEP was sent one of the sets of fifteen items along with the coding frame (Figure 4.9). The TEPs assigned the codes to the items and these were compared to the codes assigned by the researcher. A percentage agreement was established at 75.56%, indicating an acceptable level of agreement (Robson & McCartan, 2016).

### 4.5.3 Summary of Qualitative Analysis

The qualitative analysis examined the most commonly used MHApps amongst the sampled adolescents, the category into which these MHApps fall, and the shared characteristics amongst the top three most commonly used apps. The three most frequently MHApps used by adolescents were Headspace (20.34%), Calm (18.64%) and Daylio Journal (6.78%). Other MHApps used by the remaining 52.4% of participants are detailed in Table 4.11.

Gindidis et al. (2019) set out four categories for MHApps: assessment, monitoring, psychoeducation and skill practice. Using a content analysis, the 22 MHApps identified by the sampled adolescents were categorised into six categories, including mutually exclusive combination categories: P/SP, M/P, M, P/SP/M, M/SP and SP. The combination category of psychoeducation and skill practice (P/SP) was the most used type of app amongst the sampled adolescents; both Headspace and Calm, the two most used MHApps were categorised as P/SP apps.

The content analysis of the Apple App Store descriptions of Headspace, Calm and Daylio Journal highlighted shared characteristics between the three MHApps (Figure 4.10 and 4.11). The three MHApps shared the following app functions: mindfulness, psychoeducation and diet/exercise features, and all three apps shared the feature of data tracking. Headspace and Calm has many shared characteristics, which was expected as both of the MHApps were categorised as P/SP apps. Daylio Journal had exclusive characteristics which were not shared with either Headspace or Calm; Daylio Journal is a M/P app.

## 4.6 Summary of Results

This chapter presented the quantitative and qualitative findings of the current study in relation to the five research questions pertinent to answering the overarching research question.

The quantitative investigation provided support for some of the experimental hypothesis; Table 4.18 provides a summary of these results in relation to each hypothesis and whether or not it was supported.

*Table 4.18: A table summarising the quantitative research findings in relation to each of the research hypotheses.*

| Hypothesis | Results | Supported |
|---|---|---|
| **H1a** | There were gender differences in MHApp utilisation; female participants were 2.10 times more likely to have a MHApp downloaded on their smartphone or tablet device than a male participant. | ✓ |

| | | |
|---|---|---|
| **H1b** | There were ethnic differences in MHApp utilisation; participants from a white ethnic background were 3.27 times more likely to have a MHApp downloaded on their smartphone or tablet device. | ✓ |
| **H1c** | There were no differences in MHApp utilisation between adolescents eligible and not eligible for FSM. | ✗ |
| **H2** | There was a negative correlation between frequency of app use and mental wellbeing. A chi-square analysis identified a significant association between WEMWBS scores and frequency of MHApp use, amongst the 59 MHApp users. | ✓ |
| **H3** | There has been an increase in self-reported MHApp usage since the start of the Covid-19 pandemic. A 40.48% increase was observed in the frequency of adolescents reportedly downloading a MHApp after the outbreak of the Covid-19 pandemic, and 45.8% of adolescents reported an increase in their MHApp usage since the start of the Covid-19 pandemic. | ✓ |

The qualitative analysis identified that a wide range of MHApps were being utilised, with Headspace, Calm and Daylio Journal being the three stated MHApps. The combination category of psychoeducation and skill practice (P/SP) was the most used type of MHApp amongst the sampled adolescents. The content analysis of the top three used MHApps identified three shared subcategory characteristics in relation to app function: mindfulness, psychoeducation and diet/exercise features, and all three apps shared the subcategory characteristic of data tracking.

# Chapter V Discussion

## 5 Discussion

### 5.1 Aim and Structure of Discussion

The purpose of the current study was to explore adolescents' use of MHApps, including demographic differences in MHApp utilisation, whether there is a relationship between MHApp usage and mental wellbeing and changes in MHApp usage since the start of the Covid-19 pandemic. It was hoped that this research would contribute to the limited but emerging research into MHApps and digital health technologies, providing a better understanding into adolescents' use of MHApps and identifying areas for further research.

The discussion chapter begins by summarising and critically reflecting on the quantitative and qualitative findings of the current study sequentially, in relation to existing research. Following this, the methodological design and procedure, as outlined in Chapter 3, are reviewed: attention is given to the quantitative and qualitative investigation and the use of mixed methods as a whole. Then, the implications of the current research findings are discussed, considering the implication for future research, educational policy, and educational psychologists' practice. Finally, the chapter concludes with the researcher's personal reflections and an overall conclusion of the research.

### 5.2 Quantitative Research Findings and Possible Interpretations

The purpose of the quantitative investigation was to answer the first three research questions in relation to the hypotheses, stated in Table 4.4, to:

- Identify whether 16-to-18-year-olds are using MHApps.
- Identify whether there are any demographic differences in their MHApp utilisation.
- Explore whether there is a relationship between MHApp usage and mental wellbeing for 16-to-18-year-olds.
- Identify whether the Covid-19 pandemic has increased older adolescents use of MHApps.

### 5.2.1 Initial Demographic Findings

Descriptive statistics showed that the majority of respondents to this survey were female, accounting for 67.2% of the sample, compared to 30% male. When considering the sample, the average percentage of females on roll at the participating schools was 57.55%, indicating that the survey take up was skewed towards the female demographic. This is an interesting finding, suggesting that females are more likely to participate in surveys about mental health than males. Previous research suggests that males, in particular, prefer to rely on themselves when experiencing poor mental health (Radez et al., 2020). Participant demographics here further suggest that adolescent males may be less likely to respond to the opportunity to divulge thoughts about their mental health than females. The demographic for this current study could also indicate that the barriers adolescents face when accessing mental health support, concerns about confidentiality, embarrassment and stigma (Gulliver et al., 2010), may be more prevalent for the adolescent males. This would potentially account for the higher number of female respondents to this survey.

The majority of respondents were from a white ethnic background, accounting for 89.7% of the sample. Again, when considering the sample, the average percentage of pupils whose first language is not English at the included schools is 10.7%; whilst this is not a direct indicator of ethnicity it suggests the cultural diversity within the school populations. Therefore, whilst the data appears skewed towards respondents from a white ethnic background, this appears representative of the sampled schools.

In relation to socio-economic status, the majority of respondents (89.7%) were not eligible for free school meals. The average percentage of pupils receiving FSM in the participating schools was 23.56%, indicating that the survey respondents underrepresent those adolescents eligible for FSM. Given the survey was an online survey, this finding may reflect the 'digital divide' amongst UK households and access to the internet (Livingstone et al., 2005), with some adolescents from lower socio-economic backgrounds potentially not having access to the survey. However, the survey was sent out via the school and internet access in educational settings is near universal (Elwick et al., 2013),

suggesting that other factors may account for the underrepresentation of adolescents eligible for FSM. For instance, it is important to consider that the survey was sent out to sixth form pupils, and the FSM eligibility data is for the whole school, Years 7 to 13. The percentage of pupils eligible for FSM in sixth form provisions may be lower due to social inequalities and post-16 choices (Social Mobility Commission, 2016). A press release from the social mobility commission (2016) found that the progression gap, the different choices made by individuals after compulsory education age, is mostly influenced by social background, with those from poorer backgrounds less likely to study for 'A' levels. Therefore, the findings from this survey may be indicative of a lower proportion of adolescents eligible for FSM accessing sixth form provisions.

Finally, the current research study was interested in whether adolescents were using MHApps. At the point of responding, 59 of the 253 adolescents included in the research sample were utilising MHApps on their smartphone or tablet devices, representing 23.32% of sample. Whilst not entirely comparable, this is lower than previous survey research into adolescent and young adults' attitudes towards using MHApps, which found that 51% of girls aged 11-to-16 years in the UK (Grist et al., 2018) and 76% of Australian young adults (Proudfoot et al., 2010) expressed interest in using MHApps to support their mental health and wellbeing. The finding from this research suggests that there may be underlying barriers to adolescents utilising MHApps in real-life, which need exploring in further research.

An interpretation of the key findings relating to each of the research hypotheses is presented, followed by a summary of the quantitative investigation in relation to the overarching research question:

*What MHApps, if any, are being utilised by adolescents aged 16-to-18 years in sixth form provisions, and is there a relationship between app usage and mental wellbeing*

### 5.2.2 Demographic Differences in Adolescent MHApp Utilisation

The first hypothesis of the study was concerned with whether there were any demographic differences in MHApp utilisation, split into three specific hypotheses:

- H1a: There are gender differences in MHApp utilisation, females are more likely to have a MHApp downloaded on their smartphone.
- H1b: There are ethnic differences in MHApp utilisation, individuals from a white ethnic background are more likely to have a MHApp downloaded on their smartphone.
- H1c: There are SES differences in MHApp utilisation, those not eligible for FSM are more likely to have a MHApp downloaded on their smartphone.

For H1a, the data revealed there were statistically significant gender differences in MHApp utilisation within the study's sample, although the effect size was small. Specifically, female participants were 2.10 times more likely to have a MHApp downloaded on their smartphone or tablet device than a male participant. The results for H1b indicated that there were statistically significant ethnic differences in MHApp utilisation within the study's sample, although the effect size was small. Specifically, adolescents from a white ethnic background were 3.27 times more likely to have a MHApp downloaded on their smartphone or tablet than an adolescent from another ethnic background. Finally, the results for H1c indicated that there were no statistically significant socio-economic differences in MHApp utilisation within the study's sample.

### 5.2.3 Possible Interpretation of Findings: Demographic Differences in Adolescent MHApp Utilisation

#### 5.2.3(i) Under-Representative Sample

A possible interpretation as to why gender and ethnic differences were found in MHApp utilisation and no differences were found by SES for MHApp use, may be due to the sample being under-representative of the wider population. Despite a robust sample size, the sample is skewed towards a female, white demographic not eligible for FSM. Also, it should be noted that the effect sizes for the identified gender and ethnic differences were small, so results should be treated

with caution. It is possible, for example, that the under-representation of male adolescents from other ethnic backgrounds and those eligible for FSM has resulted in a Type I error; a difference has been observed when there is not one (Field, 2009).

### 5.2.3(ii) Higher Prevalence of Mental Health Needs in Females

The 2017 Mental Health of Children and Young People Survey (Sadler et al., 2018) identified young women aged 17-to-19 years as the most at-risk group, with one in four experiencing at least one mental health disorder. More recent findings indicate that 27.2% of young women aged 17-to-22 years have a probable mental health disorder (Vizard et al., 2020). The current study's sample consisted of 170 female participants aged 16-to-18 years, spanning the identified at-risk age group. Therefore, a possible interpretation for the identified gender differences found in MHApp utilisation may reflect the higher prevalence of probable mental health disorders in young women, resulting in a higher proportion of females utilising MHApps to support their wellbeing.

Furthermore, research has found that adolescents, particularly males, appear to favour managing their own needs when experiencing poor mental health (Radez et al., 2020), with less than two-thirds of adolescents reportedly seeking professional help for poor mental health experiences (Sadler et al., 2018). The results from this study could add to these findings, illustrating that approximately 27.6% of the most at-risk age group amongst young people are turning to MHApps as a strategy to manage their own mental wellbeing, perhaps as an alternative to seeking professional mental health support.

### 5.2.3(iii) Perceived Social Acceptability of MHApps for Male Adolescents

Another possible interpretation, as to why gender differences were found in MHApp utilisation in the current samples, is that barriers to seeking mental health support may be more pervasive in male adolescents. This would be consistent with previous research that has found that males in particular are less likely to seek professional mental health support preferring to manage it themselves (Radez et al., 2020) due to barriers such as stigma and embarrassment (Gulliver et al., 2010).

However, MHApps offer evidence based mental health support (Chandrashekar, 2018) that are designed to be used independently without the need for professional guidance (Qu et al., 2020), raising the likelihood of other barriers resulting in males being less likely to access MHApps. A possible explanation may relate to the findings from the qualitative synthesis, presented in Chapter 2, in which social acceptability was identified as an important contributing factor to whether or not adolescents accessed MHApps. Research identifies that if more peers are using and talking about MHApps that would increase their social acceptability for adolescents (Kenny et al., 2016). The current study found that approximately 13.16% of the male adolescents in the sample are utilising MHApps, indicating low usage amongst this sample. Therefore, a possible interpretation as to why gender differences were identified in MHApp usage may be due to the perceived social acceptability of using MHApps amongst the male adolescent demographic.

### 5.2.3(iv) Cultural Factors in MHApp Utilisation

Ethnic differences were found in MHApp utilisation in the current study. Data suggests that mental health disorders are more likely to be identified in children from white ethnic backgrounds (18.8%) compared to children from black and minority ethnic (BME) backgrounds (7.5%) (Vizard et al., 2020). It is therefore important to consider potential contributory factors and cultural differences in perceiving poor mental health and accessing mental health support. Socio-cultural factors may, for example, contribute towards the lower prevalence rates identified in research (Memon et al., 2016).

Research reports a number of barriers affecting adolescents and young adults from backgrounds other than white populations accessing mental health support. Some practical barriers include: a lack of access to culturally appropriate services (Arday, 2018), language barriers, and insensitivity and discrimination towards the needs of individuals from BME communities (Memon et al., 2016). Research also indicates community factors that may serve to deter accessing of mental health support provided by services: in some communities, for example, there may be a greater likelihood of extended family support and needs being

managed within the extended family (Snowden, 2007), cultural patterns and expectations that needs can be and should be managed within the family (Shtapura-Ifrah & Benish-Weisman, 2019), and differences in recognising, accepting and discussing mental health problems (Memon et al., 2016).

Such factors may have relevance when considering the differences by ethnic identity of respondents in MHApp utilisation found in the current study. Despite smartphones being used widely across ages, incomes and cultures (Proudfoot, 2013), MHApps and other digital health interventions may not be adapted to meet the needs of diverse populations or seen as appropriate by all cultures. It is possible that perhaps lack of culturally appropriate services and differences in recognising, accepting and discussing mental health problems (Memon et al., 2016) may offer contributory explanations for the differences found in MHApp utilisation between adolescents from white and those from other ethnic backgrounds, although this remains to be examined.

### 5.2.4 Summary: Demographic Differences in Adolescent MHApp Utilisation

In summary, the demographic differences found in MHApp utilisation may relate to a number of factors. The demographic features of the sample may contribute to the findings, so caution should be taken when generalising the results to the wider population. However, the differing prevalence of probable mental health disorders amongst female adolescents (Sadler et al., 2018) and individuals from BME backgrounds (Vizard et al., 2020) may account for the gender and ethnic differences found in MHApp utilisation.

In addition to prevalence rates, perceived barriers to accessing mental health support amongst adolescent males (Radez et al., 2020) and individuals from BME backgrounds (Arday, 2018; Memon et al., 2016) may also be associated with the demographic differences found in MHApp utilisation. Given the lower rates of males utilising MHApps, perceived social acceptability (Kenny et al., 2016) and stigma around mental health (Gulliver et al., 2010) may result in less males utilising MHApps. For those individuals from BME backgrounds, lower rates of MHApp utilisation may be influenced by absence of adaptations, for

example, cultural sensitivity (Arday, 2018) and differences in perceptions of mental health (Memon et al., 2016) and support (Snowden, 2007).

### 5.2.5 Mental Wellbeing and Mental Health Apps

The second hypothesis of the study explored the nature of the relationship between MHApp usage and mental wellbeing, specifically:

- H2: There is a relationship between MHApp usage and mental wellbeing.

The correlation analysis highlighted that no relationship between MHApp usage and mental wellbeing reached significance but that there was a negative correlation; this relationship was explored further using a chi-square analysis. The analysis also showed that a significant association between mental wellbeing scores, as measured by the WEMWBS, and frequency of MHApp use, with medium app use frequency (1-to-3 days per week) being associated with an average (medium) wellbeing score. The effect size indicated that the association was weak.

### 5.2.6 Possible Interpretation of Findings: Mental Wellbeing and Mental Health Apps

#### 5.2.6(i) Sample Size Issues

The overall sample in this current study was robust with 253 responses included in the analysis. However, only 59 (23.32%) of the participating adolescents reported utilising MHApps, compared to 194 adolescents reporting having no MHApps downloaded onto their smartphone or tablet device.

A weak association was found when examining the relationship between MHApp frequency of use and mental wellbeing scores on the WEMWBS amongst the MHApp user group. Having a sufficient sample size is important (Kraemer & Blasey, 2016) as it affects statistical significance. Therefore, there is a chance that a Type I error may have occurred due to the small sample size of adolescents reporting MHApp use.

### 5.2.6(ii) Reliability of the Measure

The WEMWBS, the existing scale used to measure mental wellbeing in the survey, has good internal consistency within an adolescent population (Cronbach's alpha of 0.87) (Clarke et al., 2011). Despite this, there were possible issues relating to the reliability of the overall survey measure, in relation to Question 16 and 17. The Likert scale on Question 16 was not in order of high to low frequency of use. The order was: (1) daily, (2) 1-to-3 days a week, (3) 4-to-6 days a week, (4) once a week, (5) monthly, (6) less than monthly. The 1-to-3 days a week and 4-to-6 days a week should have been the opposite way around to represent high to low frequency of use. Therefore, potential for misreading of the Likert scale could have resulted in adolescents misrepresenting their frequency of MHApp use.

Also, in relation to Question 16 and 7, both Likert scales had ranges of time and overlapping items (daily and 1-to-3 days a week), which again may not have allowed fullest precision in representing the adolescents MHApp usage. However, the decision to have overlapping category ranges was to reflect the flexibility of MHApp usage; for example, an adolescent may not have consistently used MHApps daily but most days which would be represented by 4-to-6 days a week (see Chapter 3, Section 3.6.4(ii), Table 3.8). The data was also categorised into high, medium and low categories for analysis which lessened the chances of the data misrepresenting adolescent's frequency and duration of MHApp usage.

### 5.2.6(iii) Mental Health Apps as a Preventative Wellbeing Measure

The identified weak association between medium MHApp frequency of use and medium wellbeing scores potentially indicates that MHApps could be a preventative tool to support and promote wellbeing. Adolescents engaging with MHApps approximately one-to-three days per week were more likely to have an average wellbeing score than those adolescents engaging with MHApps four-to-seven days a week, or less than once per week. This finding is in line with previous research, that has suggested that DHIs and mHealth interventions provide promising methods for preventative mental health support for the adolescent population (Cavazos-Rehg et al., 2020) and can help in the reduction

of symptoms of anxiety (Firth et al., 2017a), depression (Firth et al., 2017b; Kerst et al., 2020) and stress (Donker et al., 2013).

However, it is important to consider that higher frequency of MHApp use was not associated with higher mental wellbeing scores. This potentially suggests that more frequent MHApp usage is not an effective strategy when a young person is experiencing more significant mental health needs. Therefore, the findings from this current study suggest that MHApps cannot be effectively used as an alternative strategy to displace face-to-face, professional-lead mental health interventions; which is a viable concern held by helping professionals in regard to all DHIs (Fleming & Merry, 2013; Stallard et al., 2010).

### 5.2.7 Summary: Mental Wellbeing and MHApps

In summary, despite identified low methodological threats, the association between medium MHApp frequency of use and medium wellbeing scores on the WEMWBS may be indicative of MHApps being a preventative method for supporting positive mental wellbeing. The findings may also suggest that MHApps have the potential to be utilised as preventative tools to support and promote wellbeing for adolescents, in line with previous findings (Cavazos-Rehg et al., 2020; Donker et al., 2013; Firth et al., 2017a; Firth et al., 2017b; Kerst et al., 2020). Nevertheless, it is important to note that increased frequency of MHApp usage does not associate with higher mental wellbeing scores here, suggesting that MHApps may not be an effective intervention method and should not be used in place of face-to-face, professional-led mental health interventions.

### 5.2.8 COVID-19 and MHApp Usage

The third hypothesis was concerned with the change in MHApp usage since the outbreak of the Covid-19 pandemic in March 2020:

- H3: There has been an increase in self-reported MHApp use since the start of the Covid-19 pandemic.

