

Bangor University

MASTERS BY RESEARCH

Behavioural and Health Impacts of Raising Children in a Digital Household

Dixon, Donna

Award date:
2023

Awarding institution:
Bangor University

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 25. Apr. 2024

Behavioural and Health Impacts of Raising Children in a Digital Household

Donna Dixon

Bangor University

School of Educational Sciences

November 2022



Declaration

I hereby declare that this thesis is the results of my own investigations, except where otherwise stated. All other sources are acknowledged by bibliographic references. This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree unless, as agreed by the University, for approved dual awards.

I confirm that I am submitting this work with the agreement of my Supervisors.

Funding

This project was funded by Knowledge Economy Skills Scholarships (KESS II) and conducted in collaboration with Public Health Wales and Bangor University.

Knowledge Economy Skills Scholarships (KESS II) is a pan-Wales higher level skills initiative led by Bangor University on behalf of the HE sector in Wales. It is part funded by the Welsh Government's European Social Fund (ESF) convergence programme for West Wales and the Valleys.

Conferences

The results of this thesis have been presented at the following conferences:

- Bangor University Post Graduate Research Annual Conference. Bangor, UK. May 2022.
- Society for Social Medicine and Population Health Annual Scientific Meeting. Exeter, UK. September 2022.
- Public Health Wales Research and Evaluation Conference 2022. Online event. December 2022.

Acknowledgements

I would like to express my sincere gratitude to my supervisors Dr Catherine Sharp and Professor Karen Hughes for their endless patients, knowledge, guidance, understanding and dedication throughout this project. Their example as researchers and academics is a model I aspire to emulate in the future. I would also like to thank Professor Carl Hughes for his guidance and encouragement, as well as the wonderful opportunities he has provided to enhance my career during my studies. Many thanks also to thank Dr Nia Williams, without whom this opportunity would not have been possible.

I am extremely grateful to GwE, for their support in the recruitment of schools, and of course to the school staff and students who participated in this project, for their valuable time and contribution.

Also, thank you to Public Health Wales for agreeing to be the company partner for this KESS scholarship and to all the staff within the Public Health Wales research department for making me feel so welcome.

Finally, a big thank you to my family, for their endless support and for always believing in me.

Diolch o galon!

Thank you so much!

Table of Contents

	Page Number
Declaration	ii
Funding	iii
Conferences	vi
Acknowledgments	v
Table of Contents	vi
List of Figure	xii
List of Tables	xii
List of Appendices	ix
 Summary	 1
 Chapter One Introduction	 2
 Chapter Two Literature Review	
Parental Technoference and Adolescents' Mental Health and Deviant Behaviour: A Scoping Review	
Abstract	7
Introduction	8
Method	11
Results	15
Discussion	18
Limitations	24
References	36
 Chapter Three	
Empirical Paper	
Behavioural and Health Impacts of Raising Children in a Digital Household	
Abstract	45
Introduction	47
Method	48
Results	62
Discussion	77
Limitations	85
 Chapter Four	
General Discussion	
Research Summary	88

Contribution to the Literature	89
Future Implications	97
Limitations	101
Conclusion	101
References	103

List of Figures

Figure 2.1	PRISMA flow diagram of study selection.
Figure 3.1	Percentage of participants reporting cyberbullying perpetration and victimisation.
Figure 3.2	Percentage of participants reporting aggressive behaviours.
Figure 3.2	Percentage of participants reporting delinquent behaviours.
Figure 3.4	Percentage of participants reporting drug and alcohol use.
Figure 3.5.	Percentage of participants reporting anxiety levels.

List of Tables

Table 2.1	PICO method for formulating the research question.
Table 2.2	Search terms entered into the ProQuest database.
Table 2.3	Overview of the characteristics of each eligible study.
Table 2.4	Overview of studies investigating the relationships between parental technoference and adolescent mental health.
Table 2.5	Overview of studies investigating relationships between parental technoference and adolescent deviant behaviours.
Table 3.1	Modifications to the Problem Behavior Frequency Scale.
Table 3.2	Modifications made to the original Drug and Alcohol Use—Problem Behaviour Frequency.
Table 3.3	Descriptive characteristics of the sample participants.
Table 3.4	Descriptive statistics for adolescent and parent device ownership.
Table 3.5	Prevalence outcomes electronic device use.
Table 3.6	Prevalence outcomes electronic device use as a form of punishment.
Table 3.7	Prevalence outcomes electronic device use as a form of reward.

Table 3.8	Prevalence outcome cyberbullying perpetration.
Table 3.9	Prevalence outcomes cyberbullying victimisation.
Table 3.10	Prevalence outcomes aggression.
Table 3.11	Prevalence outcomes physical fighting.
Table 3.12	Prevalence outcomes delinquent behaviour.
Table 3.13	Prevalence outcomes drug and alcohol use.
Table 3.14	Prevalence outcomes anxiety.
Table 3.15	Prevalence outcomes depression.
Table 3.16	Percentage of adolescent reporting their own technoference.
Table 3.17	Prevalence outcomes adolescent technoference.
Table 3.18	Percentage of participants reporting perceptions of parental Technoference.
Table 3.19	Prevalence outcomes parental technoference.
Table 3.20	Percentage of participants reporting attitudes on perceived parental technoference during family activities.
Table 3.21	Prevalence outcomes attitudes towards parental technoference.
Table 3.23	Percentage of participants reporting perceived parental warmth
Table 3.23	Prevalence outcomes parental warmth.
Table 3.24	Pearsons' Correlation Coefficient: Means, standard deviations, and correlations for study variables.
Table 3.25	Partial Correlations: Means, standard deviations, and correlations for study variables whilst controlling for parental warmth.

List of Appendices

Appendix 2.1	PRISMA guidelines.
Appendix 2.2	Quality assessment report.
Appendix 3.1	Adolescent questionnaire.
Appendix 3.2	Pilot group feedback form.
Appendix 3.3	School recruitment e-mail.

- Appendix 3.4 School agreement.
- Appendix 3.5 Parent information letter.
- Appendix 3.6 Participant information letter.
- Appendix 3.7 Support leaflet.
- Appendix 3.8 Individual responses to the depression scale.

Summary

Emerging digital technologies are now embedded within society, and there are growing concern over the encroaching nature technology use is having within the family environment. As such, the term 'technoference' refers to habitual interferences and disruptions within interpersonal relationships or time spent together due to the use of technological devices. A growing body of evidence in countries beyond the UK, suggest that parental technoference may be associated with internalising and externalising behaviours in young children. The primary aim of this thesis was to gain an understanding of the association between parental technoference and adolescent deviant behaviours and mental well-being.

An exploratory approach was undertaken, with the presentation of a scoping review which identified key concepts within the current literature on the association between parental technoference and adolescent deviant behaviours, and mental well-being. A total of 13 quantitative studies were identified, illustrating a dearth of evidence. The findings are summarised and evaluated, whilst presenting further areas for future research. Further, a cross-sectional study was conducted, including 673 students aged between 12 and 15 years of age, within secondary schools in North Wales. A self-completion questionnaire was developed to explore the association between adolescent attitudes on parental technoference and their own technology use, deviant behaviours, and mental wellbeing. The findings revealed that adolescents who experienced parental technoference reported negative impacts on their own technology use, deviant behaviours, and mental well-being. Finally, the overall outcomes of this thesis are discussed. These include an interpretation of the findings, alongside the implications for policy makers and recommendation on the direction of future research.

CHAPTER ONE: Introduction

Emerging mobile and digital technologies such as smart phones, tablets and other devices are now ingrained in children's and their family's daily life with research evidence on the use and affect lagging behind the rate of adoption (Meeus et al., 2021). For instance, smartphones have become a need for the majority of people and there is an increasing dependency on their device due to the wide range of advantages and features they offer as internet-connected, portable, and personal devices (Kildare and Middlemiss, 2017). According to Ofcom's Communications Market Report (2020), mobile phone ownership has nearly reached ubiquity in the UK, with 98% of homes in possession of such a device. The same study shows that as children become older, they increasingly utilise mobile phones to access the internet, with mobile phones making up 50% of all devices used by children aged 12 to 15 to access the internet, compared to other devices (games consoles, smart TV, computer, mobile phone and tablet).

Despite the substantial advantages that people experience from using technology, such as improved social support and the ability to work from home, research shows that the establishment of digital technologies as a key element of the home environment has given the media the chance to disrupt social interactions and family life (McDaniel, 2018; Knitter and Zemp, 2020). Parental technoference is the term for regular interruptions in face-to-face conversations, interactions, or family time because of parental technology use. Instances are reported of parents distracted by their electronic device when the family is together, which can create the feeling of intrusion (McDaniel and Coyne, 2014). Families with children now frequently experience technoference, and emerging studies are beginning to suggest that increased time spent on technology by parents can harm children's health and development as well as their relationships with their parents (Radesky et al., 2015; Hiniker et al., 2015; McDaniel and Radesky, 2018; Abels et al., 2018). According to research, parents' physical and emotional availability is limited while they are engrossed in electronic devices, which may have a detrimental effect on the communication and

interaction between parents and children (Kildare and Middlemiss, 2017; Braune-Krickau et al., 2021). Research suggests that parental technoference may harm the relationship between parents and children due to parents being less sensitive, which in turn can cause children to develop internalising and externalising behaviours (McDaniel, 2015; Kushlev and Dunn, 2018; Vanden Abeele et al., 2020). Both internalising behaviours, directed inwards and indicating a child or young person's emotional and psychological state; and externalising behaviours, exhibited through outward behaviours reflected within the social environment, are associated with numerous adverse development outcomes (Liu, Chen and Lewis, 2011).

Adolescence is crucial period of transition. Parents are a critical resource for adolescent development and socialisation (Liu, 2004). As highlighted in attachment theory (Bowlby, 1969), strong-parent child attachment is crucial for children's healthy cognitive and emotional development. For instance, research illustrates that parental support and cohesion can decrease the risk of adolescent antisocial behaviour and improve children's and adolescents' socialisation (Ashton et al., 2016). Numerous longitudinal studies have demonstrated that parental warmth is associated with children's improved emotional adjustment, decreased internalising and externalising behaviours, enhanced prosocial behaviour, and moral reasoning (Chen, Liu and Li, 2000; Scaramella, Conger and Simnos, 1999). Contrastingly, low parental warmth has been associated with aggressive and delinquent behaviour in adolescents including increased drug and alcohol use, smoking, risky sexual behaviour and lower mental wellbeing including depression and anxiety (Brendgen et al., 2001; Hughes et al., 2020; Backman et al., 2021).

It is suggested that parental technoference conveys a clear message to adolescents that media is more significant to their parent than they are (McDaniel, 2015). Subsequently, if parents frequently allow technology to interrupt their parent-adolescent interactions, adolescents may feel overlooked or even neglected, which may influence adolescent behaviour and mental wellbeing.

According to reports, the use of technology increases during adolescence in comparison to younger children, making the role of parents to model healthy technological habits even more salient (PEW Centre, 2020). However, adolescents have received less attention in research on technoference within the family context compared to younger children, which has led to gaps in understanding and prevented adolescents from having a voice in issues that impact them (Stockdale et al., 2018). Given that young people's perspectives are frequently disregarded, it is crucial to incorporate them in policy discussions (Hooft Graafland, 2013). Adolescents' health and well-being form the foundation of society's future human capital, a tool for building prosperity in the future (Kane, Harris, Guilkey, 2016). Accordingly, the health and welfare of the next generation must be ensured, and this responsibility falls primarily on national and international organisations (Patton, 2016).

Government advice on how to responsibly use digital technology within the family environment is emerging, however, according to chief medical officers, more research is needed (Davies et al., 2019). Technology is continuously evolving, and family use and dependence is expected to increase, therefore, it is crucial to understand the possible risks to public health. For some time, guidelines on the use of technology have focused on the duration of electronic device use, accompanied by a debate over the impact on children and adolescent health and behaviours (Bellis et al., 2021). However, given the lack of evidence, public health professionals are now beginning to emphasise the implications of a whole family approach, encouraging parents to monitor their own device use in order to ensure regular screen free interactions with their child (LeBlanc et al., 2015; Stiglic and Viner, 2019).