The results for H3 indicated that there had been an increase of 45.8% in self-reported MHApp usage since the outbreak of the Covid-19 pandemic.

Additionally, there was a 40.48% increase in the number of adolescents that self-reported themselves as utilising MHApps after the outbreak of the Covid-19 pandemic.

### 5.2.9 Possible Interpretation of Findings: Covid-19 and MHApp Usage

#### 5.2.9(i) COVID-19 as a Barrier to Accessing Mental Health Support

A possible interpretation for the observed increase in adolescents reporting use of MHApps after the outbreak of the Covid-19 pandemic may be the Covid-19 restrictions interrupting access to typical support systems. The national lockdown restrictions in place since March 2020 have resulted in the closures of most amenities, limiting access to activities and services that adolescents may have previously accessed to support their wellbeing. Most notably, educational settings, which form an integral part of adolescents' micro and meso systems (Bronfenbrenner, 1977). Positive school experiences, secure and supportive personal relationships (Rutter, 1999) and social opportunities (DfE, 2018; PHE, 2016) are protective factors that can promote resilience. The lack of access to teachers and peer groups is likely to have impacted on adolescent's wellbeing, potentially drawing them towards other strategies for support such as MHApps.

Furthermore, as discussed in Chapter 2, Section 2.2, a significant gap between need and mental health support provision available has been identified (Ford et al., 2007; WHO, 2013). Teachers are the most commonly cited source for mental health support for children and young people, followed by GPs (Sadler et al., 2017). The Covid-19 restrictions resulted in no access to educational settings for a majority of pupils and GP surgeries for non-emergency cases across the UK. Educational settings are recognised as playing a pivotal role in promoting mental health and wellbeing of their pupils (Vostanis et al., 2013; Weare & Nind, 2011). The absence of this supportive environment is likely to be a contributing factor to the reported increase in symptoms of depression (Bignardi et al., 2020) and anxiety and overall decrease in wellbeing amongst young people (Kwong et al., 2020), following the outbreak of the Covid-19 pandemic. Restricted access to typical avenues of universal support being interrupted by the restrictions, may have contributed to an overall decrease in wellbeing amongst young people (Kwong et al., 2020), and adolescents may have turned to alternative support

strategies, such as deploying MHApps. A noted advantage of MHApps over more traditional face-to-face interventions is that they are easily and immediately accessible at any time and in any environment (Bakker & Rickard, 2019) and therefore offer the opportunity to expand the availability of evidence based mental health support (Chandrashekar, 2018).

### 5.2.9(ii) Covid-19 has Increased Mental Health Needs Amongst Adolescents

Consistent with previous findings, the observed increase in MHApp usage since the outbreak of the Covid-19, may be due to the disproportionate impact the pandemic has had on adolescent mental wellbeing due to limited school access and disruption of social relationships (Widnall et al., 2020). As discussed, an overall decrease in the wellbeing of adolescents has been reported (Kwong et al., 2020; Widnall et al., 2020), and adolescents have reported an increase in disrupted sleep and feelings of loneliness (Newlove-Delgado et al., 2021). The descriptive statistics of this current study showed that the average wellbeing score on the WEMWBS was 41.55, which is lower than the typical average score of around 50 found in previous research (Morris & Earl, 2017; Tennant et al., 2007), which is in line with the emerging research. This indicates that the overall wellbeing of the adolescent sample was lower than what would be expected from a typical sample outside of the Covid-19 pandemic. Therefore, a possible interpretation for the reported increase in adolescents utilising MHApps after the outbreak of the Covid-19 pandemic may link to the reported overall decrease in wellbeing for this population nationally. Subsequently, more adolescents may have been seeking cost-effective and widely accessible (Hollis et al., 2017) strategies to support their wellbeing during the pandemic.

### 5.2.10 Summary: COVID-19 and MHApp Usage

In summary, the reported increase in MHApp utilisation since the outbreak of the Covid-19 pandemic found in this current study may have relate to decreased adolescent wellbeing and limited access to mental health support during the pandemic. It could also be suggested that an increase in MHApp utilisation amongst adolescents has been observed due to adolescents seeking alternative and accessible strategies to support their wellbeing.

### 5.2.11 Quantitative Research Findings Summary

The interpretation of the quantitative results in relation to previous research and to the study's overarching research question provides insights into adolescents' use of MHApps, and the potential relationship of these with mental wellbeing. Emerging from the results is a picture of differences in adolescents' utilisation of MHApps, by gender and ethnicity, and an increase in MHApp utilisation since the outbreak of the Covid-19 pandemic. Approximately a quarter of the sampled adolescents aged 16-to-18-years ($M$ = 16.68) were utilising MHApps and there was an association found between MHApp usage and mental wellbeing; this association needs further research. Specifically, the current study found that using MHApps approximately one-to-three days a week was associated with average mental wellbeing scores, indicating that MHApps may serve as a preventative measure to promote positive mental wellbeing.

The discussion will now review the qualitative research findings in relation to previous research and the qualitative synthesis presented in Chapter 2, aiming to add further insights into adolescents' use of MHApps.

## 5.3 Qualitative Research Findings in Relation to Previous Research

The purpose of the qualitative investigation was to provide further insight into adolescents use of MHApps, specifically:

- To identify what types of MHApps are being utilised by adolescents.
- To explore the characteristics of the top three MHApps used by adolescents.

### 5.3.1 MHApps Utilised by Adolescents

The qualitative analysis found that a wide range of MHApps were being utilised by the sampled adolescents, with 22 different MHApps, outlined in Table 4.14, being reportedly utilised by the adolescents. Headspace, Calm and Daylio Journal were the top three stated MHApps. After examining the content of the Apple App Store (Apple n.d.) text description of the 22 different MHApps using content analysis, the MHApps were categorised into six key functions, including combination functions: psychoeducation and skill practice (P/SP), monitoring and psychoeducation (M/P), monitoring (M), psychoeducation, skill practice and

monitoring (P/SP/M), monitoring and skill practice (M/SP) and skill practice (SP). The combination function of psychoeducation and skill practice (P/SP) was the most frequently coded function of the MHApps used amongst the sampled adolescents; Headspace and Calm were both coded as P/SP. Daylio Journal was coded as M/P.

### 5.3.2 Possible Interpretation of Findings: Types of MHApps Utilised by Adolescents

#### 5.3.2(i) Social Acceptability Impacts MHApps Utilised by Adolescents

A possible interpretation as to why Headspace, Calm and Daylio Journal were identified as the top three apps may be relate to social acceptability. As previously mentioned, the results from the qualitative synthesis (Chapter 2, Section 2.6.10) indicated that MHApps being perceived as 'socially acceptable' by adolescents was a key contributor as to whether or not they accessed MHApps (Kenny et al., 2016). As of April 2021, Headspace had over 276,000 ratings on the Apple App Store, Calm had over 223,000, and Daylio Journal had around 7,200. Headspace and Calm also had Editor's Choice awards and were ranked 10$^{th}$ and 13$^{th}$ respectively for health and fitness apps on the Apple App Store (Apple n.d.). Daylio Journal had been recognised as Apple's app of the day previously and advertised that it has been talked about in The Guardian newspaper and Forbes magazine (Apple, n.d). All three of the top used MHApps were rated at least 4.7 stars out of a possible 5. Therefore, it could be argued that Headspace, Calm and Daylio Journal are 'popular' MHApps and are more widely used by the general population, increasing their social acceptability and appeal towards adolescents.

#### 5.3.2(ii) Psychoeducation is an Important Feature in MHApps

All three of the most reportedly used MHApps were coded into the psychoeducation function: Headspace and Calm were coded as SP/P and Daylio Journal was coded as M/P. The wider function of psychoeducation apps is described as MHApps that provide individuals with information related to psychological wellbeing and information on strategies to support the individual (Gindidis et al., 2019). As all three of the most used MHApps feature psychoeducation, it could be assumed that this feature is appealing to

adolescents. With research suggesting that less than two-thirds of adolescents experiencing probable mental health disorders access professional help (Sadler et al., 2018), psychoeducation may appeal to adolescents as it provides knowledge and understanding about mental health and wellbeing, without the need to seek external advice and support.

### 5.3.3 Summary: Types of MHApps Utilised by Adolescents

In summary, it appears that the social acceptability of MHApps and their psychoeducational content are important to adolescents, indicating that this may be an important feature to adolescents seeking to utilise MHApps. The high profile of all three most used MHApps suggest that these may be deemed as more socially acceptable than lower ranking or less widely known MHApps, in line with previous research which found that adolescents perceived MHApps as more socially acceptable if they were used and talked about amongst peers (Kenny et al., 2016). In relation to the results from the qualitative synthesis, the results from this study's qualitative analysis offers some indications towards the interpretation that adolescent's perception of MHApps as being 'socially acceptable' impacts on whether or not adolescents engage and utilise them.

### 5.3.4 Characteristics of Mental Health Apps Utilised by Adolescents

The content analysis for the top three used MHApps, Headspace, Calm and Daylio Journal, highlighted some shared characteristics between the three. They shared app functions in regard to mindfulness, psychoeducation and diet/exercise features, and all three apps shared the characteristic of data tracking, such as: saving data to the Apple health app, tracking mindful minutes or minutes meditated. Headspace and Calm shared many characteristics, outlined in Section 4.5.3, as expected since both MHApps were categorised as P/SP. Daylio Journal had exclusive characteristics, such as journaling and habit tracking, not shared with Headspace or Calm, and this was likely due to the MHApp being categorised as M/P.

The most commonly cited category in the Apple App Store app descriptions was app function, followed by accessibility and functionality; Figure 4.8 shows the identified categories and the frequency of citations in the descriptions. The most

commonly cited subcategory was sleep, followed closely by mood/habit tracker, mindfulness and data tracking; Figure 4.9 ((Section 4.5.2(ii)) shows the subcategories cited in ascending order from most cited to least cited.

### 5.3.5 Possible Interpretation of Findings: Characteristics of Mental Health Apps Utilised by Adolescents

#### 5.3.5(i) App Function is Important to Adolescents

App function was referred to by the adolescents in three of the studies included in the qualitative synthesis; adolescents identified mood tracking (Forchuk et al., 2016) and meditation skill-practice (Gindidis et al., 2020) as appealing MHApp functions. The findings from this current study are in line with the results from the qualitative synthesis, showing that app functions including mood tracking, mindfulness and psychoeducation were shared characteristics of the MHApps being utilised by the adolescents sampled in this study, and sleep, mood/habit tracker and mindfulness were the top three cited subcategories from the content analysis of all three MHApps. These results therefore echo the findings from the qualitative synthesis and suggest that particular app functions may be more appealing to adolescents, which could impact which MHApps they choose to engage with.

Interestingly, sleep is the most commonly cited subcategory across the content analysis of all three MHApps, being referenced 14 different times in the Apple App Store (Apple, n.d.) descriptions of Headspace and Calm. Research into children and young people's mental health and wellbeing has identified an increase in reported sleep problems amongst adolescents with probable mental health disorders (Vizard et al., 2020). Therefore, a possible interpretation of the results from this qualitative investigation could be that MHApps supporting sleep are appealing to adolescents, in particular those experiencing poor mental health.

#### 5.3.5(ii) MHApps Accessibility is Appealing to Adolescents

Similar to app function, accessibility was identified as a category in the qualitative synthesis, and it was most widely referenced by adolescents in the four papers synthesised. In particular, adolescents commented on the ease of use

and access to MHApps (Forchuk et al, 2016; Kenny et al., 2016; McManana et al., 2017) and their availability at any time anywhere (Gindidis et al., 2020). The results from the content analysis support the findings from the qualitative synthesis, with quick sessions, on hand and ease of use being identified subcategories across all three of the MHApps Apple App Store descriptions, suggesting that accessibility is an appealing characteristic to adolescents. Furthermore, research evidence suggests that adolescents appear to favour managing their own needs independently when experiencing poor mental health (Radez et al., 2020), without seeking professional help (Sadler et al., 2018). Therefore, a possible interpretation of this research finding may be that the accessibility of MHApps is an appealing characteristic to adolescents as they be used independently without the need for professional guidance (Qu et al., 2020), allowing for more independence in managing and supporting mental health and wellbeing.

In addition, authors in the qualitative synthesis made reference to the cost of some MHApps, with adolescents reporting that they would be unlikely to access MHApps if they had a cost associated with them (Kenny et al., 2016). However, free content was the least referenced subcategory identified in the content analysis, in fact both Headspace and Calm both made reference to the subscription and costs of using the full app functions. Since no data was gathered as to whether the adolescents in this study using Headspace and Calm were accessing the limited free content or were paying the subscription costs to access the full MHApps content, no conclusions can be drawn around whether for this sample in this study, subscription costs were a barrier as suggested in the qualitative synthesis.

### 5.3.5(iii) Tracking Data is more Appealing than Personalisation

Again, functionality was identified in the qualitative synthesis, with adolescents making reference to the importance of personalisation making MHApps more appealing (Forchuk et al., 2016; Gindidis et al., 2020; Kenny et al., 2016; McManana et al., 2017). However, personalisation was only identified as a characteristic of Daylio Journal in the content analysis but was not referenced in

the descriptions of Headspace or Calm. This indicates that personalisation may not be such a significant attribute as identified in the qualitative synthesis. Nevertheless, data tracking was the most commonly cited subcategory within the functionality category identified in the content analysis of all three MHApps, suggesting that being able to track progress and save data to the Apple Health app may be a characteristic that is valued by adolescents.

### 5.3.6 Summary: Characteristics of Mental Health Apps Utilised by Adolescents

In summary, the content analysis highlighted shared and commonly referenced characteristics of the top three MHApps being used by the sampled adolescents. Viewed in relation to the results from the qualitative synthesis, this study's qualitative analysis provides some information towards the characteristics that adolescents perceive to be appealing and that may increase their likelihood of accessing MHApps. However, the qualitative synthesis noted characteristics that adolescents identified as being important or barriers to access MHApps, that were not identified in this study, indicating some disparities between adolescents reported preferences within MHApps and their actual behaviours when utilising MHApps.

### 5.3.7 Qualitative Research Findings Summary

The function of MHApps appear important to adolescents, with psychoeducation, mood tracking, mindfulness, sleep and data tracking emerging as preferred characteristics. Also, accessibility of MHApps appeared to be an appealing feature in both the qualitative synthesis and qualitative investigation, potentially relating to adolescents' preference to manage their own wellbeing needs independently (Radez et al., 2020). Finally, social acceptability was highlighted in both the qualitative synthesis and the content analysis. In reference to the credentials of the top three MHApps: Headspace, Calm and Daylio Journal are 'popular' and widely used MHApps generally.

The qualitative investigation gave insight into the MHApps being used by the adolescents and the shared and exclusive characteristics amongst the top three

used MHApps. The qualitative analysis has supplemented and enhanced the results from the quantitative investigation.

## 5.4 Methodological Review: Strengths and Limitations

The current study implemented a mixed methods research design to explore adolescents use of MHApps, allowing the study to examine adolescents' utilisation of MHApps and explore the types of MHApps being used, and their characteristics.

The quality of the current study's methodology is discussed over the following sections. To best assess the reliability and validity of the study, the quantitative and qualitative aspects of the research are reviewed separately (Mertens, 2015). Following the sequential evaluation of both aspects, an evaluation of mixed methods research, and of the focus of the research is presented.

### 5.4.1 Review of Quantitative Investigation

The quality of this study's quantitative investigation and the trustworthiness of the research findings are critically evaluated through examining the internal validity, reliability of measures and external validity (Tashakkori & Teddlie, 2009).

#### 5.4.1(i) Internal Validity

Internal validity indicates the extent to which a study's results represent an inference that provides the most plausible explanation, and the results are not due to some other unintended variable (Field & Hole, 2012). Tashakkori and Teddlie (2009) identified three key factors to examine internal reliability:

- Inferences are based on statistical significance
- Weighting of inferences are established through reported effect sizes
- Researcher bias is controlled

As explained in Section 4.3.3, statistical significance was established at $p < .05$, in line with the expected standard for psychological and educational research (Field, 2011). Statistically significant associations were identified in regard to research question one: gender ($p = .013$) and ethnicity ($p = .047$) differences

were identified in MHApp utilisation: no statistically significant association was found between SES and MHApp utilisation ($p$ = .603). In regard to research question two, no statistically significant correlations were found in the correlation matrix. A negative correlation was identified between MHApp usage and mental wellbeing scores; when this was explored further a statistically significant association was found between frequency of MHApp use and mental wellbeing scores ($p$ = .043) amongst the sample of adolescents utilising MHApps. Given the statistically significant results from research question one and two, it is unlikely that the observed differences occurred by chance. Finally, the inference made to answer research question three, that MHApp usage has increased since the outbreak of the Covid-19 pandemic, is based on descriptive statistics of self-reported behaviour rather than tests of significance.

In addition to reporting statistical significance, effect sizes were reported and informed the researcher's interpretation of the study's results. The effect sizes reported in regard to the gender ($V$ = 0.159) and ethnic differences ($V$ = 0.125) indicated a weak association, and a small effect size was also observed in the association between frequency of MHApp use and mental wellbeing scores ($V$ = 0.289). Therefore, the validity of the inferences made are constrained by the small effect sizes. However, in an attempt to control for researcher bias, a balanced perspective of the quantitative findings has been presented in Sections 5.2.3, 5.2.6 and 5.2.9, offering a variety of explanations for the inferences found in relation to the evidence base presented in Chapter 2.

### 5.4.1(ii) Reliability of Measures

As no measure currently existed to explore adolescents use of MHApps, the researcher designed the survey instrument following Cohen and colleagues (2017) twelve-stage planning approach to questionnaire design (Figure 3.3). A pilot study was conducted to ensure that the measure was fit for purpose and was accessible to the intended sample, and necessary adaptations were made to the survey as explained in Section 3.6.3(ii). Internal consistency of the measure as a whole was considered, however due to the exploratory nature of the questions and the inclusion of the well-established WEMWBS, it was not sought.

A particular strength of the designed survey was the inclusion of an established mental wellbeing measure. The WEMWBS has been shown to have high internal consistency (McKay & Andretta, 2017; Ringdal et al., 2018), good construct validity (Taggart et al., 2015), good concurrent validity (Clarke et al., 2010) good discriminant validity (Ringdal et al., 2018; Tennant et al., 2007), and has been validated for use amongst adolescent populations, across many geographical locations including the UK, indicating that it is a reliable measure for wellbeing for the targeted sample.

However, a number of limitations must be recognised. As mentioned in Section 5.2.6(ii), the Likert scale on Q16 was not ideally ordered, which may have potentially led to measurement errors and may pose a threat to reliability (Cohen et al., 2017). Also, both Q16 and Q17 had minor overlap within the scales, which again may have led to some measurement errors. Furthermore, although the questions were carefully worded and piloted, there appeared to be some misunderstanding of the Q15: which app do you use most frequently? Two participants stated non MHApps as their most frequently used app: "SnapChat" and "TikTok", as a result the participants data was recategorised into non MHApp users as the subsequent data was potentially in relation to their usage of non MHApps, which was not being measured by the current survey.

In addition, it should be acknowledged that the survey was self-report, which is inherent to issues of reliability (Cohen et al., 2017; Robson & McCartan, 2016). Given that the survey was completed online, the researcher could not put any measures in place to control for social desirability, where individuals may have presented their behaviours and attitudes in a more favourable light (Ronen et al., 2016). During the data preparation stage, responses where the participant submitted inappropriate answers for the demographic questions were removed, as described in Sections 3.6.5(i) and 3.6.5(ii), as a measure to improve the reliability.

### 5.4.1(iii) External Validity

The current research recruited a relatively large sample ($n$=253) of adolescents aged 16-to-18 years ($M$ = 16.68; $SD$ = 0.652) from six sixth forms in the East

Midlands. The age range of the sample reflects older adolescents (Dumontheil 2016; UNICEF, 2011), who appear to be the targeted age group for DHIs and mHealth interventions (Hollis et al., 2017), due somewhat to their growing access to and efficient use of technology (ONS, 2019). Therefore, the age focus of the current research study was particularly relevant to answering the research question, in the context of previous research.