Nevertheless, research on the implications of parental digital distraction on children and adolescents is limited, making it crucial to fully understand the risks to public health, in order to eliminate the potential long-term impact to children and adolescent's behaviours and mental well-being (McDaniel, 2019). The impact of parental digital distraction on adolescents in the UK has not yet been the subject of any known studies. Consequently, the aim of the present study was to address this by exploring the effect of adolescents'

perceptions of their parents' technoference on adolescents' internalising behaviours such as anxiety and depression and externalising behaviours such as aggression, bullying, and delinquent behaviour in a sample of 12 to 15 year-olds. To date, it is understood that this is the first study to address this research objective in the UK. The current thesis tests the hypothesis that parental technoference is associated with adolescent engagement in technoference, increased deviant behaviours and poorer mental well-being. Furthermore, the hypothesis that the implications of parental technoference are predicted by parental cohesion will be tested.

Accordingly, this study sought to explore the following research questions:

- 1). How do parents use technology around their children?
- 2). What is the relationship between parents' technology distractions during interactions with their child on children's use of technology?
- 3). What is the relationship between parents' technology distractions during interactions with their child on children's deviant behaviour?
- 4). What is the relationship between parents' technology distractions during interactions with their child on children's mental wellbeing?

These questions give rise for an approach that gathers the perspectives of adolescents surrounding their parent's technology use and the impact this may have on their behaviours and mental well-being.

CHAPTER TWO: Scoping Review

Title: Parental Technoference and Adolescents' Mental Health and Deviant Behaviour:
A Scoping Review

Authors: Donna Dixon^{1,2}, Catherine. A. Sharp^{2,3}, Karen Hughes^{2,3}, Carl Hughes¹

Affiliations:

- 1) *School of Educational Sciences, CIEREI, Bangor University, Bangor, Gwynedd, United Kingdom*
- 2) *Public Health Collaborating Unit, School of Medical and Health Sciences, College of Human Sciences, Bangor University, Wrexham Technology Park, Wrexham, United Kingdom*
- 3) *Policy and International Health, World Health Organization Collaborating Centre on Investment for Health and Well-Being, Public Health Wales, Wrexham, United Kingdom*

Corresponding author: Dr Catherine Sharp catherine.sharp@wales.nhs.uk

Acknowledgements: This work was supported by Public Health Wales and Knowledge, Economy Skills Scholarships (KESS II). Thank you to Dr Nia Williams who assisted in the screening of papers. An oral presentation of this work was delivered at the Society for Social Medicine & Population Health Annual Scientific Meeting 2022.

Conflict of interest: The authors do not have any conflicts of interest to declare.

ABSTRACT

Purpose: The term 'technoference' refers to habitual interferences and disruptions within interpersonal relationships or time spent together due to use of technological devices. Evidence suggests that parental technoference may predispose children's internalising and externalising behaviours. The aim of this scoping review is to summarise existing literature on the impact of parental technoference on the mental health and deviant behaviours of young people.

Methods: A scoping review of literature was undertaken across six databases (APA PsycINFO, MEDLINE, ASSIA, ERIC, Social Sciences Premium Collection, SciTech Premium). Searches included articles examining the impact of parental technoference on adolescent mental health and deviant behaviours. All included studies demonstrated empirical findings.

Results: Searches retrieved 382 articles, of which 13 articles met the eligibility criteria. A narrative approach was applied to synthesise the eligible findings. Across all studies, adolescent perceptions of parental technoference were negatively associated to adolescent mental health and were positively related to adolescent deviant behaviours. Parental cohesion and psychological constructs were identified as significant mediating factors.

Conclusion: Findings suggest that parents should be aware of the environment in which they use electronic devices as their use can, directly and indirectly, influence adolescent mental health and behaviours. Further research into the impact of parental technoference could inform evidence-informed guidelines for parental management of electronic devices.

Key words: Technoference; Phubbing; Parent; Adolescent; Mental Health; Deviant Behaviour.

Introduction

Digitalisation within contemporary society has enabled electronic devices such as smartphones, tablets, laptops and games consoles to permeate family life. Technical advances in internet connectivity alongside device portability have increased ownership of mobiles and allowed continuous engagement and connectivity (Harmon and Mazmanian, 2013). In particular, there has been a surge in the uptake of smartphones over the last decade, reaching over half of the world's population (Olson et al., 2022). For instance, in the USA, smartphone use in those aged 18+ rose from 35% to 85% between 2011 and 2021 (PEW, 2022), whilst in China 1.22 billion people had subscribed to mobile services by 2021, representing 83% of the population Statistica (2022). Despite the benefits created for adults by technology, such as increased social support (McDaniel, Coyne and Holmes, 2011) and the flexibility to work from home (Chesley, 2010), research highlights the potential for disruption of in-person social dynamics by mobile and digital technology use. Initially, this demeanour was dubbed 'absent presence'; referring to an individual being physically present but being distracted by communication or mobile content (Gergen, 2002). The term 'technoference' was adopted to describe habitual interruptions in interpersonal relationships or time spent together caused by technological devices (McDaniel and Coyne, 2016). Similarly, the term 'phubbing', melding the words 'phone' and 'snubbing' is used to characterise a direct disregard for another individual in favour of one's phone (Roberts and David, 2016) Both terms illustrate that uninhibited device use during interactions with others can result in social exclusion and interpersonal neglect.

Studies on technoference were initiated in romantic relationships, finding that diminished interactions due to technological interruptions led to greater conflict between couples and lower relationship satisfaction, resulting in poorer overall well-being, such as depression and lower life satisfaction (McDaniel and Coyne, 2016; David and Roberts, 2017). However, research has since begun to explore the impact of technoference within the parent-child dynamic, reporting the extent of electronic device use within families and its

potential impairment of parent-child interactions (Radesky et al., 2015) parenting quality (Hiniker et al., 2015) and children's behaviour (McDaniel and Radesky, 2018). The emergence of device distraction could be worse than other distractions due to increasing prevalence and the strong habits or addictive behaviours devices can elicit. Early research suggests that breaking attention with electronics is more challenging than with other parental distractions such as reading, eating or chatting (Abels et al., 2018). Consequently, a child's needs and cues for attention are less likely to be met (Abels et al., 2018; McDaniel, 2019; Hiniker Schoenebeck and Kientz, 2016).

Parents have been found to often use electronic devices during valuable family time, such as at home (McDaniel, 2019), during meal times (Radesky et al., 2014) and at playgrounds (Hiniker et al., 2015; Vanden Abeele, Abels and Henderickson, 2020), and are less attentive and responsive to their young children when immersed in electronic devices, with fewer verbal and non-verbal parent-child interactions (Abels et al., 2018; McDaniel, 2019; Kildare and Middlemiss, 2017). Consequently, it is argued parental technoference in public is a safety risk to children due to decreased parental awareness and supervision, increasing child injuries (Kildare and Middlemiss, 2017; Lemish, Elias and Floegel, 2019). Further, observations reveal parents can demonstrate less sensitivity towards their children when digitally distracted, using harsher or angry parenting styles (Radesky et al., 2015; Kushlev and Dunn, 2018; Radesky et al., 2016). Parents also describe feeling distracted due to frequent device use resulting in diminished connection and cohesion with their children (Abels et al., 2018; Radesky et al., 2014; Kushlev and Dunn, 2018). Correspondingly, owing to their own technoference, parents have reported internalising behaviours in children, directed inwards and indicating a child or young person's emotional and psychological state; such as whining and sulking (McDaniel and Radesky, 2018), being less relaxed, and more emotional and unsatisfied (Lemish et al., 2019; Radesky et al., 2016). In the same vein, surveys also reveal associations between parental technoference and externalising behaviours, which are exhibited outwardly, reflected within the social environment, in young

children (<10 years), such as physical aggression (Wang, Qiao and Lei, 2021), hyperactivity, frustration and restlessness (McDaniel and Radesky, 2018).

The majority of existing research examining parental technoference has focused on younger children (<12), predominantly in the USA. Previous reviews have summarised evidence for impacts on younger children, and on parent-child interactions (McDaniel, 2019; Kildare and Middlemiss, 2017; Beamish, Fisher and Rowe, 2018, Knitter and Zemp, 2020; Braune Krickau et al., 2021). However, to date, no reviews have explored outcomes for adolescents in this context. Adolescent behaviours differ from those in childhood and can carry detrimental consequences. For example, internalising behaviours during adolescence are often accompanied by depression, anxiety and inhibition (Liu, Chen and Lewis, 2011) and are strong indicators of mental health conditions in adulthood. Equally, externalising behaviours are aggressive and delinquent components that constitute a significant risk to adult engagement in criminal and violent behaviours (Liu, 2004). Adolescents report their frustration at parental device use interrupting valuable family time; perceive parents as being less responsive whilst using their devices and report their expectations of parents to refrain from using digital devices during family time (Hiniker et al., 2016; Oduor et al., 2016). Addressing the lack of understanding on the subject, to the best of our knowledge, this review is the first to synthesise research on the internalising and externalising outcomes for adolescents associated with parental technoference, specifically the impact upon adolescent mental health and deviant behaviours. In contrast to a systematic review approach which aims to explore the effectiveness of a treatment or practice, a scoping review methodology was applied to the current analysis in order to summarise and identify knowledge gaps within the existing literature to guide future research direction (Munn et al., 2018).

Methods

Research Question

Research questions for this review are:

- (1) What is known about the impact of parental technoference on adolescent mental health?
- (2) What is known about the impact of parental technoference on adolescent deviant behaviour?

Procedures

The research questions were structured using the Patient Intervention Comparison Outcome (PICO) framework (Richardson et al., 1995); as outlined in Table 2.1. The review followed the guidelines of the Preferred Reporting Items for Systematic Reviews (PRISMA; Tricco et al., 2018); (see Appendix 2.1). Using the ProQuest platform, a systematic search for peer-reviewed studies was undertaken across six databases (APA PsycINFO, MEDLINE, ASSIA, ERIC, Social Sciences Premium Collection, SciTech Premium). Search terms are listed in Table 2.2. No restrictions were placed on publication dates due to technoference being a relatively new area of research. The search was conducted in the English language with no geographical restrictions. No limitations were applied on the setting of enquiry, the method for enquiry (e.g., self-report) or the data collection tool implemented (e.g., questionnaires, interviews). Results were extracted into Microsoft Excel.

Table 2.1.

PICO framework for formulating the research questions

Patient, population, problem	Intervention or exposure	Comparison or control	Outcome measures
Parental technoference and adolescent internalising and externalising behaviours	Anxiety; depression; bullying; aggression; deviant behaviour	N/A	Understand what is known about the impact of parental technoference on adolescent mental health and deviant behaviour

Table 2.2.