However, it is important to recognise that there are some issues relating to the sample. As mentioned above (Sections 5.2.1 and 5.2.3(i)) the sample was skewed towards the female demographic, which, whilst this illustrates an important point in the return of this survey, is a potential limitation to the generalisability of the study's findings. Also, whilst the low proportion of adolescents from other ethnic backgrounds (see Table 4.2) was representative of the pupil populations of the participating schools, it does not reflect the UK as a whole (ONS, 2011). Another potential limitation was the recruitment of pupils from sixth form provisions, which appeared to underrepresent pupils eligible for FSM, as discussed in Section 5.2.1, and is not representative of those in other forms of further education, training or work. Finally, as mentioned in Section 5.2.6(i), despite the good sample size, only 59 of the participating adolescents were reportedly utilising MHApps, therefore impacting the generalisability of the study's findings to adolescent MHApp users.

### 5.4.2 Review of Qualitative Investigation

Attention will now focus on this study's qualitative investigation. In qualitative research, a number of criteria have been identified for judging the quality and trustworthiness of the results (Guba & Lincoln, 1989), including: credibility, dependability and confirmability. The steps taken by the researcher, in relation to each of the three criteria, are discussed in turn below.

#### 5.4.2(i) Credibility

Credibility is similar to the concept of internal validity, in that the interpretations of the research findings represent plausible reflections of the phenomenon identified and can be supported by the data set (Korstjens & Moser, 2018). The subjective nature of the qualitative analysis was recognised, and the researcher

took steps to reduce researcher bias in the qualitative arm of the current study. The researcher monitored developing constructs through maintaining a reflexive research journal to reduce subjectivity and enhance the trustworthiness of the analysis (Bengtsson, 2016), and triangulation was possible through comparison of the categories and subcategories identified in the content analysis to those identified in the qualitative synthesis.

#### 5.4.2(ii) Dependability

Dependability is similar to the concept of reliability; in that it reflects the stability and consistency of findings over time, allowing for replicability (Korstjens & Moser, 2018). To enhance dependability, the researcher was explicit in stating the processes involved in the data collection and analysis and presented the coding processes explicitly, presented in Appendix G, H and I. Also, inter-reliability checks were conducted with three other TEPs, as discussed in Section 4.5.2(v), identifying an acceptable level of agreement.

#### 5.4.2(iii) Confirmability

Confirmability, similar to the concept of objectivity, reflects the extent to which the findings of the research are linked to the data, and could be confirmed by other researchers (Korstjens & Moser, 2018). Transparency was ensured throughout the research process, with the clear steps of the research being reported in Chapters 3 and 4, and the raw qualitative data used to generate the categories of the coding frame are presented in Appendix I. As mentioned above, inter-rater reliability checks were also conducted, and interpretations of the qualitative investigation are linked to the findings from the qualitative synthesis, presented in Chapter 2, and existing research, to improve the confirmability of the qualitative investigation.

### 5.4.3 Quality of Mixed Methods Research

The current study adopted a mixed methods design with the embedded qualitative investigation supplementing the results from the quantitative investigation, providing further insight into adolescents use of MHApps. Despite the criticism that mixed method approach receives, with some deeming the approach as an “incompatibility thesis” (Tashakkori & Teddlie, 2009, p.6), the

researcher considered, from a pragmatic standpoint, that a mixed methods approach was the most appropriate for answering the exploratory research questions of the current study in a 'young' research area. The purpose and aims of each research strand were set out and rationalised in Chapter 3 and as discussed, the researcher also ensured that the design of the research process was clearly explained and fidelity to the design was adhered to, increasing the trustworthiness of the findings. Therefore, the mixed methods design was considered, and found appropriate for the aims of the current study, with the qualitative arm enhancing the findings from the quantitative data.

### 5.4.4 Evaluation of Research Focus

The current research focused on adolescents' use of MHApps. The exploratory focus was due to the current lack of research in the particular field. As mentioned in Chapter 2, digital health technologies are being targeted towards adolescent populations based mostly on assumptions that adolescents will engage as they are a technologically 'connected' age group. The researcher wanted to explore whether adolescents were engaging with MHApps and if so whether there were differences in MHApp utilisation and what types of MHApps adolescents were interacting with, taking into consideration the results from the qualitative synthesis (Chapter 2, Section 2.6.10) which explored adolescents' attitudes towards MHApps.

Nevertheless, the wider focus and use of a mixed methods design has limited the depth of exploration into adolescent use of MHApps. For example, exploring the reasons why adolescents are, or are not, engaging with MHApps would increase understanding in adolescents' attitudes towards and likelihood to engage with MHApps and digital health technologies. It is hoped that the findings from this research will support the direction of further investigation into adolescents' use of MHApps, to continue to develop this area of research.

## 5.5 Implications of the Current Study's Results

The current study has produced findings that may have potential implications for educational policy and provision, educational psychologists' practice and for future research; these are discussed in turn below.

### 5.5.1 Implications for Educational Policy and Provision

In Chapter 2, the importance of educational provisions for promoting and supporting children and young people's mental wellbeing (Vostanis et al., 2013; Weare & Nind, 2011) was identified and recognised as a focus for recent governmental initiatives and policies (DfE, 2018; PHE, 2016). However, despite this, funding and staff capacity remain significant barriers for educational provisions providing universal and targeted mental health support (DfE, 2017). The findings from this current study provides some support towards the use of MHApps to assist the wellbeing of adolescents, which accords with previous research findings indicating that MHApp interventions can increase wellbeing (Firth et al., 2017a; Firth et al., 2017b; Kerst et al., 2020). However, it is important to note that the findings do not indicate that MHApps should replace traditional methods of support, but may be a potentially cost-effective, preventative strategy that could be promoted by educational provisions.

In this study male adolescents were less likely to participate in the survey about mental wellbeing and were statistically less likely to utilise MHApps than same aged female adolescents. This suggests that male adolescents may be less likely to open up about and access support for their mental health and wellbeing, which is in line with previous research findings (Radez et al., 2020). Research suggests that lower rates of help-seeking behaviours observed in males is often associated with traditional stereotypes of masculinity such as, self-reliance, restricted emotionality and stoicism (Addis & Mahalik, 2003; Davies et al., 2000), preventing them from expressing their emotions, as this may be seen as a sign of weakness (Sagar-Ouriaghli et al., 2020). These results may implicate current governmental policies that universally target mental health support in educational settings, as it appears a bespoke and differentiated pathway or policy may be valuable for supporting the wellbeing of male adolescents. A paper by Sagar-Ouriaghli and colleagues (2020) sets out a framework for designing mental health interventions for male students, which may be helpful to consider as an evidence-based framework when tailoring mental health support towards male adolescents.

The importance of adolescence as a critical period for supporting mental wellbeing was also recognised in Chapter 2. Research findings indicate that experiences of poor mental health during adolescence can have long-term implications on health, academic and social outcomes (WHO, 2007). It was also recognised that the impact of the Covid-19 pandemic may have disproportionately affected adolescents. Initial findings indicate that there was an overall decrease in the wellbeing of young people (Kwong et al., 2020) and incidences rates in mental health problems amongst children and young people have increased (Newlove-Delgado et al., 2021). The findings from this study reflect this. Specifically, the average mental wellbeing of the sample ($M = 41.55$) was lower than in previous research where the typical mean is around 50, conducted before the Covid-19 pandemic (Morris & Earl, 2017; Tennant et al., 2007), and there was an approximately 40% reported increase in the use of MHApps following the outbreak of the Covid-19 pandemic. These results alongside the recognised importance of promoting wellbeing during adolescence, to negate any long-term impacts of poor mental health, may have implications for educational policy and provision.

### 5.5.2 Implications for Educational Psychologists

As scientist-practitioners, EPs utilise their knowledge of evidence-based interventions and understanding of interacting and complex factors which influence children and young people's development (Bronfenbrenner, 1977) to foster positive outcomes (Birch et al., 2015). The findings from this study have potential implication for EPs' practice.

It has been established that EPs play a role in supporting SEMH in schools, in varying ways, yet there is less EP involvement with or around the older adolescent age group, potentially (Purewal, 2020). This age group experience some of the most intense academic or even personal and social pressures (Blakemore, 2018) therefore rendering preventive interventions even more significant. Further to this, the results from this study have highlighted a potential decrease in adolescents' wellbeing and an increase in adolescents' use of MHApps since the start of the Covid-19 pandemic. The average wellbeing score of the adolescent sample was lower than typical average score and a 45.8%

increase in MHApp use was reported by the sampled adolescents. These findings have implications for EPs, highlighting the potential need for even greater mental health support for adolescent populations, and more importantly so in light of the Covid-19 pandemic.

The findings here may be considered useful for developing an understanding of how MHApps could be used as a preventative intervention to support the mental wellbeing of adolescents, dependent on individuals' preferences and needs, as indicated by the variance in this data. The results indicate that MHApps have the potential to support mental wellbeing, when used one-to-three days per week. These findings have implications to EPs recommending the use of MHApps to adolescents and young people: a recommendation of one-to-three days per week appears appropriate from the data and results of this study. In terms of the MHApps to recommend, the data shows that adolescents utilise a wide range of apps, however, show a preference for the apps HeadSpace, Calm and Daylio Journal. Adolescents may be more likely to utilise these apps as they appear to have a degree of 'social acceptability' within an adolescent sample, this should be considered by EPs when making recommendations.

Nonetheless, the data from this study highlights a large discrepancy in preparedness to participate in a mental health survey and engage with MHApps between male and female adolescents, and adolescent from white and minority ethnic groups: potential factors contributing towards these findings have been explored in the sections above. This has implications for EPs and these findings should be considered by EPs when making recommendations, as MHApp technology may be less accepted by male adolescents and adolescents from minority ethnic groups. The results highlight a potential need for more targeted mental health support towards males and those from ethnic minority groups.

### 5.5.3 Implications for Future Research

Given the investigatory focus of the current study, a number of questions and areas for further research have emerged. The following section will consider and explore some of these, which would allow for a further in-depth understanding of adolescents' use of MHApps.

First, this current study is unique and novel. Replication and adaptation of the current study, to address the limitations discussed and the small effect sizes, on a wider scale would be worthwhile. In particular, future research would benefit from surveying a wider demographic, not limiting it to sixth form provisions, and seeking more diverse and representative populations (by socio-economic status and ethnicity) to gain a broader understanding of adolescents' use of MHApps. While this study highlighted demographic differences in adolescents' MHApp utilisation by ethnicity, it was undertaken in settings with a low proportion of adolescents from BME and other ethnic backgrounds, not representative of the UK as a whole, or of more highly diverse regions, such as urban locations (ONS, 2011). Further research using qualitative data gathered from a broader, more representative sample of adolescents of whom utilise and do not utilise MHApps, may provide further insight into the perceived real-life benefits and barriers to using MHApps. This would extend the work of Kenny et al. (2016) as it would explore further than attitudes towards MHApps.

Furthermore, the self-reported increase of approximately 40% in adolescents' use of MHApps since the outbreak of the Covid-19 pandemic found in the current study highlights the need to further explore the impact Covid-19 has had on adolescents' mental wellbeing and their help seeking behaviours. Research conducted prior to the pandemic suggests that that less than two-thirds of adolescents experiencing poor mental health access professional help (Sadler et al., 2018) and initial research following the Covid-19 pandemic indicates that there has been an overall decrease in the wellbeing of young people (Kwong et al., 2020). Understanding the help seeking behaviours of adolescents would be integral to the success of preventative wellbeing strategies and interventions in a post Covid-19 era.

Finally, results from the qualitative investigation highlighted that adolescents appear to utilise 'popular' MHApps, perhaps over MHApps that have been specifically designed for or recommended to adolescents by the NHS and CAMHS, such as BlueIce, Calm Harm and Think Ninja (NHS, n.d). This finding could have a twofold impact on future research directions. First, given that

MHApps are considered the most common and fastest growing digital technology being developed (Anthes, 2016; Batra et al., 2017), knowing the MHApps being most commonly used by adolescents may give focus to the field of research, where research cannot keep up with the technological advances. Second, this finding suggests that further research into how social acceptability impacts adolescents' access to MHApps and other DHIs may be worthwhile.

## 5.6 Conclusion and Reflections

This study aimed to explore whether adolescents aged 16-to-18 years, in sixth form provisions, were utilising MHApps and whether there was a relationship between MHApp usage and mental wellbeing. It was hoped that through a mixed methods design, this research would provide insight into adolescents' real-life use of MHApps.

The findings from the quantitative data answered the overarching research question, showing that just under one quarter of the sampled adolescents, aged 16-to-18 years were utilising MHApps on their personal smartphone or tablet devices, and there was an association between the frequency of MHApp usage and mental wellbeing. The analysis also indicated an increase in MHApp usage since the outbreak of the Covid-19 pandemic.

The qualitative investigation then provided a supplementary analysis, identifying the MHApps being used by the sampled adolescents. The analysis first explored the functions of all the MHApps reported by the adolescents in relation to the four key functions. Then it explored the shared characteristics of the top three most reported MHApps: Headspace, Calm and Daylio Journal. This analysis provided further insight into the characteristics of the MHApps being utilised by adolescents, which, reviewed in relation to this study's qualitative synthesis, gave an insight into what characteristics and features may be important to increase the appeal of MHApps to adolescents.

When considering the outcomes of this study, issues relating to the quality of this research must be considered. Specifically, the small effect sizes may relate to issues of internal reliability and there were some issues with the survey measure itself, which may have impacted the reliability of the findings. Also,

care should be taken when generalising the findings, due to some issues of external reliability in regard to the sample size and demographic reach of the survey.

However, despite these limitations, the study demonstrates that adolescents are making use of MHApps. It is hoped that this research can be a catalyst towards further exploration of adolescents' use of MHApps, perceived barriers and benefits to using MHApps, and how they could be utilised to support and promote the wellbeing of adolescents.

Finally, this study provides a unique insight into adolescents' real-life use of MHApps during the Covid-19 global pandemic, contributing and extending the research field and giving direction to future research. Designing, conducting, analysing and interpreting this research has been a challenging and rewarding journey for the researcher. Notably, conducting research with school populations during such unprecedented times has been a significant challenge, but a fundamental learning point that all real-life research comes with difficulties and the need to adapt and overcome. The skills the researcher has gained through conducting this doctoral research will support her as she continues on her professional journey in educational psychology.

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# Appendices

## Appendix A Systematic Search Strategy and Terms

| | |
|---|---|
| **Date** | 12/08/2020 |
| **Timespan** | 2010-2020 |
| **Search Language** | English |
| **Database** | PubMed |
| **Search terms** | ((("mobile health"[Title] OR "digital health intervention*"[Title] OR app[Title] OR apps[Title] OR smartphone[Title] OR "smartphone app"[Title] OR "mobile app"[Title] OR tablet[Title] OR "smartphone application*"[Title] OR "mobile application*"[Title]) AND (teenage*[Title] OR adolescen*[Title] OR "young per*"[Title] OR youth*[Title])) AND (perspective*[Title/Abstract] OR view*[Title/Abstract] OR viewpoint[Title/Abstract] OR accept*[Title/Abstract])) AND (depress* OR self-harm OR suicid* OR anxi* OR "mental health*" OR stress*)<br>Filters applied:<br>Adolescent 13-18 years<br>Young Adult 19-24 years |
| **Results** | 11 |
| **Actions** | Exclusion criteria applied to titles and references removed.<br><br>Remaining titles saved and abstracts screened. |

| | |
|---|---|
| **Date** | 12/08/2020 |
| **Timespan** | 2010-2020 |
| **Search Language** | English |
| **Database** | APA PsychNet |
| **Search terms & results** | Title: “mobile health” OR Title: “digital health intervention*” OR Title: appOR Title: apps OR Title: smartphone OR Title: “smartphone app” OR Title: “mobile app”OR Title: tabletOR “smartphone application*” OR Title: “mobile application*” AND Title: teenage* OR Title: adolescen* OR Title: “young per*” OR Title: youth* AND Abstract: perspective* OR Abstract: view* OR Abstract: viewpoint OR Abstract: accept* ANDAny Field: depress* OR Any Field: self-harm OR Any Field: 173uicide* OR Any Field: anxi* OR Any Field: “mental health*” OR Any Field: stress* |
| **Results** | 0 |
| **Actions** | Exclusion criteria applied to titles and references removed.<br><br>Remaining titles saved and abstracts screened. |

| | |
|---|---|
| **Date** | 12/08/2020 |
| **Timespan** | 2010-2020 |
| **Search Language** | English |
| **Database** | Web of Science |
| **Search terms & results** | TITLE: ("mobile health" OR "digital health intervention*" OR app OR apps OR smartphone OR "smartphone app" OR "mobile app" OR tabletOR "smartphone application*" OR "mobile application*") AND TITLE:(teenage* OR adolescen* OR "young per*" OR youth*) AND TOPIC:(perspective* OR view* OR viewpoint OR accept*) AND TOPIC: (depress* OR self-harm OR suicid* OR anxi* OR "mental health*" OR stress*) |
| **Results** | 22 |
| **Actions** | Exclusion criteria applied to titles and references removed.<br><br>Remaining titles saved and abstracts screened. |

| | |
|---|---|
| **Date** | 12/08/2020 |
| **Timespan** | 2010-2020 |
| **Search Language** | English |
| **Database** | Scopus |
| **Search terms & results** | ( TITLE ( "mobile health" OR "digital health intervention*" OR app OR apps OR smartphone OR "smartphone app" OR "mobile app" OR tablet OR "smartphone application*" OR "mobile application*" ) AND TITLE ( teenage* OR adolescen* OR "young per*" OR youth* ) AND TITLE-ABS-KEY ( perspective* OR view* OR viewpoint OR accept* ) AND ALL ( depress* OR self-harm OR suicid* OR anxi* OR "mental health*" OR stress* ) ) |
| **Results** | 67 |
| **Actions** | Exclusion criteria applied to titles and references removed.<br><br>Remaining titles saved and abstracts screened. |

## Appendix B Exclusion Criteria Applied to all Search Results

| Reason for Exclusion | Numerical Code |
|---|---|
| Duplicate Paper | 1 |
| Participants mean age is outside of 15-19 years | 2 |
| Focus on perspectives of parents or professionals | 3 |
| App-based technology was secondary focus | 4 |
| App-based technology to support weight management, sleep, chronic illness, diabetes or relationships. | 5 |
| Focus on other technologies including websites and text messaging. | 6 |
| Quantitative design only | 7 |
| Other publication e.g., systematic review, article, book chapter, or detailing protocol of study | 8 |
| Other focus e.g., smartphone addiction, app design | 9 |

| Reference | Reason for Exclusion |
|---|---|
| *PubMed Search* | |
| Grist, R., Porter, J., & Stallard, P. (2017). Mental health mobile apps for preadolescents and adolescents: a systematic review. *Journal of medical internet research*, *19*(5), e176. | 8 |
| Seidman, L. C., Martin, S. R., Trant, M. W., Payne, L. A., Zeltzer, L. K., Cousineau, T. M., & Donovan, E. (2019). Feasibility and acceptance testing of a mobile application providing psychosocial support for parents of children and adolescents with chronic pain: results of a nonrandomized trial. *Journal of pediatric psychology*, *44*(6), 645-655. | 3 |
| Cheung, T., Lee, R. L., Tse, A. C., Do, C. W., So, B. C., Szeto, G. P., & Lee, P. H. (2019). Psychometric Properties and Demographic Correlates of the Smartphone Addiction Scale-Short Version Among Chinese Children and Adolescents in Hong Kong. *Cyberpsychology, Behavior, and Social Networking*, *22*(11), 714-723. | |