Search terms entered into the ProQuest database

Technology Terms	Parent Terms	Outcome
TIAB(technoference OR phubbing OR distracted OR smart*phone OR "mobile phone" OR "mobile device")	TIAB(parent* OR maternal OR paternal OR mother OR father OR caregiver))	TIAB(violence OR bullying OR cyberbullying OR aggress* OR addiction OR depress* OR anxiety OR "mental health" OR "mental* ill*" OR deviant* OR problem OR behave*))

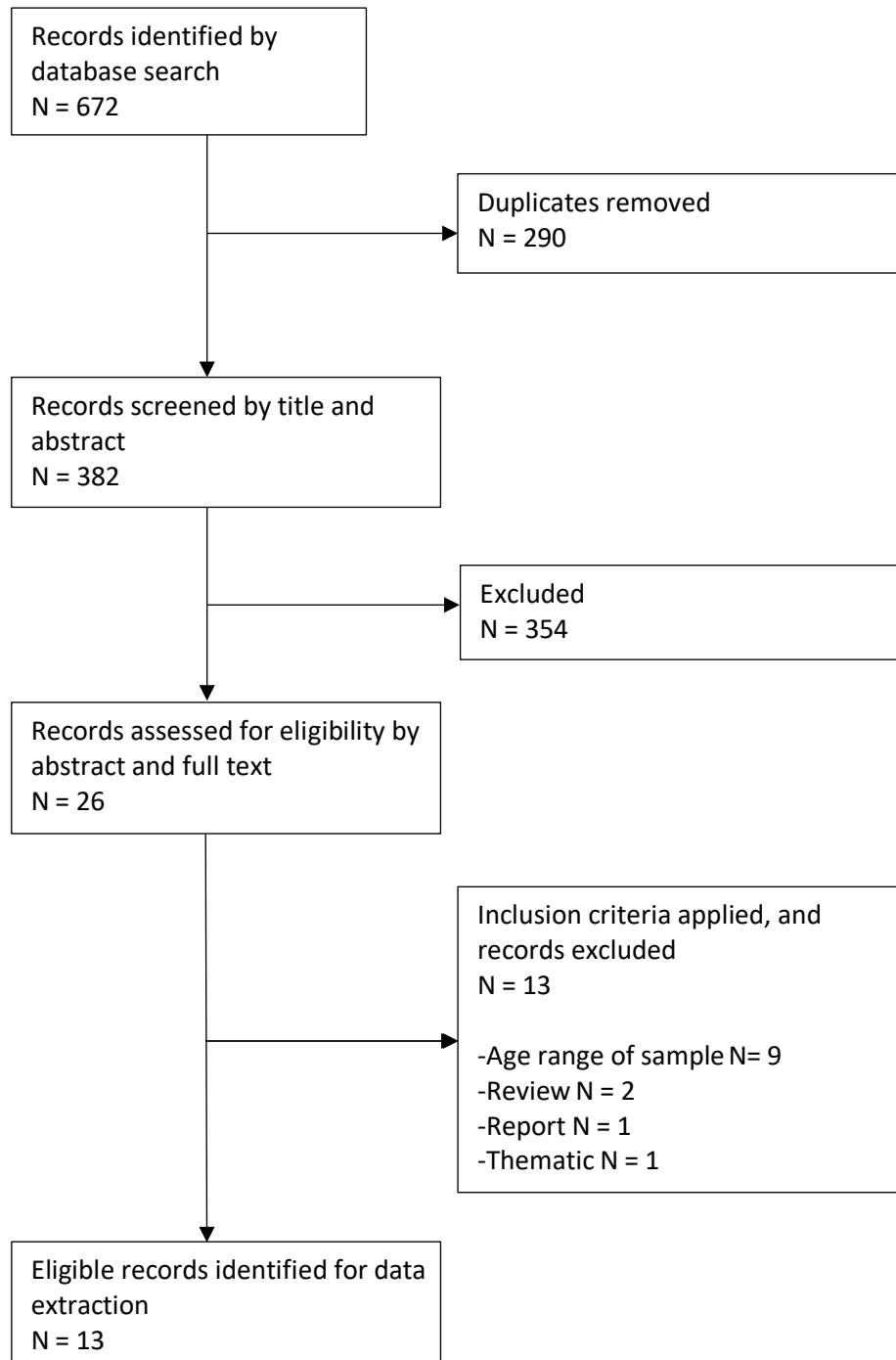
The eligibility of studies was confirmed according to their adherence to the following inclusion criteria: (a) studies must be published in peer-reviewed journals; (b) studies must present primary data on (i) the relationship between parental technoference or parental phubbing and mental health (e.g., depression, anxiety, self-esteem, addiction) in adolescents (ii) the relationship between parental technoference or parental phubbing and deviant behaviours (e.g., aggression, bullying, risk-taking) in adolescents; (c) studies must

present data for populations between the age of 10-19 years, in accordance with the World Health Organisations definition of adolescents as young people aged 10-19 years (samples were included if the majority of their participants were within this age range); (WHO, 2022).

The search was conducted by the lead author (DD) in October 2021 and retrieved 382 unique references. Title and abstracts from all reviewed references were assessed independently by (DD) and a second reviewer (KH: 40%; CAS: 30%; NW: 30%) to ascertain eligibility for inclusion. A total of 26 articles were selected for full-text review, of which 13 were identified for inclusion (see Figure 2.1). Individual studies were assessed for their risk of bias and quality of design, by the lead author (DD), using version 2 of the Cochrane Collaboration (RoB) risk-of-bias tool (Higgins et al., 2011); (See appendix 2.2). Studies were grouped according to their main objective and a descriptive account was outlined in the form of evidence tables which are presented in Tables 2.4 and 2. 5.

Figure 2.1.

PRISMA flow diagram of study selection



Results

Study characteristics

Table 2.3 provides an overview of the characteristics of each eligible study. All studies were quantitative and collected data from young people using self-report questionnaires in secondary school settings. Articles were published over a three-year period (2018 and 2021) with the majority having been conducted in China (n=12) and one in the USA. Studies measured adolescent perspectives on either parental phubbing (n=11) or parental technoference (n=2). Ten studies examined impacts on adolescent mental health (e.g. depression, anxiety, addiction) and five explored impacts on adolescent deviant behaviour (e.g. cyberbullying). Table 2.3 shows the outcomes measured by each study. Only two studies reported the prevalence of technoference or phubbing among the adolescent samples; Stockdale et al., (2018) found that in 2016, 77.5% of American adolescents reported parental technoference at least some of the time, whilst Liu et al., (2020a) identified that in 2019, 87.5% of adolescents in China revealed that they experienced parental phubbing on a daily basis.

Evidence on the impact of parental electronic device distraction on adolescent mental health

Ten studies investigated relationships between parental technoference and adolescent mental health (see Table 2.4). Sample sizes ranged from 293 to 3,322 with an age range of 10-20 years. All studies reported a negative correlation between parental technoference and mental health; in that greater perceptions of parental technoference were associated with greater adolescent mental illness.

The impact of parental technoference on levels of adolescent depression and/or anxiety was explored in four studies (Stockdale et al., 2018; Bai et al., 2020a; Wang et al., 2020; Xie and Xie, 2020). Greater perceived parental technoference was related to

increased adolescent depression and anxiety in all studies. Two studies (Stockdale et al., 2018; Bai et al., 2020b) also investigated the association between parental technoference and adolescents' own technoference patterns and subsequently how these affected levels of adolescent depression and anxiety. These found a positive correlation between parental technoference and adolescent technoference, which exacerbated levels of depression and anxiety uniquely and conjunctual. Moreover, adolescent depression levels increased as adolescent and parental technoference increased (Bai et al., 2020a). One study revealed that adolescents who reported frequent parental technoference, experienced lower levels of life satisfaction (Liu et al., 2020a). In the same vein, a negative correlation between perceptions of technoference and adolescents' general mental health was found which subsequently predicted academic burnout (Bai et al., 2020a). The relationship between perceived parental technoference and levels of adolescent mobile phone addiction was also investigated in a further four studies (Geng et al., 2021; Liu et al., 2020b; Xie et al., 2019; Zhang, Ding and Wang, 2021). Across all studies, a positive correlation was identified between perceived parental technoference and adolescent addictive mobile phone use.

Six studies examining the impact of parental technoference on adolescent mental health identified potential mechanisms underlying the associations (see Table 2.4). Firstly, the characteristics of the parent adolescent relationship was repeatedly identified as a predominant mediating factor. One study found that the association between parental technoference and adolescent mobile phone addiction was moderated by the quality of parent adolescent attachment (Xie et al., 2019). It was also revealed that the association between parental technoference and decreased adolescent life satisfaction was greater in adolescents who demonstrated preoccupied or fearful attachment styles (Liu et al., 2020a). In the same vein, adolescent attachment avoidance was found to moderate the congruent and incongruent effects of parent adolescent technoference on adolescent depressive symptoms (Bai et al., 2020a). Parental warmth was also identified as a risk factor (Stockdale et al., 2018; Xie and Xie, 2019), with lower levels of perceived parental warmth significantly

predicting adolescent depression or anxiety. Further, it was reported that lower levels of perceived family social support was a mediating factor in the link between parental technoference and adolescent depressive symptoms (Wang et al., 2020a).

Five studies also highlighted that the impact of parental technoference can be dependent upon the psychological constructs of adolescents (see Table 2.4). One study found a decline in mental health as a consequence of perceived parental technoference was moderated by adolescent agreeableness and neuroticism, with highly agreeable adolescents increasingly affected (Bai et al., 2020b). Similarly, low adolescent self-esteem was identified as a mediating factor between parental technoference and adolescent depressive symptoms (Wang et al., 2020a). Studies also established that the association between parental technoference and adolescent addictive mobile phone use was accelerated by adolescent personality traits including loneliness or fear of missing out (Geng et al., 2021) social sensitivity (Bai et al., 2020a) as well as social anxiety and core self-evaluation's (Zhang et al., 2021).

Evidence on the impact of parental electronic device distraction on adolescent deviant behaviour

Five studies explored associations between perceived parental technoference and adolescent deviant behaviour (see Table 2.5). Sample sizes ranged from 424 to 4,213 with an age range of 10 to 20 years. Four studies examined relationships between perceived parental technoference and cyberbullying perpetration (Stockdale et al., 2018; Xie et al., 2019; Wei et al., 2021; Wang et al., 2020b). and one study investigated the role of parental technoference in adolescent deviant peer affiliation. Findings highlighted that adolescents who frequently experience parental technoference were more likely to engage in cyberbullying (Wei et al., 2021; Wang et al., 2020a; Qu et al., 2020). Similarly, it was reported that parent and adolescent technoference uniquely and jointly were predictive of adolescent cyberbullying (Stockdale et al., 2018) The only study which examined parental

technoference as a risk factor for deviant peer affiliation found a negative association which subsequently mediated the development of adolescent mobile phone addiction (Xie et al., 2019).

Consistent with the findings of the first research question, the quality of parent-adolescent relationships significantly predicted the correlation between parental technoference and adolescent deviant behaviours. One study found that adolescents who perceived lower levels of mother acceptance were more likely to cyberbully others (Qu et al., 2020). Similarly, decreased perceptions of parental warmth was found to predispose adolescent cyberbullying perpetration (Stockdale et al., 2018). Further, it was reported that parent-adolescent attachment style moderated the association between parental technoference and deviant peer affiliation (Xie et al., 2019). Studies also identified potential psychological factors which influenced the relationship between parental technoference and deviant behaviours. Adolescents who reported higher levels of anxiety were found to be more likely to cyberbully others (Wei et al., 2021) whilst emotional stability was also identified as a mediating component (Qu et al., 2020). Further, it was revealed that adolescent moral disengagement and online disinhibition significantly exacerbated the relationship between parental technoference and cyberbullying perpetration (Wang et al., 2020a).

Discussion

Parental distraction with digital devices during interactions with their child, often referred to as technoference or phubbing, has gained increased attention with the increasing presence technology has in our day-to-day lives. This review explored existing studies exploring the impacts of parental technoference on adolescent mental health and deviant behaviour. To the best of our knowledge, this review is the first to examine evidence focusing specifically on parental technoference and adolescent outcomes. The authors of this paper interpreted their results in the light of four key theories. Displacement hypothesis

and Attachment theory explain the potential breakdown in relationships between adolescence and parents due to parental digital distraction; Frustration Aggression theory describes the displaced aggression adolescents may display as a result of parental technoference; and Social Learning theory underpins how adolescents may observe and imitate their parents' technology habits. The review identified limited studies (N=13 articles) exploring whether parental technoference impacts the internalising and externalising behaviours of adolescents. Nonetheless, overall, findings from identified studies consistently suggest that parental technoference can contribute to poorer levels of adolescent mental health and deviant behaviours. These are salient findings given that technology is ever encroaching within family life. Adolescents recognise that occasional parental technoference is a normative part of living within a digital society. Results reveal that infrequent levels of perceived parental technoference may have minimal impact on the internalising or externalising behaviours of young people, however, persistent perceptions of parental technoference correlated with poorer mental health outcomes and increased deviant behaviours. Therefore, the present review indicates that contextual factors including the frequency and duration of use are of high importance.

The literature identified in the present review illustrates the indirect influence of parental technoference on adolescent mental health and deviant conduct. A common interpretation within the studies herein is that electronic devices are not the direct cause of internalising and externalising behaviour within adolescents, but rather an indirect reflection of the parent adolescent relationship, beyond digital devices (McDaniel and Radesky, 2018). Eligible studies reported that adolescent experiences of frequent parental technoference is associated with decreased perceptions of parental sensitivity and warmth and increased levels of parental rejection, which is related to negative emotions such as depression, anxiety, and addictive and deviant behaviour. An explanatory model for the impact of parental technoference on the parent-adolescent relationship is the displacement

hypothesis (Neuman, 1988) which proposes that time spent on digital devices displaces time spent with other individuals. In reference to our first research question exploring whether parental technoference can impact the mental health of adolescents, this theory would suggest that time spent on a digital device reduces opportunities to show sensitive parenting and sustain attuned parent-child interactions.

When parents frequently allow digital devices to distract from interacting with their adolescent, it is possible that the adolescent may perceive the parents as less responsive and supportive which in turn can discourage feelings of cohesion; a crucial determinant of parent-adolescent attachment quality (Bowlby, 1979). The bond between adolescent and parent is one of the most pivotal bonds to be formed and the characteristics of the attachment play a critical role in adolescent outcomes, which can continue into adulthood. A substantial body of research has reported that diminished parent adolescent cohesion and low satisfaction in family functioning is strongly associated with poorer adolescent mental health (Zimmerman, Eisemann and Fleck, 2008; Chen et al., 2000; Scaramella et al., 1999). In the case of parental technoference, parental neglect for their adolescent's needs for cohesion can exasperate adolescent perceptions of rejection, resulting in lower selfevaluation and increasing vulnerability to mental health issues. Subsequently, the findings of the present review suggest that parental technoference is indirectly associated with decreased adolescent mental health through parent adolescent relationships.

Our review identified only five studies measuring associations between parental technoference and adolescent deviant behaviours, and these predominantly explored cyberbullying. The results consistently indicated that parental technoference significantly predicted adolescent cyberbullying perpetration. 'Technoference' as an exclusion behaviour is said to send a direct message to adolescents that digital devices take precedence over spending time with them (McDaniel and Coyne, 2014) leading to feelings of rejection or

neglect. This impression can elicit feelings of frustration when consistently facing parental technoference. From this perspective, adolescents may be more likely to engage in displaced aggression such as bullying blameless victims online. This can be explained by the Frustration Aggression theory (Berkowitz, 1989), which postulates that adolescents become so disconcerted at feeling rejected by their parents they retaliate in the form of tormenting others. Accordingly, the results of this review suggest that the quality of the family environment may increase new forms of aggression in the digital age such as cyberbullying. Studies herein also identify parental technoference as a potential risk factor to deviant peer affiliation. During adolescence, peer influence is extremely important and young people are highly likely to adhere to the attitudes and pressures of deviant peers (Bornstein, 2015). Previous research has identified that adolescent alliances with individuals who exhibit delinquent behaviours increase the development of deviant and antisocial undertakings (Mason and Windle, 2022; Mann et al., 2015) It has also been advocated that adolescent deviant peer affiliation is strongly influenced by negative environmental factors at a micro level (Tarantino et al., 2014) Subsequently, considering that parental technoference has the potential to interrupt the attachment between parent and adolescent, which is a protective factor in deviant peer affiliation, it is possible that associating with deviant peers is an attempt by adolescents to gain emotional support they are lacking from their parents.

A direct connection between parental technoference and adolescent internalising and externalising behaviour is also presented within the review. The results suggest that parents may be directly modelling inappropriate technological habits which are replicated by adolescents. Results revealed that high frequency parental technoference predicted addictive digital device behaviours within adolescents. Moreover, studies established a positive correlation between parental technoference and adolescent technoference and that these behaviours can subsequently both uniquely and collaboratively impact adolescent depression, anxiety and cyberbullying (Stockdale et al., 2018; Bai et al., 2020a) This direct

effect could be explained by the Social Learning Theory (Bandura, 1977) which states that children model parental behaviours. That is, adolescents will acquire unhealthy digital device habits by observing and imitating the behaviours of their parents. Similarly, the relationship between parental technoference and adolescent cyberbullying could be related to parents modelling aggressive behaviours (Wang et al, 2021). Previous research has found that parents are more hostile and respond harshly toward their children when interrupted in their device use (Kildare and Middlemiss, 2017). Potentially, these parental attitudes may be replicated by adolescents and transferred into alternative environments leading to angry or hostile behaviour towards others. Given that parents are prominent role models to adolescents (Grusec, 2011), the findings of this review are important in order to inform parents on the significant role they play in their adolescent's behaviours.

The current review also acknowledges that not all adolescents homogenously experience the impact of parental technoference. Identified studies reported potential mechanisms that mediate the robustness of the association between parental technoference and adolescent outcomes. Results indicated that decreased adolescent psychological constructs enhanced sensitivity to perceived parental technoference and were related to poorer mental health and increased deviant behaviours. Adolescents with high levels of psychological construct may be less inclined to consider parental technoference negatively and as a form of parental rejection, and therefore may be less affected by the behaviour.

Implications

Theoretically, our review suggests that parental technoference can negatively impact adolescent internalising and externalising behaviours indirectly through diminishing the quality of parent adolescent attachments. Practically, the findings indicate that parents should be aware of their environment during electronic device use and how this use can

directly and indirectly impact adolescent health and behaviours. Given the ubiquity of digital devices within daily life, to advise parents to cease use completely would be unrealistic. Further research is necessary to inform practical guidelines for parental management of their devices within the family context (Wang et al., 2021).

To date, the views of adolescents have been relatively unexplored when investigating parental technoference (Liu et al., 2020a). However, given that adolescents feel discontentment at persistent parental technoference, obtaining their perspective is of high importance when investigating adolescent outcomes. Further research should continue to consider the evolving capacities of adolescents and recognise their fundamental rights under the United Nations Convention on the Rights of the Child (1989) to have their views respected as well as the right to be heard. Understanding youth attitudes towards parental use would also contribute to one of the main principles of the United Nations Sustainable Development Goals (United Nations, 2015) which aims to promote the well-being of all individuals with a focus on preventable problems.

This review shows potential psychological constructs which played an active role in how parental technoference impacted adolescent internalising and externalising behaviours. Future research focusing on further identifying mediating mechanisms that could exasperate the effect of perceived parental technoference could identify adolescents most at risk of the behaviour. Identifying those most vulnerable to the negative effects of parental technoference provides the opportunity to construct resilience-building strategies within adolescents which should lead to improved outcomes in later life.

Identified studies exploring the association between parental technoference and deviant behaviours primarily focused on online deviancy in the form of cyberbullying perpetration. Given that previous studies have reported harsher parenting styles when children disrupt electronic device use, the aggressive attitudes observed by adolescents

may be replicated and transferred into other areas in their lives. In this vein, emerging research demonstrates a positive association between parental technoference and offline deviant behaviours in the form of physical aggression in children aged 5 to 10 years old (Knitter and Zemp, 2020). However, our review found no studies exploring relationships between parental technoference and adolescent aggression, highlighting a critical gap within current literature.

Limitations

While our review used systematic searching and data extraction methods, the analysis was limited due to the scarcity of evidence concerning the subject under investigation. Infrequent reporting of the extent of exposure to parental technoference within the included studies (N=2 articles) also restricted understanding of the potential impact of technoference on adolescent outcomes. Further, included studies were predominantly based in China, which limits the generalisability of the present findings to other countries. However, despite these limitations, to our knowledge, the current review is the first to collate literature surrounding the impact of parental technoference on adolescent mental health and deviant behaviour and address gaps within the literature. There is a need for further studies across broader geographies to subsequently inform guidelines for families surrounding the use of technology within the household.

Conclusion

Our review aimed to identify existing literature exploring the behavioural and mental health impacts of parental technoference. Findings suggest that parental technoference may contribute to poorer mental health and increased deviant behaviours in adolescents. However, major gaps in evidence exist. The findings indicate that parental technoference may be associated with parental unresponsiveness, thus suggesting that parents should be encouraged to be aware of the environment in which they use electronic devices and how

this can directly and indirectly influence adolescent health and behaviour. Further research into the caveats of parental technoference is needed to inform guidelines for family management of devices to ensure the health and wellbeing of adolescents. The review also highlights potential psychological constructs which play an active role in how parental technoference can impact adolescent internalising and externalising behaviours. Future investigations into the underlying mechanisms and moderating factors would contribute to identifying those who are more vulnerable to parental technoference.

Table 2.3: Characteristics of included studies

							Outcomes explored			Mediators	
Author	Country	Study type	Setting	Sample size	Sample age (years)	Parental technofence measurement tool	Adolescent technofence	Mental health	Deviant behaviour	Relationship quality	Psychological Constructs
Bai et al., 2020	China	Crosssectional	School	2,996	Mean age 16	Generic Scale of Being Phubbed	√	√			√
Bai et al., 2021	China	Crosssectional	School	3,322	Mean age 16	Generic Scale of Being Phubbed		√		√	√
Geng et al., 2021	China	Crosssectional	School	1,447	Mean age 16	Generic Scale of Being Phubbed		√			√

Liu et al., 2020a	China	Crosssectional	School	303	12-16	The Technoference Scale		✓		✓	✓
Liu et al., 2020b	China	Crosssectional	School	3,051	Mean age 13	Parental Phubbing Scale		✓			✓
Qu et al., 2020	China	Crosssectional	School	4,213	10-20	Generic Scale of Being Phubbed			✓	✓	✓
Stockdale et al., 2018	USA	Crosssectional	School	1,072	10-20	The Technoference Scale	✓	✓	✓	✓	✓
Wang et al., 2020	China	Longitudina l	School	2,407	Mean age 12	Parental Phubbing Scale			✓	✓	✓

Wang et al., 2020	China	Longitudinal	School	2,407	Mean age 12	Parental Phubbing Scale		✓			✓
Wei et al., 2021	China	Crosssectional	School	874	11-18	Parental Phubbing Scale		✓	✓	✓	✓
Xie et al., 2019	China	Crosssectional	School	1,007	11-16	Parental Phubbing Scale		✓	✓	✓	✓
Xie & Xie, 2020	China	Study 1 Crosssectional	School School	530 293	Study 1 Mean age 13	Parental Phubbing Scale		✓			✓

		Study 2 Crosssectional			Study 2 Mean age 12						
Zhang et al., 2021	China	Cross- sectional	School	471	Mean age 13	Parental Phubbing Scale		√		√	√

Generic Scale of Being Phubbed (Chotpitayasunondh & Douglas, 2018); The Technoference Scale (McDaniel & Coyne, 2016); Parental Phubbing Scale (Roberts & Davies, 2016)

Table 2 4: Summary of methods and findings exploring the impact of parental technoference on adolescent mental health

Citation	Study aim	Theory	Key findings
Bai et al., 2020	To understand the association between mother phubbing, adolescent academic burnout and the moderating role of mental health.	Displacement Hypothesis; Diathesis- Stress Model	Mother phubbing was positively associated with children’s academic burnout through poor mental health. The relationship between mother phubbing and adolescent mental health was moderated by agreeableness, and neuroticism aggravated the influence of general mental health on academic burnout.
Bai et al., 2021	To explore whether parental phubbing would be positively related to adolescent phubbing and whether this would be positively related to adolescent depressive symptoms and the mediating role of attachment avoidance.	Displacement Hypothesis; Person– Environment Hypothesis	Parental phubbing was positively associated with adolescent phubbing as well as depressive symptoms. Attachment avoidance moderated the congruence and incongruent effects on parent/adolescent phubbing on adolescent depressive symptoms.

Geng et al., 2021	To examine the relationship between early perceived parental phubbing and subsequent problematic smartphone use and the mediating factors of loneliness and fear of missing out.	Social Learning Theory; Compensatory Internet Use Theory	Parental phubbing predicted adolescents' subsequent problematic smartphone use. Loneliness and fear of missing out sequentially mediated the relationship.
Liu et al., 2020a	To examine the effect of parental phubbing on adolescent life satisfaction and addressing the role of the parent adolescent relationship and adolescent attachment styles.	Social Rejection Theory; Assets Theory	The conditional effect of parental phubbing on adolescents' life satisfaction was significant among the preoccupied teens and the fearful teens but not significant among the secure teens and the dismissing teens.
Liu et al., 2020b	To explore the association between parental technoference and adolescent smartphone addiction and the mediating effects of social sensitivity and loneliness.	Ecological Systems Theory; Risky Families Model	Parental technoference could positively predict adolescent social sensitivity and loneliness and in turn social sensitivity and loneliness were positively associated with smartphone addiction tendency.