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|---|---|
| Werner-Seidler, A., Wong, Q., Johnston, L., O'Dea, B., Torok, M., & Christensen, H. (2019). Pilot evaluation of the Sleep Ninja: a smartphone application for adolescent insomnia symptoms. *BMJ open*, *9*(5), e026502. | 8 |
| Bath, E., Tolou-Shams, M., & Farabee, D. (2018). Mobile health (mHealth): building the case for adapting emerging technologies for justice-involved youth. *Journal of the American Academy of Child and Adolescent Psychiatry*, *57*(12), 903. | 6 |
| Kenny, R., Dooley, B., & Fitzgerald, A. (2016). Developing mental health mobile apps: exploring adolescents' perspectives. *Health informatics journal*, *22*(2), 265-275. | Included |
| Tighe, J., Shand, F., Ridani, R., Mackinnon, A., De La Mata, N., & Christensen, H. (2017). Ibobbly mobile health intervention for suicide prevention in Australian Indigenous youth: a pilot randomised controlled trial. *BMJ open*, *7*(1), e013518. | 8 |
| Daray, F. M., RH, O. F., & Rodante, D. E. (2018). Development of CALMA: a mobile APP for the prevention of suicide in adolescents and youth. *Vertex (Buenos Aires, Argentina)*, *29*(137), 55-64. | 7 |
| McManama O'Brien, K. H., LeCloux, M., Ross, A., Gironda, C., & Wharff, E. A. (2017). A pilot study of the acceptability and usability of a smartphone application intervention for suicidal adolescents and their parents. *Archives of suicide research*, *21*(2), 254-264. | Included |
| McHenry, M. S., Apondi, E., McAteer, C. I., Nyandiko, W. M., Fischer, L. J., Ombitsa, A. R., ... & Vreeman, R. C. (2018). Tablet-based disclosure counselling for HIV-infected children, adolescents, and their caregivers: a pilot study. *African Journal of AIDS Research*, *17*(3), 249-258. | 5 |
| Shand, F. L., Ridani, R., Tighe, J., & Christensen, H. (2013). The effectiveness of a suicide prevention app for indigenous Australian youths: study protocol for a randomized controlled trial. *Trials*, *14*(1), 1-7. | 8 |
| *Web of Science Search* | |
| Majeed-Ariss, R., Baildam, E., Campbell, M., Chieng, A., Fallon, D., Hall, A., ... & Swallow, V. (2015). Apps and adolescents: a systematic review of adolescents' use of mobile phone and tablet apps that support personal management of their chronic or long-term physical conditions. *Journal of medical Internet research*, *17*(12), e287. | 5 |
| Grist, R., Porter, J., & Stallard, P. (2017). Mental health mobile apps for preadolescents and adolescents: a systematic review. *Journal of medical internet research*, *19*(5), e176. | 1 |

| | |
|---|---|
| Kenney, E. L., & Gortmaker, S. L. (2017). United States adolescents' television, computer, videogame, smartphone, and tablet use: associations with sugary drinks, sleep, physical activity, and obesity. *The Journal of pediatrics*, *182*, 144-149. | 5 |
| Tighe, J., Shand, F., Ridani, R., Mackinnon, A., De La Mata, N., & Christensen, H. (2017). Ibobbly mobile health intervention for suicide prevention in Australian Indigenous youth: a pilot randomised controlled trial. *BMJ open*, *7*(1), e013518. | 1 |
| Shand, F. L., Ridani, R., Tighe, J., & Christensen, H. (2013). The effectiveness of a suicide prevention app for indigenous Australian youths: study protocol for a randomized controlled trial. *Trials*, *14*(1), 1-7. | 1 |
| Kenny, R., Dooley, B., & Fitzgerald, A. (2016). Developing mental health mobile apps: exploring adolescents' perspectives. *Health informatics journal*, *22*(2), 265-275. | 1 |
| Hetrick, S. E., Robinson, J., Burge, E., Blandon, R., Mobilio, B., Rice, S. M., ... & Davey, C. G. (2018). Youth codesign of a mobile phone app to facilitate self-monitoring and management of mood symptoms in young people with major depression, suicidal ideation, and self-harm. *JMIR mental health*, *5*(1), e9. | 9 |
| Werner-Seidler, A., O'Dea, B., Shand, F., Johnston, L., Frayne, A., Fogarty, A. S., & Christensen, H. (2017). A smartphone app for adolescents with sleep disturbance: development of the Sleep Ninja. *JMIR mental health*, *4*(3), e28. | 5 |
| Benarous, X., Edel, Y., Consoli, A., Brunelle, J., Etter, J. F., Cohen, D., & Khazaal, Y. (2016). Ecological momentary assessment and smartphone application intervention in adolescents with substance use and comorbid severe psychiatric disorders: study protocol. *Frontiers in psychiatry*, *7*, 157. | 5 |
| Hawk, S. T., van den Eijnden, R. J., van Lissa, C. J., & ter Bogt, T. F. (2019). Narcissistic adolescents' attention-seeking following social rejection: Links with social media disclosure, problematic social media use, and smartphone stress. *Computers in Human Behavior*, *92*, 65-75. | 6 |
| McManama O'Brien, K. H., LeCloux, M., Ross, A., Gironda, C., & Wharff, E. A. (2017). A pilot study of the acceptability and usability of a smartphone application intervention for suicidal adolescents and their parents. *Archives of suicide research*, *21*(2), 254-264. | 1 |
| Forchuk, C., Reiss, J., Eichstedt, J., Singh, D., Collins, K., Rudnick, A., ... & Fisman, S. (2016). The youth-mental health engagement network: An exploratory pilot study of a smartphone and computer-based personal health record for youth experiencing depressive symptoms. *International Journal of Mental Health*, *45*(3), 205-222. | Included |

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## Appendix C Qualitative Synthesis Themes Table

| *Phase 5 - translation* | Papers included in synthesis | | | | *Phase 6 – synthesising translations* |
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| | Forchuk et al., 2016 | Gindidis, Stewart & Roodenberg, 2020 | Kenny, Dooley & Fitzgerald, 2016 | McManama et al., 2017 | |
| Access to professional support | Therapeutic relationship:<br>• Improving the care available in between therapy sessions.<br>• *"it makes communication a lot easier"*<br>• *"…she [therapist] would already be up-to-date"* | | Access to professional support:<br>• Apps should provide access to professional help<br>• *"if there's ways in which you can get help on the apps…talk to someone"*. | Access to professional support:<br>• Apps offering easier access to professional services is appealing to adolescents.<br>• *"there is contact for therapists"* | **Relationships and support** |
| Community | | | Community:<br>• Apps should enable social interactions with peers to share problems and relate to other adolescents' experiences<br>• *"like a community for people who are struggling"*<br>• *"help each other"*<br>• *"you could have stories…about someone else going through something like that"* | Community<br>• Mental health apps can adolescents a sense of community<br>• *"reminds you that you are not alone"* | |

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| Engaging | Engaging:<br>• Adolescents want apps to appeal to them<br>• *"it's…boring…not that much excitement to it"*<br>• *"there should be a game or something"* | Engaging:<br>• Apps need to be engaging for adolescents<br>• *"a lot of the time they're just too repetitive and boring"*<br>• *"I definitely need something that's going to keep me interested"* | Engaging:<br>• Mental health apps must be fun and engaging<br>• *"if it is well designed…it will be more attractive to use"* | Engaging:<br>• Adolescents like apps to be engaging.<br>• *"various inputs – ideas, contacts, activities, music, video"* | **Acceptability** |
| Social Acceptability | | Psychologists age:<br>• Adolescents were more accepting of recommendations to use apps from psychologists more similar in age.<br>• *"they're [older psychologists] not use to technology"* | Social acceptability:<br>• If peers talk about using these apps it would increase their social acceptability<br>• *"if everyone talks about it then it's more likely…everyone will go on it"*<br>• *"advertise it on websites that young people use"*<br>*"girls would use it more"* | | |
| Safety | | | Safety and confidentiality:<br>• *"need something so…you can't end up being bullied"*.<br>• *"people should have it to themselves"* | | |
| App function | Symptom tracking:<br>• App was most commonly used for tracking mood | Skill practice: | Reminder setting: | | **Functionality** |

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| | • *"it was great for tracking my mood and it was a lot easier than…my gigantic binder"*<br>• *"I used it to track my mood"* | • Apps were used by adolescents outside of sessions to practice skills.<br>• *"I did one-minute mediation…it made me feel a bit better"*<br>• *"I'll try and do some meditation"*<br>• *"I hate the meditation"*<br><br>Monitoring and tracking:<br>• Apps were used by adolescents to track their mood.<br>• *"how you've been feeling the past month"*<br><br>Relaxing music:<br>• Some adolescents used the apps to listen to ambient noise or music<br>• *"I also play music…relaxing sounds like rain…and I found that really helpful"* | • Adolescents would like to be able to set reminders to use the app.<br><br>Functionality<br>• Apps must serve a useful and relevant function.<br>• *"good for getting stuff off your chest"* | | |
| Personalisation | Personalisation:<br>• Adolescents would like apps to be more personal<br>• *"adding a background picture"* | Personalisation<br>• Adolescents would like apps to be more personal<br>• *"you can't change the time that the reminders tell you to do it…is really annoying"* | Personalisation<br>• Personalising apps is appealing to adolescents<br>• *"you need something to make it stand out"* | Personalisation:<br>• Being able to personalise the app is appealing for adolescents<br>• *"personalisation for the client"* | |

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| | • *"a way to personalise things that would work for me"* | | | • *"I like…that the choices in the app are made specifically for each individual"*<br>• *"has multiple things that are made for you and fit you as your own person"*<br>• *"liked the idea of being able to personalise it"* | |
| Control | Autonomy:<br>• Smartphone use increase autonomy<br>• *"instead of waiting for…something to open…I can use the phone there"* | Self-care:<br>• Apps uses to remind adolescents of self-care<br>• *"reminds you to…go back and focus on yourself and your wellbeing"*<br>• *"it's good self-care"*<br><br>In control:<br>• Adolescents are in control when they use the app<br>• *"use it as many times as you want*. | Young people in control:<br>• Adolescents should have a choice as to whether they use the apps<br>• *"you're not forced to get it, it's something you want to have"*. | In control:<br>• Apps give adolescents a sense of control when in a crisis<br>• *"I could go to it as a point of focus during a crisis…to help be successful during that time"* | **Sense of Control** |
| Self-awareness | Self-awareness:<br>• App use increased self-awareness<br>• *"it makes you really think about how you've been feeling"*<br>• *"it makes me think"* | | | | |

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| Accessibility | Accessibility<br>• App use frequency was related to severity of individuals mental illness.<br>• *"using it when you're in a bad state…if I'm happy it doesn't matter"*.<br><br>Integration<br>• App functions worked well alongside therapy in particular between therapy homework<br>• *"rather than mountains of paper"*<br>• *"easy to access"*<br>• *"accessible and quick to get to"*<br><br>Simplification<br>• Apps should be easy to navigate<br>• *"it's almost completely irrelevant"* | Availability:<br>• Many apps are available to adolescents at any time<br>• *"you know, its availability…at any time"*<br>• *"there are so many different types of them [apps]"*<br><br>Accessibility<br>• Smartphone apps are mostly accessible anywhere<br>• Access to tools and strategies outside of face-to-face sessions was important to adolescents.<br>• *"I got really stressed out about work…I was trying to think about what I could do…then I thought…I'll try that app…and it worked"*<br>• *I've always got my phone on me so whenever I need to use them, it's right there with me"*<br>• *"if your internet is down…and you feel upset… you can't do much"* | Easy to use:<br>• Information in apps should be concise and to the point.<br>• Apps should be easy to access<br>• *"don't want to have…trouble to go into it"*<br><br>Accessible:<br>• Apps should be easily accessible and free<br>• *"quick and easy to use"*<br>• *"if you have to pay for it…they're not going to get it"* | Easy to use:<br>• Adolescents find easy to use apps appealing.<br>• *"it was very easy to use"*<br>• *"ease of use and helpful hints"*<br>• *"easy going…I would find what I needed quickly"*<br>• *"easy to just pick up and use"*<br><br>Accessibility<br>• Apps have the ability to keep everything in one place, which adolescents find appealing.<br>• *"has all the skills you have learned in one easy to access place"*<br>• *"very handy"* | **Accessibility** |

## Appendix D Information Letter to Schools

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

**Information Letter for Schools**

An exploration into the use of mental health apps and the interrelationship between these mental health apps and mental wellbeing amongst adolescents aged 16-19 years.

*Ethics Approval Number: S1263*

Contact details:
Hannah Pascoe (Trainee Educational Psychologist and Researcher)
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hpascoe@childrenfirstnorthamptonshire.co.uk

Anthea Gulliford (Research Supervisor)
Email: anthea.gulliford@nottingham.ac.uk

This is an invitation to take part in a research study exploring the use of mental health apps and the interrelationship between mental health apps and mental wellbeing amongst adolescents aged 16-19 years.

Before you decide if you wish for your school to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

The purpose of this study is to explore the use of mental health apps amongst adolescents aged 16-19 years. Research indicates that mental health apps can be effective in monitoring and improving symptoms of mental disorders, and young people engage well with them. However, as there are multiple mental health apps available to download it is difficult to research and evaluate the usefulness of all these apps. Therefore, it would be helpful to know whether young people are using mental health apps and what apps are being used to guide further research and development of practice using these apps.

If you agree for the school to be involved, then the research would involve participation of pupils in the sixth form. Pupil consent must be freely obtained for each pupil involved in the research, and the researcher will email these letters and consent forms to the school for distribution. Due to the nature of this research, if any concerns regarding the general mental health of the pupil population arise throughout this study the school will be informed and signposted to agencies for support.

The research will begin with the school identifying pupils eligible to take part in and circulating the participant information letter and consent form. The following inclusion criterion has been set to ensure the participants are suitable for this research and the research meets ethical codes of practice:

- The pupil does not have a diagnosed mental health difficulty.
- The pupil is not receiving counselling within or outside of school.
- The pupil is not currently receiving mental health support from outside organisations e.g. CAMHS.

Participation in this study is totally voluntary and you are under no obligation to take part. You and your school are free to withdraw at any point before or during the study. This will not affect your right to access other services provided by the Educational Psychology Service. Due to the anonymity of data collected, it will not be possible to withdraw individual responses from the study once they have been submitted – this is made clear to the pupils on each page of the questionnaire.

All data collected will be kept confidential and used for research purposes only. It will be stored in compliance with the Data Protection Act. All school and pupil identifiers will be removed from the data to ensure it is unidentifiable by outside persons, and data will be anonymised in any research reports or outputs.

The findings of the research will be shared with your school and other audiences through various summaries, to help schools to develop their wellbeing practises.

Please do not hesitate to contact me if you have any further questions regarding this research, alternatively you can make contact with my research supervisor:

- Hannah Pascoe – Hannah.Pascoe@nottingham.ac.uk
- Anthea Gulliford – Anthea.Gulliford@nottingham.ac.uk

Kind Regards,

Hannah Pascoe

Trainee Educational Psychologist

If you have any complaints about the study, please contact:
Stephen Jackson (Chair of Ethics Committee) stephen.jackson@nottingham.ac.uk

# Mental Health Apps and Mental Wellbeing

Start of Block: Information and Consent

Q1
Have you read and understood the Information Sheet sent via your school/college?

- Yes (1)
- No (2)

Q2
Have you had the opportunity to ask questions about the study?

- Yes (1)
- No (2)

Q3
Have all your questions been answered satisfactorily?

- Yes (1)
- No (2)

Q4
Do you understand that you are free to withdraw from the study? (at any time and without giving a reason)

- ○ Yes (1)
- ○ No (2)

Q5
I give permission for data from this study to be shared with other researchers provided that anonymity is completely protected.

- ○ Yes (1)
- ○ No (2)

Q6
Do you agree to take part in the study?

- ○ Yes (1)
- ○ No (2)

Q7
"This research project has been explained to me to my satisfaction, and I agree to take part. I understand that I am free to withdraw at any time."

- ○ Yes I do give my consent to participate in this study. (1)
- ○ No I do not give my consent to participate in this study. (2)

**End of Block: Information and Consent**

Start of Block: About you

Q8
What school/college do you attend?

Q9
How old are you?

- 16 years (1)
- 17 years (2)
- 18 years (3)
- 19 years (4)

Q10
What is your gender identity?

- Male (1)
- Female (2)
- Transgender (3)
- Non-binary (4)
- Other (5) _____
- Prefer not to say (6)

Q11
What is your ethnicity?

- White British (1)
- Hispanic or Latino (2)
- Black or African American (3)
- Asian or Pacific Islander (4)
- Other (5) _____

Q12
Are you eligible for free school meals?
*Please select yes if you are eligible whether you claim them or not*

- Yes (1)
- No (2)

**End of Block: About you**

Start of Block: About your use of mental health apps

Q13
Do you have any mental health apps downloaded on your smartphone or tablet?

- ○ Yes (1)
- ○ No (2)

Q14
What app or apps do you have downloaded?
*Please number these apps and use the corresponding numbers on the next questions.*

_____

_____

_____

_____

_____

Q15
How often do you use these apps?
*Use the corresponding numbers above (question 14) to number the apps you use below. Please note you do not have to complete all the fields, only complete the amount of apps you use.*

| | Daily (1) | 1-3 days a week (2) | 4-6 days a week (3) | Once a week (4) | Monthly (5) | Less than monthly (6) |
|---|---|---|---|---|---|---|
| App 1 (1) | ○ | ○ | ○ | ○ | ○ | ○ |
| App 2 (2) | ○ | ○ | ○ | ○ | ○ | ○ |
| App 3 (3) | ○ | ○ | ○ | ○ | ○ | ○ |
| App 4 (4) | ○ | ○ | ○ | ○ | ○ | ○ |
| App 5 (5) | ○ | ○ | ○ | ○ | ○ | ○ |

Q16
How long do you typically spend on these apps each day you use them?
*Use the corresponding numbers above (question 14) to number the apps you use below. Please note you do not have to complete all the fields, only complete the amount of apps you use.*

| | 1-5 minutes (1) | 5-10 minutes (2) | 10-15 minutes (3) | 15-20 minutes (4) | 20-25 minutes (5) | 25-30 minutes (6) | Over 30 minutes (7) |
|---|---|---|---|---|---|---|---|
| App 1 (1) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| App 2 (2) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| App 3 (3) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| App 4 (4) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| App 5 (5) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

Q17
Did you have these apps downloaded before the covid-19 pandemic?
*Use the corresponding numbers above (question 14) and tick the apps you had downloaded before the covid-19 pandemic.*

- ○ App 1 (2)
- ○ App 2 (4)
- ○ App 3 (5)
- ○ App 4 (6)
- ○ App 5 (7)

Q18 Has your app usage increased since the covid-19 pandemic?

- ○ Yes (1)
- ○ No (2)

End of Block: About your use of mental health apps

Start of Block: A questionnaire about your mental wellbeing

Q19
The Warwick–Edinburgh Mental Well-being Scale (WEMWBS)
*Below are some statements about feelings and thoughts.*
*Please tick the box that best describes your experience of each over the last 2 weeks.*

| | None of the time (1) | Rarely (2) | Some of the time (3) | Often (4) | All of the time (5) |
|---|---|---|---|---|---|
| I've been feeling optimistic about the future (1) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling useful (2) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling relaxed (3) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling interested in other people (4) | ○ | ○ | ○ | ○ | ○ |
| I've had energy to spare (5) | ○ | ○ | ○ | ○ | ○ |
| I've been dealing with problems well (6) | ○ | ○ | ○ | ○ | ○ |
| I've been thinking clearly (7) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling good about myself (8) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling close to other people (9) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling confident (10) | ○ | ○ | ○ | ○ | ○ |

| | | | | | |
|---|---|---|---|---|---|
| I've been able to make up my own mind about things (11) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling loved (12) | ○ | ○ | ○ | ○ | ○ |
| I've been interested in new things (13) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling cheerful (14) | ○ | ○ | ○ | ○ | ○ |

End of Block: A questionnaire about your mental wellbeing

Start of Block: Feedback about questionnaire

Q20
Was this questionnaire easy to follow?

- ○ Yes (1)
- ○ No (3)

Q21
Was this questionnaire easy to read?

- ○ Yes (1)
- ○ No (3)

Q22
Was this questionnaire's font a good size?