Stockdale et al., 2018	To examine the direct relationship among adolescents' perceptions of parent-adolescent technoference and the impact on adolescent depression, anxiety, cyberbullying pro-social behaviour and civic engagement.	Attachment Theory	Parental technoference was associated with adolescent technoference which were uniquely related to increased anxiety, depression as mediated through parental warmth.
Wang et al., 2020(a)	To examine whether self-esteem and perceived social support would simultaneously moderate the relationship between parental phubbing and adolescent depressive symptoms.	Family Systems Theory	Adolescents with a high level of parental phubbing were likely to have a high level of depressive symptoms. Higher levels of parental phubbing significantly predicted depressive symptoms when adolescent self-esteem and perceived social support were low.
Xie et al., 2019	To determine if adolescent mobile phone addiction increases after being phubbed by parents and examine effects of the mediating roles of parent child attachment, deviant peer	Social Control Theory; Informal Social Control Theory	Parental phubbing was positively related with adolescent mobile phone addiction. Parent-child attachment and deviant peer affiliation was found to mediate the relationship.

	affiliation and moderating role of gender.		
Xie & Xie, 2020	To test the connections between parental phubbing and depression in late childhood and adolescence as well as the mediating roles of parental warmth parental rejection and relatedness need satisfaction.	Expectancy Violations Theory; Self-Determination Theory	Parental phubbing was associated with adolescents' depressions in both studies. Mediating factors included parental warmth, relatedness and satisfaction.
Zhang et al., 2021	To examine the potential mechanism between parental phubbing and adolescent mobile phone addiction and the mediating role of social anxiety and core self-evaluations.	Social Learning Theory	Social anxiety and core self-evaluation played multiple roles in the association between parental phubbing and adolescent mobile phone addiction, with parental phubbing influencing adolescent mobile phone addiction.

Table 2.5: Summary of methods and findings for studies exploring the impact of parental technoference on adolescent deviant behaviours

Citation	Study aim	Theory	Key findings
Qu et al., 2020	To examine whether mother phubbing would be positively related to adolescent cyberbullying and if perceived mother acceptance or emotional stability mediates this relationship.	Displacement Hypothesis; Parental Rejection Theory	Mother phubbing was positively related to adolescent cyberbullying, which was mediated by perceived mother acceptance.
Stockdale et al., 2018	To examine the direct relationship among adolescents' perceptions of parent-adolescent technoference and the impact on adolescent depression, anxiety, cyberbullying pro social behaviour and civic engagement.	Attachment Theory	Parental technoference was associated with adolescent technoference which were uniquely related to increased cyberbullying, mediated through parental warmth.

Wang et al., 2020(b)	To examine whether parental phubbing was significantly related to adolescent cyberbullying perpetration and if moral disengagement mediated this relationship.	Frustration Aggression Theory	Adolescents with a high level of parental phubbing were likely to cyberbully others. Moral disengagement significantly mediated the relationship between parental phubbing and adolescent cyberbullying perpetration.
Wei et al., 2021	To investigate the impact of parental phubbing on adolescent cyberbullying perpetration and the mediating role of anxiety and Zhong-Yong thinking.	Social Control Theory	Parental phubbing was positively associated with adolescent cyberbullying perpetration and anxiety mediated this association.
Xie et al., 2019	To determine if adolescent mobile phone addiction increases after being phubbed by parents and examine effects of the mediating roles of parent child attachment, deviant peer affiliation and moderating role of gender.	Social Control Theory; Informal Social Control Theory	Parental phubbing was positively related to adolescent deviant peer affiliation which mediated adolescent mobile phone addiction.

References

- Abels, M., Vanden Abeele, M., van Telgen, T., van Meijl H., (2018) *Nod, nod, ignore: An exploratory observational study on the relation between parental mobile media use and parental responsiveness towards young children*. In Eva M. Luef M, Manuela M, Marin, M (Eds.). *The talking species: Perspectives on the evolutionary, neuronal, and cultural foundations of language*. Graz, Austria: Uni-Press Verlag. p. 195-228
- Bai, Q. Lei, L. Hsueh, F., Yu, X., Wang, X., Wang, P. (2020a) *Parent-Adolescent Congruence in Phubbing and Adolescents' Depressive Symptoms: A Moderated Polynomial Regression with Response Surface Analyses*. *Journal of affective disorders* Vol 275: p. 127–135.
- Bai, Q., Bai, S., Dan, Q., Lei, L., Wang, P. (2020b) *Mother Phubbing and Adolescent Academic Burnout: The Mediating Role of Mental Health and the Moderating Role of Agreeableness and Neuroticism*. *Personality and individual differences* Vol 155: 109622
- Bandura, A. (1978) *Social Learning Theory of Aggression*. *Journal Of Communication*. Vol 28: p. 12-29.
- Barrance, R. (2019) *Beth Nawr*. The survey results and analysis of the experiences and worries of children and young people in Wales and their priorities for the Children's Commissioner.
- Beamish, N., Fisher., J. Rowe., H. (2018) *Parents' use of mobile computing devices, caregiving and the social and emotional development of children: a systematic review of the evidence*. *Australian Psychiatry*. Vol 27(2): p. 132–143.
- Berkowitz, L. (1989) *Frustration-aggression hypothesis: Examination and reformulation*. *Psychological Bulletin*. Vol 106: p. 59-73.

Braune-Krickau, K., Schneebeli, L., Pehlke-Milde, J., Gemperl, M., Koch, R., Wyl, A. (2021)

Smartphones in the Nursery: Parental Smartphone Use and Parental Sensitivity and

Responsiveness Within Parent–child Interaction in Early Childhood (0–5 Years): A Scoping Review. Infant mental health journal. Vol 42(2): p. 161–175.

Bornstein, M. (2015) *Children's parents.* In M. H. Bornstein, T. Leventhal, & R. M. Lerner (Eds.), *Handbook of child psychology and developmental science: Ecological settings and processes.* John Wiley & Sons. Vol 201: p. 55–132).

Bowlby, J. (1979). *The Bowlby-Ainsworth attachment theory.* Behavioral And Brain Sciences.

Vol 2: p. 637-638.

Chen, X., Liu, M., Li, D. (2000) *Parental warmth, control, and indulgence and their relations to adjustment in Chinese children: A longitudinal study.* Journal of Family Psychology. Vol 14(3): p. 401– 419.

Chesley N. (2010) *Technology use and employee assessments of work effectiveness, workload, and pace of life.* Information, communication & society Vol 4: p. 485–514.

David, E., and Roberts, J. (2017) *Phubbed and Alone: Phone Snubbing, Social Exclusion, and Attachment to Social Media.* Journal of the Association for Consumer Research. Vol 2: p 155–163.

Geng, J., Lei, L., Ouyang, M., Nie, J., Wang, P. (2021) *The Influence of Perceived Parental Phubbing on Adolescents' Problematic Smartphone Use: A Two-Wave Multiple Mediation Model.* Addictive behaviors Vol 121: 106995.

Gergen, K. (2002) *The challenge of absent presence*. In Katz J. Aakhus M. Perpetual contact:

Mobile Communication, Private Talk, Public Performance. Cambridge University Press. p 227-241

Grusec, J. (2011). *Socialization Processes in the Family: Social and Emotional Development*. Annual review of psychology. Vol 62: p. 243–269.

Harmon, E., and Mazmanian, M. (2013) *Stories of the Smartphone in everyday discourse*. CHI Conference on Human Factors in Computing Systems. p. 1051-1060.

Higgins, J., Altman, D, Gøtzsche, P., Jüni, P., Moher, D., Oxman, A. D., Savović, J., Schulz, K. F., Weeks, L., Sterne, J. (2011) Cochrane Bias Methods Group, Cochrane Statistical Methods Group. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials.

Hiniker, A., Sobel, K., Suh, H., Sung, Y., Lee, C., Kientz, J. (2015) *Texting while Parenting*. Proceedings Of The 33Rd Annual ACM Conference On Human Factors In Computing Systems - CHI '15. (2015).

Hiniker, A., Schoenebeck, S., Kientz, J. (2016) *Not at the Dinner Table: Parent's and Children's Perspectives on Family Technology Rules*. Proceedings Of The 19Th ACM Conference On Computer-Supported Cooperative Work & Social Computing - CSCW '16.

Kildare, C., and Middlemiss, W. (2017) *Impact of parents mobile device use on parent-child interaction: A literature review*. Computers In Human Behavior. Vol 75: p. 579-593.

Knitter, B., and Zemp, M. (2020) *Digital family life: A systematic review of the impact of parental smartphone use on parent-child interactions*. Digital Psychology. Vol 1(1): p. 29-43.

Kushlev, K., and Dunn, E. (2018) *Smartphones distract parents from cultivating feelings of connection when spending time with their children*. Journal Of Social And Personal Relationships. Vol 36: p. 1619-1639.

Lemish, D., Elias, N., Floegel D. (2019) *"Look at me!" Parental use of mobile phones at the playground*. Mobile Media & Communication. Vol 8(2): p.170-187

Liu, J., Chen, X., Lewis, G. (2011) *Childhood internalizing behaviour: analysis and implications*. Journal Of Psychiatric and Mental Health Nursing. Vol 18: p. 884-894.

Liu, J. (2004) *Childhood externalizing behavior-theory and implication*. Journal of Child and Adolescent Psychiatric Nursing. Vol 17: p. 93–103.

Liu, Q., Wu, J., Zhou, Z., Wang, W. (2020a) *Parental Technoference and Smartphone Addiction in Chinese Adolescents: The Mediating Role of Social Sensitivity and Loneliness*. Children and youth services review. Vol 118: 105434.

Liu, K., Chen, W., Wang, H., Geng, J., Lei, L. (2020b) *Parental Phubbing Linking to Adolescent Life Satisfaction: The Mediating Role of Relationship Satisfaction and the Moderating Role of Attachment Styles*. Childcare, health & development Vol 47(2): p. 281– 289.

Mann, F., Kretsch, N., Tackett, J., Harden, K., Tucker-Drob, E. (2015) *Person environment interactions on adolescent delinquency sensation seeking, peer deviance and parental monitoring*. Personality Individual Differences. Vol 76: p. 129–134.

Mason, W., Windle, M. (2022) *Gender, self-control, and informal social control in adolescence: A test of three models of the continuity of delinquent behavior*. Youth & Society. Vol 33(4): p. 479-514.

McDaniel, B., Coyne, S., Holmes, E. (2011) *New Mothers and Media Use: Associations Between Blogging, Social Networking and Maternal Well-Being*. Maternal and child health journal. Vol 16: p. 1509–1517.

McDaniel, B. (2015) *“Technoference”: Everyday intrusions and interruptions of technology in couple and family relationships*. In C. J. Bruess (Ed.), *Family communication in the age of digital and social media*. New York: Peter Lang Publishing.

McDaniel, B., and Coyne, S. (2016) *“Technoference”: The interference of technology in couple relationships and implications for women’s personal and relational wellbeing*. Psychology Of Popular Media Culture. Vol 5: p. 85-98.

McDaniel, B., and Radesky, J. (2018) *Technoference: longitudinal associations between parent technology use, parenting stress, and child behavior problems*. Pediatric Research. Vol 84: p. 210-218.

McDaniel, B. (2019) *Parent distraction with phones, reasons for use, and impacts on parenting and child outcomes: A review of the emerging research*. Human Behavior And Emerging Technologies. Vol 1: p. 72-80.

Munn, Z., Peters, M., Stern, C., Tufanaru, C., McArthur, A. (2018) *Aromataris, E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach*. BMC Medical Research Methodology. Vol 18: 143

Neuman, S. (1988) *The Displacement Effect: Assessing the Relation between Television Viewing and Reading Performance*. Reading Research Quarterly. Vol 23: p. 414.

Oduor, E., Neustaedter, C., Odom, W., Tang, A., Moallem, N., Tory, P. (2016) *The Frustrations and Benefits of Mobile Device Usage in the Home when Co-Present with Family*

Members. *Proceedings Of The 2016 ACM Conference On Designing Interactive Systems*

Olson, J., Sandra, D., Colucci, E. (2022) *Smartphone addiction is increasing across the world: A meta-analysis of 24 countries*. *Computers in Human Behavior*. Vol 129: 107138.

PEW Research Centre. (2022) *Mobile Factsheet*.

Available at: <https://www.pewresearch.org/internet/fact-sheet/mobile/>

Qu, J., Lei, L., Wang, X., Xie, X., Wang, P. (2020) *Mother Phubbing and Adolescent Cyberbullying: The Mediating Role of Perceived Mother Acceptance and the Moderating Role of Emotional Stability*. *Journal of interpersonal violence* Vol 37: p. 11-12. NP9591–NP9612.

Radesky, J., Miller, A., Rosenblum, K., Appugliese, D., Kaciroti, N., Lumeng, J. (2015) *Maternal mobile device use during a structured parent–child interaction task*. *Academic Pediatrics*. Vol 15: p. 238-244.

Radesky, J., Kistin, C., Eisenberg, S., Gross, J., Block, G., Zuckerman, B., Silverstein, M. (2016) *Parent Perspectives on Their Mobile Technology Use*. *Journal Of Developmental & Behavioral Pediatrics*. Vol 37(9) p. 694-701.

Radesky, J., Kistin, C., Zuckerman, B., Nitzberg, K., Gross, J., Kaplan-Sanoff, M. (2014) *Patterns of Mobile Device Use by Caregivers and Children During Meals in Fast Food Restaurants*. *Pediatrics*. Vol 133 e843-e849.

Roberts, J., and David, M. (2016) *My life has become a major distraction from my cell phone: Partner phubbing and relationship satisfaction among romantic partners*. *Computers In Human Behavior* Vol 54: p. 134-141.

Scaramella, L., Conger ,R., Simons, R. (1999) *Parental protective influences and genderspecific increases in adolescent internalizing and externalizing problems*. Journal of Research on Adolescence Vol 9: p. 111–141.

Statistica. (2022).

Available online at: <https://www.statista.com/statistics/278204/china-mobile-users-bymonth/>

Stockdale, L., Coyne, S., Padilla-Walker, L. (2018) *Parent and Child Technoferece and socioemotional behavioral outcomes: A nationally representative study of 10- to 20 year-Old adolescents*. Computers In Human Behavior. Vol 88: p. 219-226.

Tarantino, N., Tully, E., Garcia, S., South, S., Iacono ,W., McGue ,M. (2014) *Genetic and environmental influences on affiliation with deviant peers during adolescence and early adulthood*. Developmental Psychology. Vol 50: p. 663–673.

Tricco, A., Lillie, E., Zarin, W., O'Brien, K. (2018) *PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation*. Ann Intern Med. Vol 169(7): p. 467-473.

UNICEF (2019) *The United Nations Convention on the Rights of the Child*. London: UNICEF.

Available at <https://www.unicef.org.uk/what-we-do/un-convention-child-rights/>

United Nations. (2015) *Transforming our world: The 2030 Agenda for Sustainable Development*. <https://sdgs.un.org/2030agenda>

Vanden Abeele, M., Abels, M., Hendrickson, A. (2020) *Are parents less responsive to young children when they are on their phones? A systematic naturalistic observation study*. Cyberpsychology, Behavior, and Social Networking Vol 23: p. 363-370.

Wang, X., Qiao, Y., Li W., Lei, L. (2021) *Parental Phubbing and Children's Social Withdrawal and Aggression: A Moderated Mediation Model of Parenting Behaviors and Parents' Gender*. Journal of interpersonal violence.

World Health Organisation (2022) *Adolescent health*.

Available at: https://www.who.int/health-topics/adolescent-health#tab=tab_1.

Wang, X., Gao, L., Yang, J., Zhao, F., Wang, P. (2020a) *Parental Phubbing and Adolescents' Depressive Symptoms: Self-Esteem and Perceived Social Support as Moderators*. Journal of youth and adolescence Vol 49: p 427–437.

Wang, X., Wang, W., Qiao, Y., Gao, L., Yang, J., Wang, P. (2020b) *Parental Phubbing and Adolescents' Cyberbullying Perpetration: A Moderated Mediation Model of Moral Disengagement and Online Disinhibition*. Journal of interpersonal violence Vol 37(1): p. 123:

Wei, H., Ding, H., Huang, F., Zhu, L. (2021) *Parents' phubbing and cyberbullying among adolescents: the mediation of anxiety and the moderation of zhongyong thinking*. International Journal of Mental Health and Addiction.

Xie, X., and Xie, J. (2020) *Parental Phubbing Accelerates Depression in Late Childhood and adolescence: A Two-Path Model*. Journal of adolescence. Vol 78: p. 43–52.

Xie, X., Chen, W., Zhu, X., He, D. (2019) *Parents' Phubbing Increases Adolescents' Mobile Phone Addiction: Roles of Parent-Child Attachment, Deviant Peers, and Gender*. Children and youth services review Vol 105: 104426

Zhang, Y., Ding, Q., Wang, Z. (2021) *Why Parental Phubbing Is at Risk for Adolescent Mobile Phone Addiction: A Serial Mediating Model*. Children and youth services review. Vol 121

Zimmermann, J., Eisemann, M., Fleck, M. (2008) *Is Parental Rearing an Associated Factor of Quality of Life in Adulthood?* Quality of life research Vol 17: p. 249–255.

CHAPTER THREE: Behavioural and Health Impacts of Raising Children in a Digital Household: A Cross-Sectional Survey

Abstract

Introduction: The term 'technoference' refers to habitual interferences and disruptions within interpersonal relationships or time spent together due to the use of technological devices. Emerging evidence suggests that parental technoference may predispose children's internalising and externalising behaviours. This study aims to understand the impact of parental technoference on adolescents by investigating the relationship between parents' use of digital technology and adolescents' use of technology, deviant behaviours and mental well-being.

Methods: A cross-sectional study was employed in three secondary schools across North Wales. A total of 673 adolescents, aged 12-15 years (44.9% girls), were recruited to participate. Data collection used a self-completion questionnaire developed for this project. Outcome measures were self-reported adolescent technoference, deviant behaviours (aggression, physical fighting, cyberbullying, delinquency, drug and alcohol use) and mental well-being (anxiety, depression), as mediated through parental warmth.

Results: Overall, a third of adolescents (32.4%) reported perceived parental technoference and nearly half (49.1%) reported engaging in technoference themselves during interactions with their parent(s). Perceived frequency of parental technoference was associated with increased adolescent technoference ($p < .001$); deviant behaviours including aggression ($p < .001$); drug and alcohol use ($p < .001$); physical fighting ($p = 0.02$); cyberbullying perpetration ($p = 0.05$); and mental wellbeing including anxiety ($p < .001$); depression ($p < .001$). Adolescents perceived parental technoference was inversely associated with parental warmth ($p < .001$). However, parental warmth did not

mediate the relationship between parental technoference and adolescent outcomes measured.

Conclusion: Adolescents who experienced parental technoference reported negative impacts on their own technology use, deviant behaviours and mental well-being. Gaining a greater understanding of the caveats of parental technoference on adolescents' internalising and externalising behaviours will help to design family guidelines on device management to ensure the health and well-being of young people, during a digital revolution.

3.1. Introduction

Previous studies exploring the perspectives of adolescents have identified that at least some level of parental technoference is a frequent occurrence (Stockdale, 2018; Bai et al, 2020). Research has also established that young people feel negatively towards parental digital distraction describing feelings of sadness and frustration (Hiniker et al., 2016). Our scoping review (see Chapter 2) reports that parental technoference may negatively impact adolescent internalising behaviours including depression, anxiety and addictive behaviours, as well as externalising behaviours including deviant peer affiliation and cyberbullying. Findings suggest an indirect link between parental technoference and adolescent outcomes as a reflection of parental unresponsiveness due to digital distraction. Similarly, studies suggest that parents directly model unhealthy digital device use which is imitated by adolescents.

Given the infancy of the research area, there is a dearth of research investigating the attitudes of adolescents regarding parental technoference and the impact on adolescent health and behavioural outcomes (Stockdale et al., 2018; Kildare and Middlemiss, 2017). To date research has primarily focused on younger children or asked parents themselves; the views of adolescents have not been extensively sought (Stockdale et al., 2018). However, the validity of research based upon parental reports may be unclear due to social desirability bias and parents providing more favourable reports of their own habits (Bornstein et al, 2014; Schwartz, Bartin-Henry & Pruzinski, 1985). Consequently, it has been argued that adolescent perceptions of their parents' behaviours may be more reliable than parent's own reporting of their practices (Borawski et al., 2003; Bogenschneider, Small and Tsay, 1997). It is recognised internationally that children and adolescents are active citizens (Borgers et al., 2000), hence, in addition to addressing the gaps within the current literature, the objective of this study was to provide a platform for young people to express their attitudes towards parental digital distraction, and further, how this may affect their behaviour and mental well-being.

3.2. Methods

Section 3A: Questionnaire Development

3.2.1 Selecting appropriate data collection instruments

A quantitative approach was adopted using an attitudinal questionnaire to gather an understanding of the trends and patterns in the attitudes of a cohort of adolescents towards parental technoference (see Appendix 3.1). A descriptive, quantitative approach enabled a comparison between groups and an investigation of relationships between the independent variable (parental technoference) and other outcome variables within the sample of adolescents (Babbie, 2010).

When selecting data collection tools with adolescents, the stages of cognitive development should be considered, as the response quality is influenced by the developmental capacity to respond (Omrani et al., 2019). When using questionnaires with this age group, adolescents need to first be able to understand the meaning of a question; second, relevant memory information must be retrieved to give an answer; and third, they must answer by choosing the relevant response category (Borgers et al., 2000). Piaget's (1929) theory of cognitive growth emphasises children's intellectual development through a series of fixed stages. The theory postulates that between the age of 11 to 16 years, adolescents enter the formal operational stage, during which cognitive functioning is well developed, including the ability to think and reason, affording them the capability of completing adult-style questionnaires (Borgers et al., 2000). The use of a questionnaire is a well-established data collection tool and has successfully been adopted for use with adolescents in large-scale international surveys, such as the Young Persons Attitude and Behaviour Survey (GOV.UK, 2019); Health Behaviour School Children Survey (Inchley et al, 2018); and the British Social Attitudes Study (Park et al., 2014).

Nevertheless, a potential issue when utilising questionnaires with adolescents is the influence that peers or parents may have on the answers provided by participants (Omrani et al., 2019). Subsequently, administering online self-report questionnaires within a classroom setting which had been organised to ensure the privacy of participants, under the supervision of a member of staff and researcher was considered

most advantageous. This mode of administration enhanced the sense of privacy compared to a home survey, eliminated potential social desirability bias and is a strategy used in the internationally administered Health Behaviour School Children Survey (Inchley et al., 2018). Furthermore, the online questionnaire was also designed to be completed anonymously.

3.3. Designing the questionnaire

The questionnaire content was informed by key themes identified in our scoping review (see Chapter 2). The five key themes were (i) parental technoference (Stockdale et al., 2018, Bai et al., 2020) (ii) adolescent technoference; (Stockdale et al., 2018; Bai et al., 2020a) (iii) adolescent deviant behaviours (Qu et al., 2020; Stockdale et al., 2018; Wang et al., 2020b; Wei et al., 2021; Xie et al., 2019) (iv) adolescent mental wellbeing (Bai et al., 2020a; Bai et al., 2020b; Geng et al., 2021; Liu et al., 2020a; Liu et al., 2020b; Stockdale et al., 2018; Wang et al., 2020a; Xie et al., 2019; Xi and Xie, 2020; Zhang et al., 2021); and (v) parental warmth (Liu et al., 2020a; Stockdale et al., 2018; Bai et al., 2020a; Wang et al., 2020a; Xie and Xie 2020; Xie et al., 2019).