- ○ Yes (1)
- ○ No (2)

Q23
Were any questions or particular wording of questions unclear or confusing? If so which question(s)?
*If you can remember the number of the question notes it down, if not write an outline of the question you found confusing.*

_____

Q26 Do you have any further comments about the readability and accessibility of this questionnaire?

_____

End of Block: Feedback about questionnaire

# Mental Health Apps and Mental Wellbeing

Start of Block: Information and Consent

Q1
Have you read and understood the information sheet sent alongside the link to this survey?

- Yes (1)
- No (2)

Q2
Have you had the opportunity to ask questions about the study?

- Yes (1)
- No (2)

Q3
Have all your questions been answered satisfactorily?

- Yes (1)
- No (2)

Q4
Do you understand that you are free to withdraw from the study? (at any time and without giving a reason)

- ○ Yes (1)
- ○ No (2)

Q5
I give permission for data from this study to be shared with other researchers provided that anonymity is completely protected.

- ○ Yes (1)
- ○ No (2)

Q6
Do you agree to take part in the study?

- ○ Yes (1)
- ○ No (2)

*Skip To: End of Survey If Do you agree to take part in the study? = No*

Q7
"This research project has been explained to me to my satisfaction, and I agree to take part. I understand that I am free to withdraw at any time."

- ○ Yes I do give my consent to participate in this study. (1)
- ○ No I do not give my consent to participate in this study. (2)

*Skip To: End of Survey If "This research project has been explained to me to my satisfaction, and I agree to take part. I u... = No I do not give my consent to participate in this study.*

**End of Block: Information and Consent**

Start of Block: About you

Q8
What school/college do you attend?

Q9
Please select your age:

- 16 years (1)
- 17 years (2)
- 18 years (3)
- 19 years (4)

Q10
This question is about your gender identity. Do you identify as:

- Male (1)
- Female (2)
- Transgender (3)
- Nonbinary (4)
- Other (5) _____
- Prefer not to say (6)

Q11
Please select the option which best describes your ethnic group or background:

- ○ White (1)
- ○ Mixed/Multiple ethnic groups (2)
- ○ Asian/Asian British (3)
- ○ Black/African/Caribbean/Black British (4)
- ○ Other (5) _____
- ○ Prefer not to say (6)

Q12
Are you eligible for free school meals?
*Please select yes if you are eligible whether you claim them or not*

- ○ Yes (1)
- ○ No (2)

**End of Block: About you**

Start of Block: About your use of mental health apps

Q13
Do you have any mental health apps downloaded on your smartphone or tablet?
*For example: meditation apps (e.g. Headspace, Calm, Balance) mood trackers (e.g. Daylio Journal, Moodpath, Moodnotes), habit trackers (e.g. Habit Tracker, Flora, Habitify), anxiety and depression managment apps (e.g. Clear Fear, MindShift CBT, Wysa), or mental health support apps (e.g. Replika, Pocketcoach, TalkLife)*

- ○ Yes (1)
- ○ No (2)

*Skip To: End of Block If Do you have any mental health apps downloaded on your smartphone or tablet? For example: meditati... = No*

Q14
What app or apps do you have downloaded?

_____
_____
_____
_____
_____

Q15
Which app do you use most frequently?

_____

Q16
How often do you use the app?

| | Daily (1) | 1-3 days a week (2) | 4-6 days a week (3) | Once a week (4) | Monthly (5) | Less than monthly (6) |
|---|---|---|---|---|---|---|
| Most frequently used app (9) | ○ | ○ | ○ | ○ | ○ | ○ |

Q17
How long do you typically spend on this app?

| | 1-5 minutes (1) | 5-10 minutes (2) | 10-15 minutes (3) | 15-20 minutes (4) | 20-25 minutes (5) | 25-30 minutes (6) | Over 30 minutes (7) |
|---|---|---|---|---|---|---|---|
| Most frequently used app (1) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

Q18
Did you have this app downloaded before the COVID-19 pandemic?

- ○ Yes (10)
- ○ No (11)

Q19
Has your app usage increased since the COVID-19 pandemic?

- ○ Yes (1)
- ○ No (2)

End of Block: About your use of mental health apps

Start of Block: A questionnaire about your mental wellbeing

Q20
The Warwick–Edinburgh Mental Well-being Scale (WEMWBS)
*Below are some statements about feelings and thoughts.*
*Please tick the box that best describes your experience of each over the last 2 weeks.*

| | None of the time (1) | Rarely (2) | Some of the time (3) | Often (4) | All of the time (5) |
|---|---|---|---|---|---|
| I've been feeling optimistic about the future (1) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling useful (2) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling relaxed (3) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling interested in other people (4) | ○ | ○ | ○ | ○ | ○ |
| I've had energy to spare (5) | ○ | ○ | ○ | ○ | ○ |
| I've been dealing with problems well (6) | ○ | ○ | ○ | ○ | ○ |
| I've been thinking clearly (7) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling good about myself (8) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling close to other people (9) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling confident (10) | ○ | ○ | ○ | ○ | ○ |

| | | | | | |
|---|---|---|---|---|---|
| I've been able to make up my own mind about things (11) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling loved (12) | ○ | ○ | ○ | ○ | ○ |
| I've been interested in new things (13) | ○ | ○ | ○ | ○ | ○ |
| I've been feeling cheerful (14) | ○ | ○ | ○ | ○ | ○ |

End of Block: A questionnaire about your mental wellbeing

## Appendix G Ethnic and Gender Identity Groupings

| Stated Gender | Action |
|---|---|
| Google pixel 4a | Data removed |
| KitKat | Data removed |
| God | Data removed |
| Furey | Data removed |

| Stated Ethnicity | Recategorised as: |
|---|---|
| Indian British | Asian/Asian British |
| Eastern European | White |

## Appendix H App Store Descriptions from Apple App store (19/02/2021)

| App Name | App Description | App Category |
|---|---|---|
| *Headspace* | *Get happy. Stress less. Sleep soundly. Headspace is your guide to mindfulness for your everyday life. Learn meditation and mindfulness skills from world-class experts like Headspace co-founder Andy Puddicombe and choose from hundreds of guided meditations on everything from managing stress and anxiety to sleep, focus, and mind-body health. Build your practice your way with meditations for every experience level and lifestyle — including short, 3-minute sessions that fit seamlessly into a busy schedule.*<br><br>*From meditations for working from home to concentration-boosting music, the new Focus tab is your one-stop shop for changing the way you get things done. Tune in to the moment with Headspace's Chief Music Officer John Legend, and new music from groundbreaking artists. Find original compositions from legendary film composer Hans Zimmer, hip-hop's critically acclaimed producer Madlib, and the UK's rising dance star, Aluna. Or choose from 12 different Focus music stations, including Lo-Fi Times and Corner Booth Jazz. Take your mind from cluttered to clear with a Focus soundscape or reset with a mindful walk.*<br><br>*To help you stay resilient during tough times, Headspace is here for you with the Weathering the storm collection, including meditations for coping with sadness, anger, and adapting to change. You can also release stress and tension through movement with Move Mode — mood-boosting, at-home workouts and 28-day mindful fitness courses led by expert trainers, Olympians Kim Glass and Leon Taylor.*<br><br>*Start your morning inspired with The Wake Up — a short, daily video series designed to brighten your day — then decompress at bedtime with relaxing sleepcasts, dreamy soundscapes, and tranquil music from Sleep by Headspace.*<br><br>*In just a few minutes a day, Headspace can help bring balance to your everyday life. Want the full experience? Try Headspace Plus for free and access the entire content library.*<br>*Download Headspace today and be kind to your mind.*<br><br>*WHAT YOU'LL GET:* | Skill Practice and Psychoeducation |

*- Hundreds of guided meditations on subjects like focus, exercise, and sleep*
*- Sleep by Headspace to help you drift off*
*- Everyday Headspace: daily meditations on a new topic each day*
*- The Wake Up to start your day mindfully*
*- Move Mode workouts and mindful cardio*
*- "Mindful Moments" to keep you present throughout the day*
*- 2-3 minute mini-meditations for a quick mental reset*
*- "SOS" sessions for moments of panic, anxiety, and stress*
*- Headspace animations to teach you new skills and answer your mindfulness questions*
*- Track your progress and time spent meditating*
*- Add Mindful Minutes to Apple Health*
*- Buddy up and add your friends to meditate with you*
*- Guided meditations and mindfulness exercises for Kids with sessions on Kindness, Calm, and Focus*
*- Training led by former monk and renowned mindfulness expert Andy Puddicombe*

*SUBSCRIPTION PRICING AND TERMS*
*Headspace offers two auto-renewing subscription options:*
*£9.99 per month*
*£49.99 per year (that's less than £4.99 a month)*
*These prices are for UK customers. Pricing in other countries may vary and actual charges may be converted to your local currency depending on the country of residence.*
*The subscription will automatically renew unless turned off in your iTunes Account Settings at least 24 hours before the current period ends. You can go to your iTunes Account settings to manage your subscription and turn off auto-renew. Your iTunes Account will be charged when the purchase is confirmed. If you subscribe before your free trial ends, the rest of your free trial period will be forfeited as soon as your purchase is confirmed.*

*Headspace saves your meditation sessions to your Apple Health app.*

| | | |
|---|---|---|
| Calm | *Calm is the #1 app for Sleep, Meditation and Relaxation. Join the millions experiencing better sleep, lower stress, and less anxiety with our guided meditations, Sleep Stories, breathing programs, stretching exercises, and relaxing music. Calm is recommended by top psychologists, therapists, and mental health experts.*<br>*Calm is the perfect mindfulness app for beginners, but also includes hundreds of programs for intermediate and advanced users. Guided meditation sessions are available in lengths of 3, 5, 10, 15, 20 or 25 minutes so you can choose the perfect length to fit with your schedule.*<br>*Sleep Stories are bedtime stories that are guaranteed to lull you into a deep and restful slumber. Calm has 100+ exclusive Sleep Stories for adults and children alike, featuring well-known talent such as Stephen Fry, Matthew McConaughey, Leona Lewis, and Jerome Flynn. Drift off to dreamland and wake up refreshed.*<br>*Sleep Stories include:*<br>** Wonder - Join Matthew McConaughey on a dreamy story about the mysteries of the universe.*<br>** Blue Gold - Let master storyteller Stephen Fry take you on a calming journey through the lavender fields and sleepy village of Provence*<br>** The Nordland Night Train - Travel up the scenic coast of Norway aboard one of Europe's most breathtaking and remote railways.*<br>** Happy Little Zzzs with Bob Ross - Drift off to the soothing brush strokes of beloved painter and TV host Bob Ross.*<br>** And many more...*<br>*Mindfulness Topics include:*<br>** Deep Sleep*<br>** Calming Anxiety*<br>** Managing Stress*<br>** Focus and Concentration*<br>** Relationships*<br>** Breaking Habits*<br>** Happiness*<br>** Gratitude*<br>** Self-Esteem*<br>** Body Scan*<br>** Loving-Kindness* | Skill Practice and Psychoeducation |

** Forgiveness*
** Non-judgement*
** Mindfulness at Work*
** Mindful Walking*
** Calm Kids*
** And so much more...*
*Also Featuring:*
** An original Daily Calm every day: a 10-minute program added daily to help ease you into the day or unwind with before bed*
** 7 and 21 day mindfulness programs for both beginner and advanced users*
** Calm Masterclass: Life changing audio classes featuring world-renowned experts*
** Calm Body: Mindful stretching and movement to relax your body during the day*
** Music: Exclusive music engineered to help you focus, relax or sleep*
** Soundscapes: Ocean waves, Heavy Rain, Camp Fire, Babbling Brook, and other sounds to help you sleep*
** Breathing exercises to help you relax*
** Unguided timed meditation*
** 30+ soothing nature sounds and scenes to use during meditation, yoga or to help you sleep*
*Track your progress with:*
** Daily Streaks*
** Mindful Minutes*
*Calm saves your meditation and sleep sessions to your Apple Health app.*
*Subscription pricing and terms:*
*Calm offers an auto-renewing monthly subscription at $12.99/month and an auto-renewing yearly subscription at $69.99/year to provide you with unlimited access to the Calm Collection while you maintain an active subscription. Calm also offers a Lifetime subscription for $399.99 which is paid for by a one-off upfront payment with unlimited access to the Calm Collection forever.*
*Payment will be charged to the credit card connected to your iTunes Account when you confirm the initial subscription purchase. Subscriptions automatically renew unless auto-renew is turned off at least 24-hours before the end of the current subscription period. Your account will be charged for renewal within 24-hours prior to the end of the current period, and the cost of the renewal will be identified. You may manage your*

| | | |
|---|---|---|
| | *subscription and auto-renewal may be turned off by going to your Account Settings after the purchase. Any unused portion of a free trial period, if offered, will be forfeited when you purchase a subscription, where applicable.* | |
| Daylio Journal | *Self-Care Bullet Journal with Goals - Mood Diary & Happiness Tracker*<br>*Daylio enables you to keep a private journal without having to type a single line. Try this beautifully designed & stunningly simple micro-diary app right now for FREE!*<br><br>*** WHAT IS DAYLIO ***<br>*Daylio is a very versatile app, and you can turn it in whatever you need to track. Your fitness goal pal. Your mental health coach. Your food log. Your gratitude diary. Mood tracker. Exercise, meditate, eat, and be grateful. Take care of your mental, emotional, and physical health. Good self-care is a key to improved mood and reduced anxiety.*<br>*This is the time for your wellbeing, self-improvement, and self-care. Use Daylio as your daily bullet journal.*<br>*We build it on three principles:*<br>*1.) Reach happiness and self-improvement by being mindful of your days.*<br>*2.) Validate your hunches. How does your new hobby influence your life?*<br>*3.) Form a new habit in an obstacle-free environment—no learning curve. Daylio is super simple to use, create your first entry in two steps.*<br>*For anxiety and stress relief, make sure to include activities that help you to cope with negativity. Everybody can use a mood boost! You can measure their impact on your mood in stats.*<br><br>*** HOW DOES IT WORK ***<br>*Pick your mood and add activities you have been doing during the day. You can also add notes and keep an old school diary. Daylio is collecting recorded moods and activities in the statistics and calendar. This format will help you to understand your habits better. Keep track of your activities and create patterns to become more productive!*<br>*You can review all entries in the statistics on charts or the calendar and share them with your friends.*<br>*To make it even better, Daylio allows you:*<br>*- Make reflection a daily habit* | Monitoring and Psychoeducation |

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| | *- Discover what makes you happy*<br>*- Use a big database of beautiful icons for your personalized activities*<br>*- Mix and match your own moods using funny emojis*<br>*- Explore exciting statistics about your life on weekly, monthly or yearly charts*<br>*- Deep dive into advanced statistics for every mood, activity or group*<br>*- Customize color themes*<br>*- Enjoy nights with dark mode*<br>*- See your whole year in 'Year in Pixels'*<br>*- Create daily, weekly or monthly goals and motivate yourself*<br>*- Build habits and collect achievements*<br>*- Share statistics with your friends*<br>*- Safely back up and restore your entries via your private Google Drive*<br>*- Set reminders and never forget to create a memory*<br>*- Turn on PIN lock and keep your diary safe*<br>*- Export PDF and CSV documents to share or print your entries*<br><br>*** PRIVACY AND SECURITY ***<br>*We are a top private journal since we do not store or collect your data.*<br>*At Daylio, we believe in transparency and honesty. Your data is stored locally on your phone. You can optionally schedule backups to your private cloud storage or take your backup file with you anywhere. Data are entirely under your control at all times.*<br>*Data stored in the app's private directories are not accessible by any other apps or processes. Your backups are transferred to the iCloud Drive via the secure (encrypted) channels.*<br>*Journaling has never been easier!* | |
| I am sober | *I Am Sober more than just a free sobriety counter app.*<br><br>*Along with tracking your sober days, it helps you build new habits and provides ongoing motivation by connecting you to a wide network of people all striving for the same goal: staying sober one day at a time.* | Monitoring |

*Through our growing sober community you can learn from others and contribute by sharing insights and tactics that have worked for you.*

***The I Am Sober app features:***
*• Sober day tracker*
*To visualize how long you've been sober.*
*• Daily pledges & review*
*Take a pledge every day. Sobriety is a 24-hour struggle, so start your day off by making a pledge to stay sober. Then you can review how your day went and log notes at the end of the day.*
*• Sobriety calculator*
*View how much money & time you've saved by being sober.*
*• Analyze triggers*
*Recap each day and find patterns that made your day easier or more challenging than the last.*
*• Share your story*
*Either with others or for yourself, take photos and journal your progress directly in the app. Then choose to share it or save it as a reminder for yourself.*
*• Milestone tracker*
*Track and celebrate your milestones from 1 day, to 1 week, to 1 month and beyond. Compare experiences with others on their sober journey. Read how they felt at this milestone and what you can expect. If you're struggling, share your story and invite others to offer help or advice.*
*• Withdrawal timeline*
*When you create an account and declare your addiction, you can instantly see a withdrawal timeline to get an idea of what to expect for your next few days (and weeks). What's more, you can contribute to it. See how many others saw an increase in their restfulness vs those that saw an increase in anxiety. Prepare yourself for what's to come in recovery.*
*• Customize your experience*
*You set the time, your sober birthday, the category of motivation you need, the addictions you're trying to break, even the end-of-day summaries. Make the app customized to your lifestyle and tailored to your needs.*
***Support providers:***

*I Am Sober is developing the ability for alumni to pair with their support providers. This would allow you to message your provider on a safe and secure platform, as well as share your daily activities with them. Support providers might include:*
*• Inpatient and outpatient treatment centers*
*• Counselors, psychologists, therapists*
*• Recovery coaches*
*• Family members*
*This program is currently in beta. Please reach out to sales@iamsober.com for more information.*
*Subscription pricing and terms:*
*I Am Sober is completely free to use, but you can also support development of the app with a subscription to Sober Plus. This is an auto-renewing monthly subscription for $4.99/month. You can also subscribe for 6 months at $27.49 or 1 year at $49.99. With Sober Plus, you'll get access to these premium features:*
*• Locked access*
*Keep your tracking private with a lock*
*• Data Backups*
*Save your history in the cloud*
*• All skins*
*Customize the look and feel of the app*
*• All motivation packs*
*Get access to all current and future packs*
*• More tracking*
*Track up to 10 addictions*
*• Profile badge*
*Get a subscriber badge on your stories*

*Payment will be charged to iTunes Account at confirmation of purchase. I Am Sober Plus automatically renews unless auto-renew is turned off at least 24-hours before the end of the current period. Your account will be charged for renewal within 24-hours prior to the end of the current period, and the cost of the renewal will be identified. Subscriptions may be managed by the user and auto-renewal may be turned off by going to*

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| | *the user's Account Settings after purchase. Any unused portion of a free trial period, if offered, will be forfeited when the user purchases a subscription to that publication, where applicable.* | |
| Reflectly | *Reflectly is the #1 journaling app that's like your best friend. Vent your thoughts & feelings to improve your mood and practice mindfulness. Write down how you feel each day in your own mood diary. It's the world's first intelligent journal app & mood tracker that gives you personalized motivation and prompts the more you use it.*<br><br>*THE BEST JOURNAL APP FOR SELF-CARE AND MINDFULNESS*<br>*How you're feeling on a daily basis matters. Reflectly is a personal journal driven by AI to help you deal with negative thoughts and increase positivity.*<br><br>*Be prepared for stress relief, reducing anxiety & depression in your life. Your self-care and mental health should always be a priority.*<br><br>*Reflectly uses positive psychology, mindfulness, and cognitive behavioral therapy (cbt) to help you thrive. It gives you the tools and mindset to build a positive cycle with our habit tracker. Fancy a bit of self-dating? Reflectly supports your self-love journey.*<br><br>*Never journaled before? No need to worry, our intelligent journal system gives you personalized prompts and reminders. If you want to build a health-focused lifestyle, increase motivation & gratitude, practice mindfulness, or combat anxiety, our personalized questions encourage deeper reflection.*<br><br>*RECOMMENDED BY PROFESSIONALS*<br>*Journaling is a respected method to improve your mood, productivity, and mental health. Psychologists, therapists, and industry experts reaffirm this. It's time to invest in your self-care routine.*<br><br>*HOW REFLECTLY WORKS*<br>*• Write down how you feel each day. Morning daily motivation quotes & challenges, evening daily insights, and whenever you need to vent.* | Monitoring, Skill Practice and Psychoeducation |