Because the questionnaire was designed for use with adolescents aged 12 to 15 years old, emphasis was placed on ensuring appropriate language for the age range to ensure that key questions were understood. The main goal in designing the questionnaire was aligning youths' ability to complete questions, and minimising developmentally related errors, given that data collection measures which are inappropriate for a child's developmental stage can potentially lead to misinterpretation of questions (Amato and Ochiltree, 1987). Question-wording, structure and length of surveys are important factors for data quality (de Leeuw, 2011). Consequently, validated data collection tools underpinned the questionnaire, based on their appropriateness and reliability for use with the target age range. Furthermore, a young person consultation group was formed enabling adolescents to be actively involved in the planning stage of the research and

captured their views on the data collection tool that it was relevant and understandable for the target age range (Johnson et al., 2014).

3.3.1. Piloting of the questionnaire with the target population

The questionnaire was based on validated data collection tools, where possible. However, piloting the questionnaire with the target population supports its reliability and content validity (Dillman and Smyth, 2007; Haeger et al, 2012). DeVellis (2016) advises that questionnaires should ensure the ease of understanding for the target audience and that questions are interpreted as intended by the researcher. Accordingly, the questionnaire was piloted online with a young people's advisory group of eight young people aged between 12 and 15 (girls 5, boys 3). The key function of the advisory group was to provide feedback via an evaluation form which included questions on the suitability of the questionnaire for the target age group, in terms of the topics explored, as well as the wording and terminology used, the length of the questionnaire and an evaluation of the time it took to complete (see Appendix 3.2) Verbal consent was obtained from the individual's parents prior to participation. Data obtained through the piloting was disregarded and did not feature in the final dataset.

3.3.2 The Main Themes

Parental technofence

To measure parental technofence, three questions from a modified version of The Technofence Scale by McDaniel and Coyne (2014) were used. The scale has been measured to have excellent reliability ($\alpha = .85$) with adolescents (Stockdale et al., 2018). The three items included '*My parent or caregiver ignores me when they are on their electronic device*'; '*I struggle to get my parent or caregiver's attention when they are on their electronic device*'; and '*My parent or caregiver checks their electronic device even if I'm right in the middle of conversation them*'. For each item, adolescents answered using

a sixpoint Likert scale (not at all = 1, always = 6). Scores were calculated with higher scores representing higher levels of parental technoference. This scale displayed excellent reliability in the current study ($\alpha = .85$).

Adolescent technoference

To measure adolescent technoference, three questions from a modified version of The Technoference Scale by McDaniel and Coyne (2014) were also used. Excellent reliability $\alpha = .87$ for this scale has also previously been found with adolescents (Stockdale et al., 2018). The three items included *'I ignore my parent or caregiver when I'm on my electronic device'*; *'My parents or caregiver struggles to get my attention when I am on my electronic device'*; and *'I check my electronic device even if I'm right in the middle of a conversation with my parent or caregiver'*. For each item, adolescents answered using a six-point Likert scale (not at all = 1, always = 6). Scores were calculated with higher scores representing higher levels of adolescent technoference. The scale displayed acceptable reliability in the current study ($\alpha = .71$).

Parental warmth

Parental warmth was measured using three items from a modified version of the Parenting Styles and Dimensions Questionnaire-Short Version (PSDQ) by Robinson, Mandelko, Olsen and Hart (2001). Excellent reliability ($\alpha = .87$) has been reported by adolescents (Stockdale et al., 2018). Items included *'My parents give comfort and understanding when I am upset'*; *'My parents are responsive to my feelings and needs'*; *'My parents have warm and loving times together with me'*. For each item, adolescents answered using a five-point Likert-scale (never = 1, always = 5), with increased scores indicating higher levels of parental warmth. This scale displayed excellent reliability in the current study ($\alpha = .89$).

Cyberbullying Perpetration

Cyberbullying perpetration was measured using the Cyberbullying Questionnaire by Ibarra, Diener-West and Leaf (2000), which comprises three items. Excellent reliability ($\alpha = 0.82$) has been measured in the original version with adolescents (Stockdale et al., 2018). Adolescents self-reported how many times they had '*spread rumours about someone online whether they were true or not*'; '*made rude or mean comments to anyone online*'; '*made aggressive or threatening comments to anyone online*'. For the current study, a modification was made to the original timeframe, from one year to one month, and the response scale was amended from a five-point Likert scale (never = 1, everyday = 5) to a three-point scale (never = 1, once = 2, more than once = 3). Higher scores represented higher levels of cyberbullying perpetration. This change was made so that adolescents would focus on their current situation and the Likert-scale amended to reflect how the response categories would be collapsed for analysis. This modified scale displayed acceptable reliability in the present study ($\alpha = .73$).

Cyberbullying victimisation

The Cyberbullying scale by Ibarra, Diener-West and Leaf (2007) was also used to measure adolescent cyberbullying victimisation. Adolescents self-reported how many times in the last month they '*had rumours spread about me online whether they were true or not*'; '*had rude or mean comments made about me online*'; and '*received aggressive or threatening comments online*'. For each item, adolescents reported on a three-point Likert scale to each item (never = 1, once = 2, more than once = 3) with higher scores representing higher levels of cyberbullying victimisation. This scale displayed excellent reliability in the current study ($\alpha = .80$).

Physical fighting

The frequency of adolescent physical fighting was measured using a single item from the Youth Risk Behavior Survey Questionnaire, which has been extensively validated across America (Abreu et al., 2010). Adolescents reported how many times they had been involved in a physical fight within the last twelve months. Responses ranged on a six-point Likert scale (I have not been in a physical fight = 0, four times or more = 5).

Aggressive behaviour

The level of adolescent aggressive behaviour was measured using an adapted version of the Aggression Scale (Orpinas and Frankowski, 2003). The original version showed excellent internal consistency ($\alpha = .90$). Nine items were included based on behaviours which can occur in school towards other individuals such as teasing, pushing, hitting, encouraging students to fight, threatening to hurt or hit another student and getting angry easily. For the purpose of the current study, the scale was modified from within the last month to within the last seven days and the response options was amended from a six-point Likert scale (Never = 0, six or more times = 5) to a three-point Likert scale (never = 1, once = 2, more than once = 3). Higher scores represented greater levels of aggressive behaviour. This change was made so that adolescents would focus on their current situation and the Likert-scale amended to reflect how the response categories would be collapsed for analysis. This scale displayed excellent reliability in the current study ($\alpha = .86$).

Delinquent behaviours

The level of adolescent delinquent behaviour was measured using The Behavior Frequency Scale (Jessor & Jessor, 1977) which provided acceptable reliability ($\alpha = .76$) within the Multisite Violence Prevention Project (2001) when used with adolescents (Miller et al., 2004). Eight items were included based on adolescents' engagement in

delinquent behaviour such as shoplifting, suspension and stealing. In the current study, modifications were made to the timescale from twelve months to one month and the response scale was also amended from a six-point Likert scale (Never = 0, 20 times or more times = 5) to a two-point scale (no = 1, yes = 2). Higher scores represented greater levels of delinquent behaviour. This change was made so that adolescents would focus on their current situation and the Likert-scale amended to reflect how the response categories would be collapsed for analysis. Based on feedback received from the young people's advisory group during piloting, the language of one item was amended to be culturally appropriate; this is highlighted in Table 3.1. This scale displayed good reliability in the current study ($\alpha = .80$).

Table 3.1 Modifications to the Problem Behavior Frequency Scale for use within the present study (change of wording is underlined for clarity)

Original Version	Modified Version
Have you ever snuck into <u>someplace</u> without paying such <u>as movies</u> , onto a bus or subway?	Have you ever snuck into <u>somewhere</u> without paying such <u>as the cinema</u> , onto a bus or subway?

Drug and Alcohol Misuse

Adolescent drug and alcohol use was measured using the Drug and Alcohol Use Problem Behaviour Frequency Scale (Farrell et al., 2000). This scale measured excellent reliability ($\alpha = .84$); within the Multisite Violence Prevention Project (2001) when used with adolescents (Miller et al., 2004). Adolescents responded to five items reporting on the frequency of their use of tobacco, alcohol, marijuana, or any other drug within the last month. For each item, adolescents answered using a six-point Likert scale (none = 1, 20 or more = 6). Higher scores represented greater levels of drug and alcohol use. Based on feedback received from the young people's advisory group during piloting, the language was amended to be culturally appropriate. The difference in wording is shown in Table 3.2. This scale measured acceptable reliability in the current study ($\alpha = .79$).

Table 3.2. Modifications made to the original Drug and Alcohol Use—Problem Behaviour Frequency Scale for use within the present study (change of wording is underlined for clarity)

Original Version	Modified Version
<u>In the last thirty days, how many times have you</u>	<u>Based on your behaviours offline, how many times have you done the following within the last month?</u>
<u>Drunk beer (more than a sip or a taste)</u>	<u>Drank alcohol</u>
Smoked <u>cigarettes</u>	Smoked <u>a cigarette or electronic cigarette</u> <u>(vape</u>
Used <u>marijuana (pot, hash, reefer)</u>	Used <u>cannabis (weed)</u>

Anxiety

Levels of anxiety were measured using the Generalised Anxiety Disorder Assessment (GAD-7; Spitzer et al., 2006) which has demonstrated excellent reliability in a large cohort of adolescents in China ($\alpha = .93$; Sun et al, 2021) and in America ($\alpha = .81$; Bentley et al., 2021). The scale contains seven items relating to experiences associated with anxiety such as the inability to stop worrying, nervousness, and restlessness and asks about the previous two weeks. Response options are a four-point Likert scale (not at all = 0, several days = 3), with higher scores representing increased levels of anxiety. The scale displayed excellent reliability within the current study ($\alpha = .94$).

Depression

Depression levels were measured using the Centre for Epidemiological Studies Depression Scale (Radloff, 1977). The measure has demonstrated excellent reliability with adolescents in China ($\alpha = .82$; Wang et al, 2020) and with adolescents in America ($\alpha = .88$; Stockdale et al., 2018). The measure contains 20 items focusing on experiences

associated with depression, such as restless sleep, poor appetite, and feeling lonely, in a two-week timeframe. For the purpose of the current study, modifications were made to the original response scale, from a four-point Likert scale (rarely or none of the time = 0; most or all of the time = 3); to a three-point scale (rarely or none of the time = 0, occasionally or a moderate amount of time [3-4 days] = 2). This change was made to the Likert-scale to reflect how the response categories would be collapsed for analysis. Higher scores represented greater levels of depression. This scale displayed excellent reliability in the current study ($\alpha = .91$)

3.3.2 Additional Scales

Attitudes towards parental technofence

A scale designed by the project team in order to explore adolescents attitudes towards their parents technofence was included to measure adolescent attitudes towards their parent's technofence. Adolescents answered three questions about how it makes them feel when their parent uses their electronic device in three specific situations: *'During a conversation between me and my parent or caregiver'*, *'During time spent as a family'* and *'When my parent or caregiver is supporting me at an event'*. Responses ranged on a four point Likert scale (they don't use electronic devices during this activity = 0, good = 3). This scale demonstrated good reliability within the current study ($\alpha = .80$).

Electronic device use as a form of punishment or reward

As a behavioural management strategy, parents may use electronic devices as punishment or rewards, such as confiscate or limit time and, permit additional access, respectively (Hawi and Rupert, 2015; Maniccia et al., 2011). Correspondingly, adolescents were asked if their parent *'Limits your time or removes your electronic devices as a form of punishment or discipline?'* and *'Rewards your achievements by allowing you to spend an*

increased amount of time on your electronic device?'. Adolescents answered on a two-point Likert scale (yes = 1, no = 2).