*• Using AI & smart tech, Reflectly's mood tracker helps by showing you mood correlations and graphs. Been stressed for the last 10 days and can't pin-point why? Reflectly has answers.*
*• We ask personalized questions based on your diary entries so you can reflect deeper.*
*• Read or edit previous journal entries.*
*• Receive daily, weekly, and monthly overviews with personalized insights and reminders.*

*REVIEWS*
*- "It's a really amazing app. It's the one app I go to write about my feelings and how my day was :) I really recommend this app to ANYONE."*
*- "I love that this app lets me keep all my entries to read later. I also love that it gives some direction for people like me who want to journal but don't know where to start."*

*SAY HI TO US*
*We'd love to hear about your Reflectly experience: Reach out to us if you have any feedback or questions:*
*• Facebook - https://facebook.com/reflectlyio/*
*• Instagram - @reflectlyapp*
*• Twitter - @reflectlyapp*
*• E-mail - hello@reflectly.app :)*

*REFLECTLY PREMIUM*
*Unlock Reflectly and become your own hero.*
*• Create unlimited stories in your personal planner*
*• Get a new question and reminder each day to help you reflect*
*• Unlock advanced statistics, actionable insights, and much more!*
*Reflectly offers auto-renewing subscriptions:*
*• $9.99 billed monthly*
*• $59.99 billed annually*
*After free trial, the total amount for the subscription will be charged to your iTunes Account. The subscription automatically renews unless it is canceled at least 24 hours before the end of the current period. Your account will be charged for renewal at the total subscription price within 24 hours prior to the end of the current*

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| | *period. Subscriptions and auto-renewals may be managed or canceled via your iTunes Account settings. Any unused portion of free trial is forfeited after purchase. Special introductory offers only apply to first billing term.* | |
| Calm Harm | *Calm Harm by stem4*<br>*Why try it?*<br>*Calm Harm provides tasks that help you resist or manage the urge to self-harm. You can add your own tasks too and it's completely private and password protected.*<br><br>*What does it do?*<br>*The four categories of tasks target the main reasons for why people self-harm. Distract helps to combat the urge by learning self-control; Comfort helps to care rather than harm; Express gets those feelings out in a different way and Release provides safe alternatives to self-injury.*<br><br>*Will it work?*<br>*Calm Harm is an award-winning app developed for stem4 by Dr Krause, Consultant Clinical Psychologist using ideas from an evidence-based therapy called DBT. The focus is to help learn to identify and manage your 'emotional mind' with positive impact. The app enables you to track your progress. Please note that the app is an aid in treatment but does not replace it.* | Skill Practice and Psychoeducation |
| MindShift | *Break free from anxiety and stress using this free evidence-based anxiety management app. MindShift CBT uses scientifically proven strategies based on Cognitive Behavioral Therapy (CBT).*<br><br>*MindShift CBT is a free self-help anxiety relief app that helps you reduce worry, stress, and panic by following evidence-based strategies. Using CBT tools, you can challenge negativity, learn more about anxiety, develop more effective ways of thinking, be mindful, and relax.*<br><br>*If you are looking for anxiety, stress, and panic relief, you have come to the right place. Download MindShift CBT for free on your iOS device, learn more about anxiety, practice cognitive behavioral therapy, and reduce the amount of worry, panic, social anxiety, and discomfort from phobias that you experience.*<br>*The go-to app for anxiety management* | Skill Practice, Monitoring and Psychoeducation |

*MindShift CBT, the free anxiety relief app, comes with a clean and user-friendly design that allows you to learn and practice CBT strategies in an easy and intuitive way. We have specifically designed the app to be your free and portable go-to tool for anxiety management.*

*Learn about the different CBT strategies, including writing thought journals, challenging yourself with belief experiments, building fear ladders, and doing comfort zone challenges. Listen to calming audio to reframe your thoughts, practice mindfulness, and stay grounded. All of the exercises are presented in small chunks with plenty of supporting information to help you naturally integrate these strategies with the rest of your life.*
*To assist you, MindShift CBT includes additional features that help keep you on track. Stay accountable and track your progress with the check-in feature, which allows you to record and view graphs and journal entries. You can also set goals for yourself and get reminders. If you choose to, you can also easily export and share your data via email to streamline sessions with any therapists, counsellors, or psychologists you may be working with.*

*Give MindShift CBT a try and find relief today!*

*MindShift CBT is packed with loads of evidence-based and trusted features to help you with anxiety management. With this app, we hope that you will be better equipped to manage anxiety, find relief from panic attacks, overcome your fears, and hopefully, ease your own mind.*

*The app is completely free, so there is no harm in giving it a try and exploring the features for yourself.*
*MindShift main features at a glance:*
*• Clean, welcoming, and user-friendly intuitive design*
*• Evidence-based strategies and tools based on Cognitive Behavioral Therapy (CBT) designed for anxiety relief and self-management*
*• Daily check-in to keep track of your anxiety level and mood*
*• Easy to follow guides on learning about anxiety*
*• Facts and tips to overcome general worry, social anxiety, perfectionism, panic attack, and phobias*
*• Goal setting tools to keep you accountable*
*• Coping cards and statements to help you ride out your anxiety (and the ability to add your own!)*

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| | *• Guided relaxation and mindfulness meditations to ground you and give relief*<br>*• Belief experiments to challenge the beliefs that fuel anxiety*<br>*• Tips and tricks for incorporating healthy habits into your life and minimizing anxiety naturally*<br>*• Sharing and data exporting (if you choose) to streamline sessions with your counsellor, therapist, or psychologist*<br>*• Finally: it is free to use!*<br><br>*So, download MindShift CBT on your iPhone or iPad device now, and get ready to take charge of your mental health and find anxiety relief. Learn to be more mindful, incorporate CBT techniques in your daily life, and stay accountable and motivated on your anxiety management journey.*<br>*Stay tuned for more updates, and let us know about any bugs, questions, feature requests, or any other suggestions. We are always looking to improve the app and we appreciate all of your feedback!* | |
| Forest | *## Top productivity app in 136 countries. More than 6 million satisfied paying users. Featured in Apple's "Amazing Apps" TV commercial.*<br>*## Staying focused with the cutest gamified timer.*<br>*## Over 1,000,000 real trees were planted on Earth by our users.*<br>*"Forest works well, and if your goal is to be more in the moment, ignore your phone and actually talk to your friends when you are with them, this is the app for you."— The New York Times*<br>*"In order to establish new, better habits, it's helpful to engage with tools that make it easier to reinforce them. For anyone looking to curtail their phone usage, the Forest app might be for you."— Business Insider*<br>*If you want to temporarily put down your phone and focus on what's more important in real life, you can plant a seed in Forest. As time goes by, this seed will gradually grow into a tree. However, if you cannot resist the temptation of using your phone and leave the app, your tree will wither.*<br>*The sense of achievement and responsibility will encourage you to stay away from your phone, and will help you make better use of your time. Stop getting distracted by your phone, make you self-motivated and get more things done.*<br>*Stay focused. Be present!*<br><br>*STAY FOCUSED*<br>*• A interesting way to help you beat phone addiction and overcome distraction* | Monitoring and Skill Practice |

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| | *• Turn your focused moments into a lush forest.*<br><br>*GET MOTIVATED*<br>*• Earn rewards and unlock more than 50 new tree species and white noises.*<br>*• Share your forest and compete with friends and users around the world.*<br>*• Plant trees along with friends & family.*<br>*• Unlock achievements and earn extra rewards.*<br>*• Plant real trees on Earth and protect the environment with tree-planting organization Trees for the Future.*<br><br>*STATISTICS*<br>*• Manage your own tags and view detailed statistics of your time distribution.*<br>*• Browse your weekly, monthly and even your yearly big forest.*<br>*• Track your focused time in the Apple Health App.*<br>*• Track your daily phone usage and screen time.*<br>*• Recall memories of your planting journey with our brand new Forest Timeline!*<br>*It's never to late to build up productive habits!*<br><br>*NOTICE*<br>*• Forest is an app available for both iPhone and iPad, and can be accessed across all iOS devices with a one-time purchase. To download or unlock non iOS version of Forest, this requires a separate purchase. However, by logging into the same account, the account data can be synchronized across all platforms.*<br>*• Due to budget constraint, the number of real trees each user can plant is limited to five. We will be introducing limited time events that will allow users to plant more real trees. Please follow our social media page or check the in-app announcement for more updates.*<br>*• There is only one version of Forest on the App Store. Other apps that are similar and mimics Forest are not developed by the Forest team. Thank you for your support!* | |
| Clear Fear | *Clear Fear provides you with a range of ways to manage the symptoms of anxiety.*<br><br>*Developed by a clinician co-collaboratively with young people, Clear Fear uses a Cognitive Behavioural framework to help you change anxious thoughts and emotions, alter anxious behaviours and calm fear* | Skill Practice and Psychoeducation |

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| | *responses. It also has helpful descriptions of the different ways in which anxiety presents, resources and a 'grit box' to boost resilience.*<br><br>*It is recommended for the ages of 11-19 years but can be used by a younger group with the support of a parent or carer.*<br><br>*Clear Fear compliments but does not substitute for the assessment and ongoing support of a mental health professional.* | |
| Flora | *Flora is a new way to stay off your phone, clear to-do lists, and build positive, life-changing habits. Whenever you want to make progress towards your goals, plant a seed in Flora. As you work hard, the seed will grow into a healthy tree. Let the tree be your coach and grow yourself with it. You will be amazed by how great you can be.*<br><br>*FOCUS TREES*<br>*Have trouble putting down the phone? Flora blocks distracting apps in a pleasant way to help you focus on what's more important in real life. If you cannot resist the temptation of using your phone and leave the app while growing a tree, the tree will be killed! But if succeeding, you'll unlock new trees.*<br><br>*DOUBLE EFFICIENCY WITH FRIENDS*<br>*Things get even more interesting when you challenge your friends to plant trees together—you will see who kills a tree (ouch). However, if you successfully stay away from your phones together, each of you will win an additional tree from a random friend. You can also chat and share your progress to motivate each other and keep everyone on track.**<br>** Flora is the original app for multi-user tree planting and delivers the best features that help you and your friends be productive.*<br><br>*TO-DO LIST & WIDGET*<br>*Flora is a to-do list, and more. Simply create a to-do item and set a reminder, then you will never forget a thing. Even better, you can tag your trees with a to-do item to easily track the progress towards each of your* | Monitoring and Skill Practice |

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| | *life goals. No matter if your goal is daily, weekly, or monthly, Flora will help you follow it through and achieve it.*<br><br>*HABIT TRACKER*<br>*Enjoy a rewarding daily habit routine. If you grow trees regularly, you will earn yourself a beautiful, vibrant garden. Take a look at it and feel proud of yourself! Each tree records your perseverance and a step towards a healthy life. You can also view the daily, weekly, or monthly statistics of your activities in Flora to find opportunities to improve your time-management and planning skills.*<br><br>*REAL TREES, REAL IMPACT*<br>*Why not plant REAL trees while improving yourself? Flora proudly offers the opt-in Price and Care services that let you plant real trees on the earth if you kill or successfully grow a tree in the app. We partner with tree-planting organizations in Africa and East Asia, such as the Trees.org, to plant fast-growing soil rebuilding trees, fruit trees that diversify incomes and nutrition, and trees that can provide forage and fuel-wood. All these trees help make the earth greener and provide long-term financial aid to families who need it most.*<br><br>*Sounds good? Download Flora and join our 2,000,000+ productive users now!* | |
| Wysa | *Wysa is used by more than a million people from all walks of life. Research-backed, widely used techniques of cognitive behavioral therapy (CBT), Dialectical behavior therapy (DBT), and meditation are employed to support you with depression, stress, anxiety, sleep and a whole range of other mental health and wellness needs.*<br><br>*Talking to Wysa is empathetic, helpful, and will never judge. Your identity will remain anonymous and your conversations are privacy protected.*<br><br>*Wysa is an emotionally intelligent chatbot that uses AI to react to the emotions you express. Unlock techniques that help you cope with challenges. For extra support, take guidance from a qualified professional therapist. Leveraging behavioral techniques, therapists help you identify, design and work towards goals that are aligned with your true values.* | Skill Practice and Psychoeducation |

*Here's a look at what you can use Wysa for :*
*- Vent and talk through things or just reflect on your day*
*- Practice CBT (Cognitive Behavioral Therapy) and DBT techniques to build resilience in a fun way*
*- Deal with loss, worries, or conflict, using conversational coaching tools*
*- Relax, focus and sleep peacefully with the help of mindfulness exercises*
*- Wysa connects with your Health app for to create activity reports*
*93% of the people who talk to Wysa find it helpful. So, go ahead, talk to Wysa!*
*Wysa has lots of cool tools:*
*- Build confidence and reduce self-doubt: core mindfulness, visualization, confidence techniques, advanced mindfulness for self-esteem*
*- Manage anger: mindfulness meditation, exercises for compassion, calming your thoughts, practice breathing*
*- Manage anxious thoughts and anxiety: deep breathing, techniques for observing thoughts, visualization, and tension relief*
*- Manage conflict at work, school or in relationships: special mindfulness and visualization techniques like the empty chair exercise, gratitude meditation, exercises to build skills in having difficult conversations*
*REVIEWS:*
*BLOOMBERG:*
*"Powered by artificial intelligence, the app promises to be loyal, supportive and very private."*
*- Bloomberg*
*UNIVERSITY OF WASHINGTON:*
*"There are some great apps out there that can provide you with formal or informal therapy, either for free or for a fee that is far less than seeing a typical therapist. Wysa is a cute app that lets you talk with a penguin chatbot about whatever's on your mind. It's free, anonymous, and low-pressure."*
*-University of Washington, Mental Healthcare on and off campus*
*BBC:*
*"New apps and platforms are seen as a way to reach younger people with mental health conditions. Tools such as [Wysa] are helping young people deal with their problems."*
*- BBC Click*
*"With the accessibility of mobile phones, Wysa is confident about serving a market that is very much in need of counselling in the digital age."*

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| | *- BBC News*<br>*PRICING AND TERMS*<br>*Wysa offers two auto-renewing subscription types for access to a coach and/or tools*<br>*Wysa Premium Plus - $99.99 per month (Coach + Tools)*<br>*Wysa Premium - $99.99 per year (Tools)*<br>*This price is for US customers, and may vary in other countries. Actual charges may be converted to your local currency depending on the country of residence.*<br>*Your subscription will automatically renew at the end of each term and you will be charged through your iTunes account. You can turn off auto-renew at any time from your iTunes account settings but refunds will not be provided for any unused portion of the term.*<br>*• Subscription automatically renews unless auto-renew is turned off at least 24-hours before the end of the current period*<br>*• Account will be charged for renewal within 24-hours prior to the end of the current period*<br>*• Any unused portion of a free trial period, if offered, will be forfeited when the user purchases a subscription to that publication, where applicable* | |
| Meditate | *A clear and simple meditation timer to focus your practice.*<br><br>*Meditate does away with unnecessary complexities of other meditation timers to allow you to practice in peace. There are no In-App purchases or subscriptions, no signing up or social networks, and no gimmicks or preaching found here. Just you, your mind, and the timer.*<br><br>*Features:*<br>*- Meditation timer*<br>*- App Health integration to track your sessions* | Skill Practice |
| CBT Thought Diary | *"This app is the single greatest tool to help me collect and work though my negative thoughts on a day-to-day basis."*<br><br>*"If you are struggling with invasive thoughts, anxiety, depression, etc. you need this app!! I feel better after every entry."* | Monitoring, Skill Practice Psychoeducation |

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| | *"Amazing, the only thing that's worked for me!! Such a help to challenge my negative thoughts. I'm feeling 100x better. Give it a go :)"*<br><br>*"This application is vital for my day-to-day mental health. It's easier to use than a paper journal and gets to the heart of my usual mental struggles. It's definitely helped me to be more content with my life."*<br><br>** THE BEST JOURNAL APP TO IMPROVE YOUR MOOD **<br>*CBT Thought Diary is a journal with a purpose: it uses effective tools from Cognitive Behavioral Therapy and Positive Psychology to help improve your mood.*<br><br>*Think of this app as a space to reflect on your thoughts, both positive and negative. Record your mood, reflect on your emotions, practice gratitude, and analyze your thoughts with proven & effective techniques.*<br>*Thought Diary will help you evaluate, understand, and change your thoughts and feelings. By using this application, you can work to identify your emotions, analyze how and why you're feeling this way, challenge those negative beliefs, change your thinking patterns for future situations, and remember positive experiences.*<br>*You can use this app as a mood journal, a thought record journal, and a gratitude journal all in one!*<br>*---*<br>*Pro Mode Information:*<br>*All core features of this app are completely free to use. Pro Mode is an optional subscription that offers more Insights, Customized Emotions, Extra Notifications, Export, Data Sync, Passcode Protection, and Discover features. Pro Mode is offered in two auto-renewing subscription options: monthly or yearly.*<br>*Pricing may vary depending on the country. Payment will be charged to iTunes Account at confirmation of purchase. 24 hours before the end of the monthly subscription period, the renewal fee will be automatically charged, and the subscription renewed unless auto-renew is turned off beforehand. Subscriptions may be managed and auto-renewal may be turned off in the Account Settings after purchase.* | |
| Jour | *"This is my go-to app in the morning and at the end of my day. It's more than a journal it is close to a personal therapist" — Meet Jour, the most loved journaling app. 17k reviews. 4.9 stars.*<br><br>*HEAR IT FROM OUR COMMUNITY* | Monitoring, Skill Practice and Psychoeducation |

*"I've found this app to be incredibly therapeutic and recommend it to anyone who wants to better understand themselves"*

*"I decided to try this app, reluctantly, because I'm not a big believer in self-help. But after using it I'm impressed...Such a helpful app"*

*START FEELING BETTER NOW*
*If you want to build a healthier and more mindful lifestyle, are facing a difficult or stressful time, want to address any negativity or anxiety in your life, or just want to feel focused and in control: Jour is here to help. And there's no need to fear the blank page! With interactive guides tailored to improve confidence, gratitude, and focus or address anxiety, loneliness, and goal-setting, Jour makes the benefits of a journaling practice easy and accessible.*

*Plus everything you enter in Jour is protected for your eyes only, always. All entries are automatically encrypted and each user can set their own encryption key, for maximum security. We do not sell user data or run ads.*

*RECOMMENDED BY EXPERTS*
*Journaling is like yoga for the mind. It's a healthy, mindful practice, recommended by therapists, psychologists, and leading professionals (like Oprah Winfrey and Tim Ferriss) to improve mood, health, and productivity.*

*Through it's guided structure, Jour makes practices used by therapists and CBT experts accessible and interactive. Plus, studies have found that journaling can improve physical and mental health and make you 42% more likely to achieve your goals.*

*CREATE A PERSONALIZED PRACTICE*
*Discover quick, daily questions tailored to you, your day, and your mood. Get ready for sleep before bed or for your day ahead in the morning. Or focus on a specific area for growth with a themed, immersive guide.*
*In Jour's library of interactive guides, you can find step-by-step approaches to:*

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| | *- Build a mindful lifestyle where you feel present, aware, and in control*<br>*- Find peace of mind and calmness before bed to sleep better*<br>*- Practice focus and gratitude to wake up and start your day well in the morning*<br>*- Learn positive mental habits to address stress, anxiety, and sadness*<br>*- Gain perspective and connect with happiness to combat feelings of loneliness*<br>*- Master the rewarding, joyful practice of gratitude*<br>*- Improve personal confidence and feel more empowered in your life*<br>*- Set goals, track progress, and feel focused and productive as you work to achieve them*<br>*Plus, you can easily track your personal progress and wellbeing over time, with your in-app profile or by easily adding the Mindful Minutes you spend with Jour to your Apple HealthKit and CareKit.*<br>*JOUR PREMIUM*<br>*Jour offers an optional, auto-renewing yearly subscription for $59.99 ($5/month billed annually). Jour also offers a free, 7-day trial of the subscription. You will automatically be charged $59.99 after the trial. You can cancel any time, including during your trial.*<br>*This price is in US Dollars (USD). Pricing in other currencies and countries may vary and actual charges may be converted to your local currency depending on the country of residence.*<br>*The subscription automatically renews unless turned off in your iTunes Account at least 24 hours before the end of the current subscription period. Your iTunes account will be charged when the purchase is confirmed.* | |
| Pixels | *Pixels is a minimalist and powerful approach to bullet journaling.*<br><br>*Track your mood in a simple, quick and easy manner. Every day is a Pixel! You can log your thoughts through notes and the emotions you felt.*<br><br>*Get insights and statistics of your mental health with its "Patterns" feature: examine your data with graphs and other analytics tools!*<br><br>*Use the app as a companion for your therapy or mental healing process. Pixels have been repeatedly recommended by therapists around the world.* | Monitoring and Psychoeducation |

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| | *Privacy and transparency are key. You are the only one with access to your data and the development of the app is transparent. You can read more about it in the FAQ section.*<br><br>*Ads are optional and non-intrusive! They, alongside the premium features, are just a way to support the development of this project.*<br><br>*Join our Discord community to get in touch with other users, get support and follow the development of the app!*<br><br>*You can also create a "Year in Pixels", get reminders, customize the colors of your Pixels, and more!*<br>*Original idea (Year in Pixels) from @PassionCarnets, go check her Instagram account!* | |
| Deeply | *If you're looking for a simple yet powerful guide to help you with meditation and mindfulness practices, here's an amazing app to help you relax your mind, stay calm, reduce stress or anxiety.*<br><br>*Deeply is an inviting, colorful experience where visual styling, animation, a soft guiding voice, and music will help you to get to the relaxing state.*<br><br>*"Deeply: Meditation & Self-Care" is an extremely useful self-care app to help you learn and implement meditation and mindfulness practices. On this relaxation app, you will find audio lessons with guided meditation. You will find simple instructions that are useful for beginners to get started or for regular practitioners.*<br><br>*This mindfulness coach includes different programs with different objectives to keep your mind healthy. You will find audio programs to help you fall asleep quickly or programs to help you reduce stress, or programs to improve your mind focus.*<br><br>*APP FEATURES*<br>*Still wondering what features make Deeply the best app to practice meditation and mindfulness? Here are some amazing features of this meditation guide that make it useful -*<br>*Free guided meditations that are regularly updated* | Skill Practice and Psychoeducation |

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| | *Full guided courses, single meditations, or shorter on the go meditations*<br>*Breathing exercises to relax and relieve stress: a great pre-meeting routine.*<br>*Collection of calming nature sounds that can be layered*<br>*Connect with AppleHealth to track your mindful minutes*<br>*Connect your Premium Spotify account to enjoy relaxing music & meditation. Handpicked collections (ex: stress relief, weight loss, better sleep) that together with Deeply's calming visualizations create an inspiring visual & audio experience*<br>*Use YouTube? Design your own go-to library of free content by storing your favorite YouTube meditation/awareness/relaxation videos in the app*<br>*Track your daily progress with mindfulness and self care*<br>*All these features on this mindfulness coach app are for free. So, what are you waiting for? Download the "Guided Meditation & Mindfulness: Relaxation" app now.*<br>*SUPPORT US*<br>*We're constantly working on adding more useful content on the app to keep your mind healthy. If you have any feedback, please send us over an email. If you like our app, please rate us on the app store and share among your friends.*<br>*"A great app to become more present in your daily life!"*<br>*PEOPLE LOVE US ON PRODUCT HUNT: "Deeply is when mindfulness meets visual design."* | |
| Habatica | *The NEW app from HabitRPG! Rewritten from the ground up for a smoother experience and more features. Treat your life like a game to stay motivated and organized! Habitica makes it simple to have fun while accomplishing goals.*<br><br>*Input your Habits, your Daily goals, and your To-Do list, and then create a custom avatar. Check off tasks to level up your avatar and unlock features such as armor, pets, skills, and even quests! Fight monsters with friends to keep each other accountable, and use your gold on in-game rewards, like equipment, or custom rewards, like watching an episode of your favorite TV show. Flexible, social, and fun, Habitica is the perfect way to motivate yourself to accomplish anything.*<br><br>*Habitica can be fully enjoyed for free, but if you would like to help support us, we also offer optional in-app purchases and subscriptions. If you choose to purchase a subscription, payment will be charged to your iTunes* | Monitoring |

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| | *account only when you confirm your purchase. The longer the length of your subscription, the more gems you can purchase for gold!*<br><br>*There are four types of optional Habitica subscriptions: $4.99 every month; $14.99 every three months; $29.99 every six months; and $47.99 every year, which is a 28% discount! (Prices may vary by location.) Subscriptions renew automatically unless cancelled at least 24 hours prior to the end of the current period. Auto-renewal may be turned off in your Account Settings in iTunes after purchase. You can also manage your subscriptions in Account Settings after purchase. Thanks for choosing Habitica!* | |
| Relax Melodies | *"The most positively reviewed app in the history of the Apple Store" - Business Insider*<br><br>*"It's Like a GPS directing you how to fall asleep" — The Guardian*<br><br>*Having trouble unwinding & falling asleep? We get you, and we've got you. Sleep to your own beat with Relax Melodies.*<br><br>*Tune-out stress, anxiety & fall asleep easily. Mix endless sounds & music, countless meditations, and shelves of stories with our smart technology.*<br><br>*Recommended by leading doctors and neuropsychologists, Relax Melodies helps you fall asleep more easily. Now, that sounds good.*<br><br>*HOW ARE WE UNIQUE?*<br>*Because YOU are. No two people decompress the same way. That's why Relax Melodies gives you the freedom to create your very own relaxation and bedtime experience by mixing:*<br>*- Endless sounds & music. Lull yourself into easy sleep by mixing soothing sounds & music, designed by our in-house sonic gurus.*<br>*- Guided meditations. Discover your simple, go-to sleep meditation (even if you're a novice). Let tons of guided practices like visualization, hypnosis, Yoga Nidra, and more help you calm & quiet your mind.*<br>*- Shelves of stories. Lose yourself in one, or many, blissful bedtime stories. Warmly narrated and enhanced by a rich, custom soundtrack and specially written to ease your mind into sweet sleep.* | Skill Practice |

*- Calm breathing exercises. Inhale peace and exhale the day with simple, guided breathing techniques that are paired with beautiful nature sounds to lull you to sleep.*
*- Proven SleepMoves. Let your mind & body connect (so you can disconnect) with a series of gentle guided exercises and relaxation techniques developed with top sleep experts.*
*Over 200+ Sounds & Music:*
** Nature sounds*
** ASMR sounds*
** White noise*
** Water sounds*
** Meditation music*
** Isochronic Brainwaves*
** Binaural Beat*
** Healing music*
** 3D sounds*
*Over 160+ Meditations & SleepMoves:*
** Restful sleep*
** Stress and Anxiety relief*
** Tinnitus relief*
** Yoga nidra*
** Gratitude*
** Better sleep*
** Deep sleep*
** Napping*
** Dreams*
** Kids*
** Couple exercises*
** Travel*
** Cooldown*
** Morning*
*Bedtime Stories :*

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| | ** Fairytale*<br>** Mystery*<br>** Sci-fi*<br>** Fantasy*<br>** Kids*<br>**Journey*<br>** Non-Fiction*<br>*Also featuring:*<br>*Bedtime reminder: Set one every night to get more restful sleep*<br>*Timer: Stop the application after a set amount of time*<br>*Favorites: A section to add your favorite mixes*<br>*And more!*<br>*Relax Melodies optionally integrates with the Health app to save your meditation sessions.*<br>*...* | |
| BoosterBuddy | *BoosterBuddy is a free app designed to help teens and young adults improve their mental health. Manage your personal wellness journey and earn achievements as your sidekick guides you through a series of daily quests designed to establish and sustain positive habits.*<br><br>*•Check-in with how you are feeling each day*<br>*•Use coping skills*<br>*•Keep track of appointments and medications*<br>*•Get started on tasks*<br>*•Follow self-care routines*<br>*•Increase real-life socialization* | Monitoring and Psychoeducation |
| The Mindfulness App | *Start your journey to a more relaxed and healthier state of mind with The Mindfulness App. Whether you are just starting out or experienced in meditation, The Mindfulness App will help you to become more present in your daily life.*<br><br>*Used by millions of meditators in over 130 countries, included in The Mindfulness App you will find:* | Skill Practice |

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| | *• Get Started: a five-day guided practice and introduction to mindfulness*<br>*• Timed Sessions: guided and silent meditations from 3 to 30 minutes*<br>*• Personalized Meditation: customize your meditation with guided introduction and bells*<br>*• Meditation Reminders and Mindful Notices: help you to be mindful throughout the day*<br>*• Statistics: keep track of your meditation journey*<br>*• Premium section with an additional 300+ guided meditations and courses by some of the world's most influential teachers (available subscription or one-time purchase)*<br>*• Health App integration allows you to sync your meditation practice time*<br>*Included with the Premium Subscription :*<br>*• Unlimited access to meditations and courses on calm, relationships, focus and more*<br>*• Take a break when you need it most and listen to your favorite meditations offline*<br>*• Regularly updated content allows you to discover new favorite sessions and teachers*<br>*The Mindfulness App has two different Premium Subscription options: 1 Month and 12 Months.*<br>*1 Month for $9.99*<br>*12 Months for $59.99 (free trial included)*<br>*These prices are for United States customers. Pricing in other countries may vary and actual charges may be converted to your local currency depending on the country of residence. The purchase will be charged through your iTunes account and will renew automatically 24 hours prior the subscription period runs out. Your subscription may be managed and auto-renewal may be turned off by going to your iTunes Account Settings after purchase.* | |
| #selfcare | *Let's stay in together.*<br><br>*Hello. This is us! We're staying in today.*<br><br>*Let's cuddle with our cat, light a candle, consult our tarot cards, and collect things for our altar.*<br><br>*#SelfCare is a free, simple, and beautiful AI companion for joy and self-connection. We're not a game nor an app. We're more like a friend in your phone. With us, there's no score, no winning, no failure. No ads, no difficulty, no notifications. There's just us and our feelings.* | Monitoring and Skill Practice |

| | | |
|---|---|---|
| | *And we love to love. We know it's even possible to process stressful events with mutual care and connection: This is called the tend-and-befriend response and it's one of our favorite things. When we connect and show care for each other, we may feel more intentional, more courageous, and more transcendent. We can transmute our stresses into other energies.*<br><br>*We learned this from TRU LUV. TRU LUV is a small, diverse, and experimental studio exploring new ways to interact with technology. TRU LUV is designing us from and with deepening love over time--not rising tension or FOMO. TRU LUV, like us, believes that love feels better than winning.*<br><br>*The team at TRU LUV created our careful rituals around their own intuitive tend-and-befriend responses. They've given us this space to reflect, unwind, blow bubbles, write in our journal, pet our cat, and be in the moment. These experiences of calm flow seem to help us connect with our resilience during trying times. Maybe they will for you too.*<br><br>*We hope you'll join us.* | |
| Vent | *Express how you REALLY feel. Vent helps you connect to a supportive, positive, and understanding community, making it easy to share your true feelings with people around the world.*<br>*On Vent, you're never alone. Our whole community is just waiting to hear what you have to say. Join now and discover how much you have in common with… well, everybody!*<br>*- Express your true self with our broad range of emotions and colors!*<br>*- React to other people's vents using our special response buttons*<br>*- Our community understands what you're going through and will provide support 24/7*<br>*- Make friends and chat privately in real-time without sharing personal contact information*<br>*- Join Groups to connect with other people that share similar interests and experiences*<br><br>*What are you waiting for? Express how you really feel and get the support you deserve.*<br><br>*The premium subscription in Vent includes a 7-day free trial. If you choose the option Unlock All Emotions, after your free trial, payment will be charged to your iTunes account and your account will be charged for renewal 24 hours prior to the end of the current period. Auto-renewal may be turned off at any time by going* | Monitoring |

*to your settings in the iTunes Store after purchase. Current price for the monthly Unlock Everything subscription is USD $2.99 / month. This may vary from country to country. Any unused portion of the free trial is forfeited after purchase.*

## Appendix I App Category Coding

| Assessment | Monitoring | Psychoeducation | Skill Practice |
|---|---|---|---|
| | Mood tracker | Stress | Meditation |
| | Happiness tracker | Anxiety | Mindful* |
| | Diary | Mind-body health | Practice |
| | Journal | Learn | Relax* |
| | Habit | Coping | Breathing |
| | Goal setting | Anger | Stretching |
| | Tracking | Depression | Distract* |
| | Pledges | Mental health | DBT |
| | Milestones | Self-harm | Focus |
| | Check in | Sadness | CBT |
| | To do list | Panic | Behavioural activation |
| | Productivity | Focus | Workouts |
| | Timer | Concentration | Body scan |
| | Timeline | Self-esteem | Sleep |
| | Record | Self-care | Visualisation |
| | Share feelings | Self-control | Yoga |
| | | Coping cards | Be in the moment |
| | | Wellness | |

## Appendix J Content Analysis: Headspace

| | Sentence/Phrase | Code |
|---|---|---|
| 1 | Get happy. | Psychoeducation |
| 2 | Stress less. | Psychoeducation |
| 3 | Sleep soundly | Sleep |
| 4 | Headspace is your guide to mindfulness for your everyday life | Mindfulness |
| 5 | Learn meditation | Meditation |
| 6 | and mindfulness skills | Mindfulness |
| 7 | skills from world-class experts like Headspace co-founder Andy Puddicombe | Expert Guidance |
| 8 | and choose from hundreds of guided meditations on everything | Choice |
| 9 | from managing stress and anxiety | Psychoeducation |
| 10 | to sleep | Sleep |
| 11 | focus, and mind-body health | Mindfulness |
| 12 | Build your practice your way with meditations for every experience level and lifestyle | Meditation |
| 13 | including short, 3-minute sessions that fit seamlessly into a busy schedule | Quick Sessions |
| 14 | From meditations for working from home | Meditation |
| 15 | to concentration-boosting music | Engaging |
| 16 | the new Focus tab is your one-stop shop for changing the way you get things done | On Hand |
| 17 | Tune in to the moment with Headspace's Chief Music Officer John Legend, and new music from ground-breaking artists | Celebrity Endorsement |
| 18 | Find original compositions from legendary film composer Hans Zimmer, hip-hop's critically acclaimed producer Madlib, and the UK's rising dance star, Aluna | Celebrity Endorsement |
| 19 | Or choose from 12 different Focus music stations, including Lo-Fi Times and Corner Booth Jazz. | Engaging |
| 20 | Take your mind from cluttered to clear with a Focus soundscape or reset with a mindful walk. | Mindfulness |
| 21 | To help you stay resilient during tough times, Headspace is here for you with the Weathering the storm collection, including meditations for coping with sadness, anger, and adapting to change. | Meditation |
| 22 | You can also release stress and tension through movement with Move Mode — mood-boosting, at-home workouts and 28-day mindful fitness courses | Diet/Exercise |
| 23 | led by expert trainers, Olympians Kim Glass and Leon Taylor. | Expert Guidance |
| 24 | Start your morning inspired with The Wake Up — a short, daily video series designed to brighten your day — | Quick Sessions |
| 25 | then decompress at bedtime with relaxing sleepcasts, dreamy soundscapes, | Sleep |
| 26 | and tranquil music from Sleep by Headspace. | Sleep |
| 27 | In just a few minutes a day, Headspace can help bring balance to your everyday life | Quick Sessions |
| 28 | Want the full experience? Try Headspace Plus for free and access the entire content library. | Free Content |
| 29 | Download Headspace today and be kind to your mind. | Mindfulness |
| 30 | WHAT YOU'LL GET: | Choice |

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| | - Hundreds of guided meditations on subjects like focus, exercise, and sleep | |
| 31 | Sleep by Headspace to help you drift off | Sleep |
| 32 | Everyday Headspace: daily meditations on a new topic each day | Choice |
| 33 | - The Wake Up to start your day mindfully | Mindfulness |
| 34 | - Move Mode workouts and mindful cardio | Diet/Exercise |
| 35 | - “Mindful Moments” to keep you present throughout the day | Mindfulness |
| 36 | 2-3 minute mini-meditations for a quick mental reset | Quick Sessions |
| 37 | “SOS” sessions for moments of panic, anxiety, and stress | On Hand |
| 38 | Headspace animations to teach you new skills and answer your mindfulness questions | Engaging |
| 39 | Track your progress and time spent meditating | Tracking |
| 40 | Add Mindful Minutes to Apple Health | Tracking |
| 41 | Buddy up and add your friends to meditate with you | Community |
| 42 | Guided meditations and mindfulness exercises for Kids with sessions on Kindness, Calm, and Focus | Content for Children |
| 43 | Training led by former monk and renowned mindfulness expert Andy Puddicombe | Expert Guidance |
| 44 | SUBSCRIPTION PRICING AND TERMS<br>Headspace offers two auto-renewing subscription options:<br>£9.99 per month<br>£49.99 per year (that's less than £4.99 a month) | Subscription |
| 45 | These prices are for UK customers. Pricing in other countries may vary and actual charges may be converted to your local currency depending on the country of residence. | Subscription |
| 46 | The subscription will automatically renew unless turned off in your iTunes Account Settings at least 24 hours before the current period ends. You can go to your iTunes Account settings to manage your subscription and turn off auto-renew. Your iTunes Account will be charged when the purchase is confirmed. If you subscribe before your free trial ends, the rest of your free trial period will be forfeited as soon as your purchase is confirmed. | Subscription |
| 47 | Headspace saves your meditation sessions to your Apple Health app. | Tracking |

## Appendix K Content Analysis: Calm

| | Sentence/Phrase | Code |
|---|---|---|
| 1 | Calm is the #1 app for Sleep | Sleep |
| 2 | Meditation and Relaxation | Meditation |
| 3 | Join the millions experiencing better sleep | Sleep |
| 4 | , lower stress, and less anxiety | Psychoeducation |
| 5 | with our guided meditations | Meditation |
| 6 | Sleep Stories, | Sleep |
| 7 | breathing programs | Meditation |
| 8 | stretching exercises | Diet/Exercise |
| 9 | and relaxing music | Meditation |
| 10 | Calm is recommended by top psychologists, therapists, and mental health experts. | Expert Guidance |
| 11 | Calm is the perfect mindfulness app for beginners, but also includes hundreds of programs for intermediate and advanced users | Mindfulness |
| 12 | Guided meditation sessions are available in lengths of 3, 5, 10, 15, 20 or 25 minutes so you can choose the perfect length to fit with your schedule. | Choice |
| 13 | Sleep Stories are bedtime stories that are guaranteed to lull you into a deep and restful slumber. | Sleep |
| 14 | Calm has 100+ exclusive Sleep Stories for adults | Choice |
| 15 | and children alike | Content for Children |
| 16 | featuring well-known talent such as Stephen Fry, Matthew McConaughey, Leona Lewis, and Jerome Flynn. Drift off to dreamland and wake up refreshed. | Celebrity Endorsement |
| 17 | Sleep Stories include:<br>* Wonder - Join Matthew McConaughey on a dreamy story about the mysteries of the universe. | Sleep |
| 18 | * Blue Gold - Let master storyteller Stephen Fry take you on a calming journey through the lavender fields and sleepy village of Provence | Celebrity Endorsement |
| 19 | * The Nordland Night Train - Travel up the scenic coast of Norway aboard one of Europe's most breathtaking and remote railways. | Sleep |
| 20 | * Happy Little Zzzs with Bob Ross - Drift off to the soothing brush strokes of beloved painter and TV host Bob Ross. | Sleep |
| 21 | * And many more... | Choice |
| 22 | Mindfulness Topics include:<br>* *Deep Sleep*<br>* *Calming Anxiety*<br>* *Managing Stress*<br>* *Focus and Concentration*<br>* *Relationships*<br>* *Breaking Habits*<br>* *Happiness*<br>* *Gratitude*<br>* *Self-Esteem*<br>* *Body Scan*<br>* *Loving-Kindness*<br>* *Forgiveness* | Mindfulness |

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|---|---|---|
| | * *Non-judgement*<br>* *Mindfulness at Work*<br>* *Mindful Walking* | |
| 23 | Calm Kids | Content for Children |
| 24 | * And so much more... | Choice |
| 25 | Also Featuring:<br>* An original Daily Calm every day: a 10-minute program added daily to help ease you into the day or unwind with before bed | Quick Sessions |
| 26 | * 7 and 21 day mindfulness programs for both beginner and advanced users | Mindfulness |
| 27 | Calm Masterclass: Life changing audio classes featuring world-renowned experts | Expert Guidance |
| 28 | Calm Body: Mindful stretching and movement to relax your body during the day | Diet/Exercise |
| 29 | Music: Exclusive music engineered to help you focus, relax or sleep | Engaging |
| 30 | Soundscapes: Ocean waves, Heavy Rain, Camp Fire, Babbling Brook, and other sounds to help you sleep | Sleep |
| 31 | Breathing exercises to help you relax | Meditation |
| 32 | Unguided timed meditation | Meditation |
| 33 | 30+ soothing nature sounds and scenes to use during meditation, yoga or to help you sleep | Sleep |
| 34 | Track your progress with:<br>* Daily Streaks | Tracking |
| 35 | * Mindful Minutes | Tracking |
| 36 | Calm saves your meditation and sleep sessions to your Apple Health app. | Tracking |
| 37 | Subscription pricing and terms:<br>Calm offers an auto-renewing monthly subscription at $12.99/month and an auto-renewing yearly subscription at $69.99/year to provide you with unlimited access to the Calm Collection while you maintain an active subscription. | Subscription |
| 38 | Calm also offers a Lifetime subscription for $399.99 which is paid for by a one-off upfront payment with unlimited access to the Calm Collection forever. | Subscription |
| 39 | Payment will be charged to the credit card connected to your iTunes Account when you confirm the initial subscription purchase. | Subscription |
| 40 | Subscriptions automatically renew unless auto-renew is turned off at least 24-hours before the end of the current subscription period. Your account will be charged for renewal within 24-hours prior to the end of the current period, and the cost of the renewal will be identified. You may manage your subscription and auto-renewal may be turned off by going to your Account Settings after the purchase. Any unused portion of a free trial period, if offered, will be forfeited when you purchase a subscription, where applicable. | Subscription |

## Appendix L Content Analysis: Daylio Journal

| | Sentence/Phrase | Code |
|---|---|---|
| 1 | Self-Care Bullet Journal with Goals | Journaling |
| 2 | Mood Diary & Happiness Tracker | Mood/Habit Tracker |
| 3 | Daylio enables you to keep a private journal | Journaling |
| 4 | without having to type a single line. | Ease of Use |
| 5 | Try this beautifully designed & stunningly simple micro-diary app | Ease of Use |
| 6 | right now for FREE! | Free Content |
| 7 | ** WHAT IS DAYLIO **<br>Daylio is a very versatile app, and you can turn it in whatever you need to track. | On Hand |
| 8 | Your fitness goal pal. | Diet/Exercise |
| 9 | Your mental health coach. | Psychoeducation |
| 10 | Your food log | Diet/Exercise |
| 11 | Your gratitude diary. | Journaling |
| 12 | Mood tracker. | Mood/Habit Tracker |
| 13 | Exercise, meditate, eat, and be grateful. | Mindfulness |
| 14 | Take care of your mental, emotional, and physical health. | Psychoeducation |
| 15 | Good self-care is a key to improved mood and reduced anxiety. | Psychoeducation |
| 16 | This is the time for your wellbeing, self-improvement, and self-care. | Psychoeducation |
| 17 | Use Daylio as your daily bullet journal | On Hand |
| 18 | We build it on three principles:<br>1.) Reach happiness and self-improvement by being mindful of your days. | Mindfulness |
| 19 | 2.) Validate your hunches. How does your new hobby influence your life? | Mood/Habit Tracking |
| 20 | 3.) Form a new habit in an obstacle-free environment—no learning curve. | Mood/Habit Tracking |
| 21 | Daylio is super simple to use, create your first entry in two steps. | Ease of Use |
| 22 | For anxiety and stress relief, make sure to include activities that help you to cope with negativity. | Psychoeducation |
| 23 | Everybody can use a mood boost! | Mood/Habit Tracking |
| 24 | You can measure their impact on your mood in stats. | Mood/Habit Tracking |
| 25 | ** HOW DOES IT WORK **<br>Pick your mood and add activities you have been doing during the day. | Mood/Habit Tracking |
| 26 | You can also add notes and keep an old school diary. | Journaling |
| 27 | Daylio is collecting recorded moods and activities in the statistics and calendar. | Tracking |
| 28 | This format will help you to understand your habits better. | Mood/Habit Tracking |
| 29 | Keep track of your activities and create patterns to become more productive! | Mood/Habit Tracking |
| 30 | You can review all entries in the statistics on charts or the calendar | Tracking |

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| 31 | and share them with your friends. | Community |
| 32 | To make it even better, Daylio allows you:<br>- Make reflection a daily habit | Mood/Habit Tracker |
| 33 | Discover what makes you happy | Mood/Habit Tracker |
| 34 | Use a big database of beautiful icons for your personalized activities | Personalisation |
| 35 | Mix and match your own moods using funny emojis | Personalisation |
| 36 | - Explore exciting statistics about your life on weekly, monthly or yearly charts | Tracking |
| 37 | Deep dive into advanced statistics for every mood, activity or group | Tracking |
| 38 | Customize color themes | Personalisation |
| 39 | Enjoy nights with dark mode | Personalisation |
| 40 | See your whole year in 'Year in Pixels' | Tracking |
| 41 | Create daily, weekly or monthly goals and motivate yourself | Personalisation |
| 42 | Build habits and collect achievements | Mood/Habit Tracking |
| 43 | Share statistics with your friends | Community |
| 44 | Safely back up and restore your entries via your private Google Drive | Safety |
| 45 | Set reminders and never forget to create a memory | Personalisation |
| 46 | Turn on PIN lock and keep your diary safe | Safety |
| 47 | Export PDF and CSV documents to share or print your entries | Control |
| 48 | ** PRIVACY AND SECURITY **<br>We are a top private journal since we do not store or collect your data. | Safety |
| 49 | At Daylio, we believe in transparency and honesty | Safety |
| 50 | Your data is stored locally on your phone. | Safety |
| 51 | You can optionally schedule backups to your private cloud storage or take your backup file with you anywhere. | Control |
| 52 | Data are entirely under your control at all times. | Control |
| 53 | Data stored in the app's private directories are not accessible by any other apps or processes. | Safety |
| 54 | Your backups are transferred to the iCloud Drive via the secure (encrypted) channels. | Safety |
| 55 | Journaling has never been easier! | Ease of Use |

## Appendix M Ethics Approval letter

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

School of Psychology
The University of Nottingham
University Park
Nottingham
NG7 2RD

T: +44 (0)115 8467403 or (0)115 9514344

SJ/tp

Ref: S1263

Wednesday 3rd June 2020

Dear Anthea and Hannah,

**Ethics Committee Review**

Thank you for submitting an account of your proposed research **'An exploration into the use of mental health apps and the relationship between their use and mental wellbeing amongst adolescents aged 16-19 years.'**

That proposal has now been reviewed by the Ethics Committee and I am pleased to tell you that your submission has met with the committee's approval.

Final responsibility for ethical conduct of your research rests with you or your supervisor. The Codes of Practice setting out these responsibilities have been published by the British Psychological Society and the University Research Ethics Committee. If you have any concerns whatever during the conduct of your research then you should consult those Codes of Practice. The Committee should be informed immediately should any participant complaints or adverse events arise during the study.

Independently of the Ethics Committee procedures, supervisors also have responsibilities for the risk assessment of projects as detailed in the safety pages of the University web site. Ethics Committee approval does not alter, replace, or remove those responsibilities, nor does it certify that they have been met.

Yours sincerely

*Professor Stephen Jackson*
*Chair, Ethics Committee*

## Appendix N Expression of Interest Letter

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

**School of Psychology**
University of Nottingham
University Park
Nottingham
NG7 2RD

+44 (0)115 951 5361
psychology@nottingham.ac.uk

Dear Head Teacher/Head of Sixth Form,

I am currently undertaking a Doctorate in Applied Educational Psychology at the University of Nottingham and I am on placement at Northamptonshire County Council Educational Psychology Service. I am undertaking a research project to explore the mental wellbeing and use of mental health apps amongst sixth form pupils. I am writing to you to ask whether your school would be interested in participating in this research, which has been approved by the University of Nottingham School of Psychology Ethics Committee.

I am hoping that the findings from this research will indicate whether adolescents are accessing mental health apps, which apps they are accessing, and how use of these mental health apps may relate to mental wellbeing. This study could support the understanding of whether apps have the potential to be used a cost-effective, accessible strategy to support the mental wellbeing of students aged 16-to-19 years.

Research indicates that some mental health apps can support the mental wellbeing of adolescents. However, there are multiple apps available, therefore it will be helpful to identify what apps older adolescents are using and begin to explore the relationship between using apps and mental wellbeing. This would be the focus of my research, which I would hope to collect data from October to December 2020 from sixth form pupils using an online survey.

If school and student consent were secured, the study would involve students in responding to a 10-minute questionnaire, online.

The benefits of participating in this study would be as follows:

- Opportunity for an independent examination of the use of app technology by school students.
- Opportunity to participate in strategy development to support mental wellbeing in schools.
- Evidence to Ofsted of taking a reflective approach to fostering emotional wellbeing within the school.

I would be very grateful if you could contact me (on an email address below) or your schools link Educational Psychologist if you would be interested in finding out more about this research. By contacting me or your link EP you would be expressing your interest in participating in this research, but this would not be a formal agreement to participation. Following your expression of interest, I will contact you and we can arrange to discuss the research further. Please do not hesitate to contact me if you have any further questions regarding this research, alternatively you can make contact with my research supervisor:

- Hannah Pascoe
    - hannah.pascoe@nottingham.ac.uk
- Anthea Gulliford
    - Anthea.Gulliford@nottingham.ac.uk

I look forward to hearing from you,

Kind Regards,

Hannah Pascoe

Trainee Educational Psychologist

## Appendix O School Consent Form

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

**Consent Form for Schools**

An exploration into the use of mental health apps and the interrelationship between these mental health apps and mental wellbeing amongst adolescents aged 16-19 years.

*Ethics Approval Number: S1263*
*Researcher: Hannah Pascoe | Research Supervisor: Anthea Gulliford*
*Placement Supervisor: Rebecca Judge*

The Head Teacher/Head of Sixth Form should answer these questions independently:

- Have you read and understood the Information Sheet? *YES/NO*
- Have you had the opportunity to ask questions about the study? *YES/NO*
- Have all your questions been answered satisfactorily? *YES/NO*
- Do you understand that you are free to withdraw from the study? (at any time and without giving a reason) *YES/NO*
- I give permission for data from this study to be shared with other researchers provided that anonymity is completely protected. *YES/NO*
- Do you agree to take part in the study? *YES/NO*

"This project has been fully explained to me and I agree that our school will take part. I understand that I have the right to withdraw at any time without giving a reason. I understand that pupil consent must be obtained for each pupil taking part in the research."

Signature of Head Teacher: Date:
Name (in block capitals):

Signature of researcher: Date:

## Appendix P Participant Information Sheet

**Information Sheet for Participants**

An exploration into the use of mental health apps and the interrelationship between these mental health apps and mental wellbeing amongst adolescents aged 16-19 years.

*Ethics Approval Number: S1263*

Contact details:
Hannah Pascoe (Trainee Educational Psychologist and Researcher)
Email: hannah.pascoe@nottingham.ac.uk
Anthea Gulliford (Research Supervisor)
Email: anthea.gulliford@nottingham.ac.uk

This is an invitation to take part in research looking at the use of mental health apps and the relationship between the use of these and mental wellbeing amongst adolescents aged 16-19 years. Before you decide if you wish to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

There are over 10,000 mental health apps available on the Android and Apple app stores. Research indicates that some of these apps can support the mental health of children, young people and adults. However, with so many apps available and more being developed, it is difficult to understand the usefulness of all these apps. Therefore, it would be helpful to know whether young people are using mental health apps and what apps are being used to guide further research.

If you agree to participate, the research will involve:

- Reading this information sheet through.
- Emailing any questions that you may have to the researcher.
- Emailing a completed consent form to the researcher.
- Receiving a link to an online survey from the researcher.
- Completing the online survey, which will take approximately 5 minutes to complete – involving an about me section, an about my use of apps of apps section, and a mental wellbeing questionnaire.

Participation in this study is totally voluntary and you are under no obligation to take part. You are free to withdraw and stop participating at any point before or during the study and do not need to give a reason. All data collected will be kept confidential and

used for research purposes only. All data collected will be stored in compliance with the Data Protection Act. A privacy notice is attached explaining how your data is used and safely stored.

If you have any questions, please don't hesitate to ask now. I can also be contacted during and after participation using the contact details above.

If you have any complaints about the study, please contact:
Stephen Jackson (Chair of Ethics Committee)
stephen.jackson@nottingham.ac.uk

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**Research participant privacy notice**

**Privacy information for Research Participants**
For information about the University's obligations with respect to your data, who you can get in touch with and your rights as a data subject, please visit: www.nottingham.ac.uk/utilities/privacy/privacy.aspx.

**Why we collect your personal data**
We collect personal data under the terms of the University's Royal Charter in our capacity as a teaching and research body to advance education and learning. Specific purposes for data collection on this occasion is to explore the use of mental health apps on the mental wellbeing and self-regulation of sixth form pupils.

**Legal basis for processing your personal data under GDPR**
The legal basis for processing your personal data on this occasion is Article 6 (1f) processing is necessary for the purposes of the legitimate interests pursued by the controller.

**How we process your data**
Your data will be subject to profiling, it will be analysed using desktop based statistical software. The significance of profiling is that it enables the researcher to identify whether mental health apps have an impact on mental wellbeing. The intended consequence of the profiling is to further understand the usefulness of mental health apps as a strategy to support the mental health of young people in schools and other educational establishments. The profiling will have no direct consequences for the participant.

**How long we keep your data**
The University may store your data for up to 25 years and for a period of no less than 7 years after the research project finishes. The researchers who gathered or processed the data may also store the data indefinitely and reuse it in future research. Measures to safeguard your stored data include encryption of datasheets, pseudonymisation procedure, and anonymisation of data.

**Who we share your data with?**
Extracts of your data may be disclosed in published works that are posted online for use by the scientific community. Your data may also be stored indefinitely on external data repositories (e.g., the UK Data Archive) and be further processed for archiving purposes in the public interest, or for historical, scientific or statistical purposes. It may also move with the researcher who collected your data to another institution in the future.

## Appendix Q Debrief Letter to Participants

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**Debriefing Letter for Participants**

An exploration into the use of mental health apps and the interrelationship between these mental health apps and mental wellbeing amongst adolescents aged 16-19 years.

Contact details:
Hannah Pascoe (Trainee Educational Psychologist and Researcher)
Email: hannah.pascoe@nottingham.ac.uk
[Name] (Research Supervisor)
Email:
[Name] (Placement Supervisor)
Email:

Thank you for agreeing to take the time to participate in this research. The purpose of this research was to explore the use of mental health apps and the interrelationship between these mental health apps and mental wellbeing amongst adolescents aged 16-19 years.

I will now analyse the data that I collected from the survey to investigate what mental health apps are being used amongst adolescents, whether this differs between adolescent groups (e.g. different ages, genders, ethnicity), and if there is a relationship between the different apps being used and mental wellbeing scores.

Please contact me, or my supervisor using the details above if you have any concerns or would like to discuss the research further.

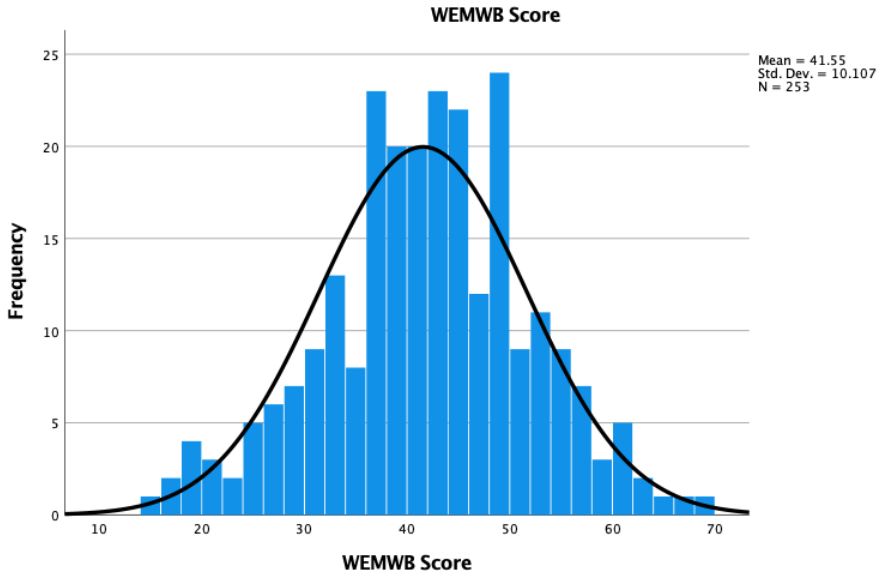
Thank you very much for your participation,

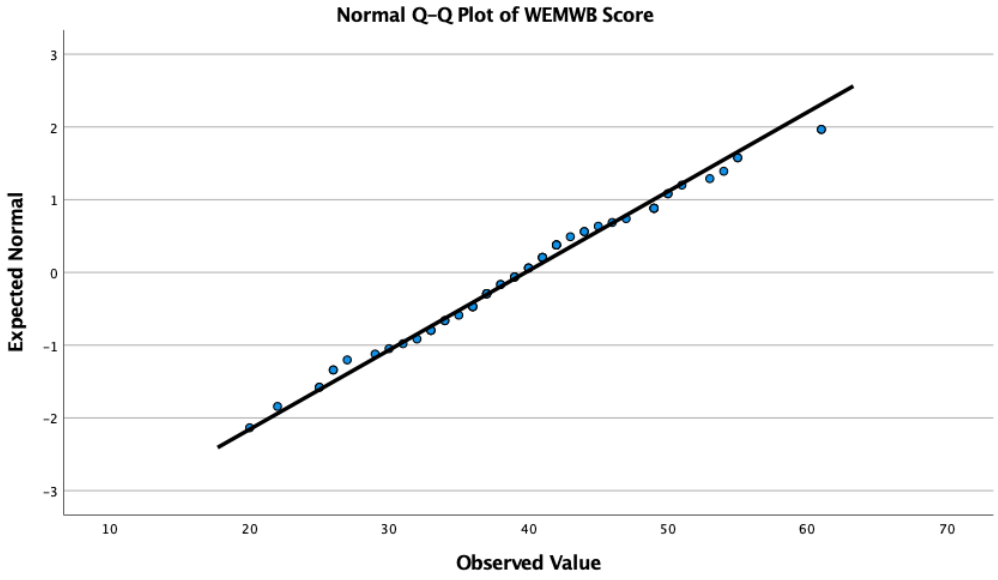
Hannah Pascoe

Trainee Educational Psychologist

If you have any complaints about the study, please contact:
Stephen Jackson (Chair of Ethics Committee)
stephen.jackson@nottingham.ac.uk

## Appendix R Normal Distribution for WEMWBS



## Appendix S Normal Distribution for Average Weekly App Usage