3.4 Finalising the questionnaire

Further to evaluation and feedback from a young person's consultation group on the appropriateness of the data collection tool (see section 3.5 herein), the questionnaire was structured using a series of closed questions to produce pre-coded data which could be easily analysed, quantified, and compared (Cohen et al., 2018). The attitudinal questionnaire consisted of 78 questions, comprising of six parts. Question order began with broad questions and concluded with more sensitive questions, which is a method suggested to increase the likelihood of participant perseverance and elicit a higher success rate (Dillman et al., 2014). The six sections of the questionnaire were structured as follows:

Part One: Demographic information

Demographic questions included participants' age, gender and whom they considered to be their main parent or caregiver. For the avoidance of confusion, in the event that a participant's parents or caregiver were separated, they were asked to indicate the parent or caregiver they were with on the morning of data collection. Adolescents were also asked to provide their postcode in order to measure the socioeconomic levels of participants using the Welsh Deprivation Multiple Index online tool. *The term 'parent or caregiver' was used in the questionnaire, however, for simplicity in this thesis, 'parent' will be used hereafter, but does encompass anyone with a kinship relationship to the adolescent participant.*

Part Two: Adolescents relationship with electronic devices

Questions relating to electronic device ownership; frequency of their electronic device use; and their level of technoference within parent-adolescent interactions.

Part three: Adolescent's' perceptions of their parent's relationship with electronic devices

Questions focused on adolescents' perception of their parent's electronic device ownership; perceived parental technofence; and their attitudes towards their parents technofence.

Part 4: Parental Warmth

This part explored levels of perceived parental warmth.

Part 5: Deviant behaviours

Questions asked about adolescents' levels of deviant behaviours, including cyberbullying perpetration and victimisation; aggressive behaviour; physical fighting; delinquent behaviours; and drug and alcohol misuse.

Part 6: Mental health.

This part focused on mental health and well-being and contained measures which focused on levels of mental well-being, anxiety and depression.

Section 3B: Questionnaire Implementation

3.7. Ethical Approval

This study was granted full ethical approval from Bangor University's School of Education Ethics Committee (Ethics application No.: 14012022-1224). The overarching aim was respecting autonomy, minimising harm, and protecting privacy.

3.8. Sample Recruitment

Undertaking the research within secondary schools was considered advantageous given the potential to influence a high response rate with a readily available sample of participants (Cohen et al., 2018). In compliance with the funding requirements of the

project, schools within the county of Flintshire and Wrexham, North East Wales, were invited to partake in a process of purposeful sampling. Specifically, students aged 12 to 15 years old who were in years 8 and 10 were invited to take part. Based on publicly available information, a database was created of all secondary schools within Wrexham and Flintshire. The database included demographic information such as socio-economic status and the number of enrolled pupils. To aid an equal sample of socio-economic status, schools were separated into two categories, 50% most deprived quintile and 50% least deprived quintile using the Welsh Index of Multiple Deprivation (2022) interactive online tool (WIMD, 2022). In order to randomly select schools for recruitment whilst ensuring an equal balance of deprivation levels, schools within each category were randomly assigned an ID number using the random assignment tool within the database, which were further arranged into ascending order. Schools were then individually contacted in their ascending order.

Initial contact was made with the 18 secondary school headteachers between the months of February and March 2021, via e-mail, providing information regarding the purpose of the study (see Appendix 3.3). One school within Wrexham agreed to participate in the study. Further one school in Denbighshire; and another in based in Conwy were successfully recruited. Schools that reported not being able to participate in the study gave reasons such as Covid-19 restrictions, busy schedules or having recently participated in other research projects. Due to the complications encountered in recruiting schools which was to be expected given the difficulties schools faced during and following the COVID-19 pandemic, a strategic decision was made to extend the recruitment area to include Denbighshire and Conwy. Upon agreement to participate, signed confirmation was obtained by each participating school (see Appendix 3.4). Opt-out participant information sheets for parents were provided (see Appendix 3.5). No opt-out forms were returned by parents. Pupils were also provided with separate information

letters (see Appendix 3.6) which were distributed by the school electronically, seven days prior to data collection.

3.9. Participants

As mentioned, 3 secondary schools were recruited to take part in the study between the month of March 2022 and June 2022. A total of 673 adolescents completed the questionnaire. A total of 344 pupils in Year 8 (aged 12 to 13) and a further 329 pupils in Year 10 (aged 14 to 15 years) completed the questionnaires.

3.10. Experimental Design

The study employed a cross-sectional design to explore the associations between adolescents' perceptions towards parental technoference and adolescent internalising and externalising behaviours.

3.11. Procedure

Data collection took place between March 2022 and June 2022. Schools were asked to identify an appropriate lesson and book a computer room for pupils to be able to access the questionnaire. Schools were given the option of a researcher being present within data collection sessions at school or being teacher-administered. The presence of a researcher facilitated the ability to provide an explanation for any points raised by participants, which may have potentially elicited a higher response rate through encouraging participant completion (Mitchell and Jolley, 2010).

At the outset of the session, the researcher provided a verbal introduction to the study and research purpose which was scripted to avoid any potential researcher bias. Participants were advised of the objective of the questionnaire and that there were no right or wrong answers. The researcher outlined that participation was on a voluntary basis, which meant that they could elect to 'opt out' if they chose not to

participate at any point within the data collection session. It was also reported that the completion of the questionnaire should be on an individual basis and that participants should refrain from discussing their answers with their peers during the data collection process.

Participants were provided with a link to the online survey via their individual school 'HWB' account, which had been allocated by their class teacher. Participants were made aware of their right to withdraw from the study at any time during the research process. Digital informed assent was obtained from each participant which ensured they received sufficient information on the aims and objectives of the study and were aware of the risks and benefits of partaking, in order to make an informed decision on participation. Participants were allocated twenty-five minutes to complete the online questionnaire on a school electronic device. The lead researcher was present during data collection, alongside a class teacher who acted as gatekeeper. A de-brief was delivered by the researcher at the end of the data collection session to alleviate any uncomfortable feelings that the questionnaire topics may have elicited. Further, participants were provided with a leaflet detailing information on national support agencies (see Appendix 3.7).

3.12. Statistical Analysis

Data gathered from each online questionnaire was downloaded in Excel format and converted into the Statistical Package for the Social Sciences (SPSS) version 25 for statistical analysis. Following data cleaning, 643 questionnaire completions remained. Raw data were analysed by the lead researcher and quality assured by another member of the research team. The questionnaire was coded in a manner that included assigning numbers to the created categories, which were calculated to provide a total score, with higher scores indicating greater prevalence rates. Prior to testing hypotheses, missing data were inspected and coded with a number not associated with a possible data entry.

Only missing data required for a specific analysis was excluded and therefore other individual responses were still included within the analysis for which they provided the necessary information. In the event that participants had provided multiple answers, an average of their score was included.

Data were examined to ensure normal distribution and the alpha level was set to $p < .05$. All constructs had acceptable internal consistency ($> .70$). The correlational coefficient effect size for Pearson is reported throughout using the following cutpoints: small effect as .10, medium effect as .30, and large effect as .50 (Cohen, 1992).

Descriptive statistics were calculated to examine the characteristics of participants regarding the study variables, followed by a series of independent-sample t-tests to discover if there were any significant differences between the means of gender, age and deprivation levels. Pearson product-moment correlation analysis was performed to describe the strength and direction of the relationship between parental technoference and the continuous variables including: adolescent technoference, parental warmth, attitudes towards parental technoference, deviant behaviours, and mental well-being. Finally, to obtain a more accurate indication of the relationships between variables, mediation analysis was conducted using Partial correlation to assess the association between parental technoference and adolescent outcomes whilst statistically controlling for parental warmth.

Results

A total of 673 participants completed the online questionnaire, across three secondary schools within North Wales. Of these 643 provided the demographic information required. A total of 333 pupils in Year 8 (age 12 to 13 years; girls 42.6%) and a further 310 pupils in Year 10 (aged 14 to 15; girls 44.2%,) were included within the final analysis. The characteristics of all participants are within Table 3.3.

Table 3.3.*Descriptive characteristics of the sample participants.*

	Year 8 (N = 333)		Year 10 (N = 310)	
	n	%	n	%
Gender				
Girl	142	44.1	137	46.0
Boy	180	55.9	161	54.0
Prefer not to say	11	3.3	12	3.9
Deprivation level^a				
50% most deprived quintile	78	41.3	80	39.0
50% most deprived quintile	111	58.7	61	125
Main carer				
Mother	237	74.5	226	76.6
Father	63	19.8	43	14.6
Other	18	5.7	26	8.8

^aBased on a total of n=395 participants who provided their postcode.

Nearly all adolescents (99.7%) reported they owned an electronic device, and all adolescents reported their parent owned a device (100%). Table 3.4 shows the different types of electronic devices owned by the adolescents and their parents; a mobile phone was the most commonly owned device for adolescents and parents. Almost all adolescents (97.3%) reported their electronic device use as 'average to high'. No significant differences were found in adolescents' electronic device use of by gender, year groups, or deprivation levels ($p>0.05$; Table 3.5).

Table 3.4.*Descriptive statistics for adolescent and parent device ownership*

	Adolescent	Parent
	%	%
Tablet / iPad	56.1	43.0
Desktop computer	27.7	28.4
Laptop	64.6	66.8
Mobile phone	97.1	97.4
Games console e.g. Xbox	77.3	23.6
Other electronic device	32.0	27.0
I / they do not own an electronic device ^a	-	-

^aA small proportion of individuals (<5) identified that either they do not own an electronic device or their parent does not own a device.

Table 3.5.*Prevalence outcomes electronic device use.*

		Mean (± SD)	t	p	Effect size
Age	Year 8	2.55	.833	.405	>0.05
	Year 10	2.51			
Gender	Girls	2.56	1.56	.117	>0.05
	Boys	2.49			
Deprivation	50% most deprived	2.54	.679	.486	>0.05
	50% least deprived	2.50			

A third of adolescents (35.6%; n=211) reported that their parent limits their device use as a form of punishment. Of those, 18.3% also reported that electronic devices are used as a reward. The use of devices as a method of punishment was reported significantly more amongst younger adolescents than older adolescents (36.3% vs 34.9%,

respectively; $p < 0.05$). No significant differences were found by gender or levels of deprivation ($p > 0.05$; Table 3.6). The proportion of boys who reported that their parent rewards them with electronic device use was moderately higher in comparison to girls (22.1% vs 14.1%, respectively; $p < 0.05$). Additionally, a significantly higher proportion of younger adolescents reported their parent rewards their achievements with electronic device use, compared to older adolescents (24.5% vs 11.8%, respectively; $p < .001$). No significant difference was found between levels of deprivation ($p > 0.05$; Table 3.7).

Table 3.6.

Prevalence outcomes electronic device use as a form of punishment.

		Mean (\pm SD)	t	p	Effect size
Age	Year 8	1.40	2.63	.009	<0.05
	Year 10	1.30			
Gender	Girls	1.36	.337	.736	>0.00
	Boys	1.34			
Deprivation	50% most deprived	1.36	.903	.367	>0.05
	50% least deprived	1.31			

Table 3.7

Prevalence outcomes electronic device use as a form of reward.

		Mean (\pm SD)	t	p	Effect size
Age	Year 8	1.24	4.03	.000	<.001
	Year 10	1.11			
Gender	Girls	1.14	-2.45	.014	<0.05
	Boys	1.22			
Deprivation	50% most deprived	1.16	.868	.386	>0.05
	50% least deprived	1.13			

Deviant behaviour

Cyberbullying perpetration and victimisation. A third of adolescents (34.2%; $n=216$) had been a perpetrator of cyberbullying within the last month. One in three (32.8%) reported making rude or mean comments to another person online; 20% reported having made aggressive or threatening comments to another person online; and 11.5% reported spreading rumours about another person online (Figure 3.1). Boys reported a significantly higher level of cyberbullying perpetration than girls ($M = 4.0$ vs $M = 3.5$, respectively; $p < .001$). No significant difference was found by school year group or levels of deprivation ($p > 0.05$; Table 3.8). Almost half of adolescents (48.6%; $n=303$) had been a victim of cyberbullying within the last month. One in four adolescents (43.8%) reported that rude or mean comments had been made about them online; a third (32.6%) reported receiving aggressive or threatening comments online; and almost a quarter (23.3%) reported rumours had been spread about them online. No significant differences were found by gender, school year groups, or levels of deprivation ($p > 0.05$; Table 3.9).

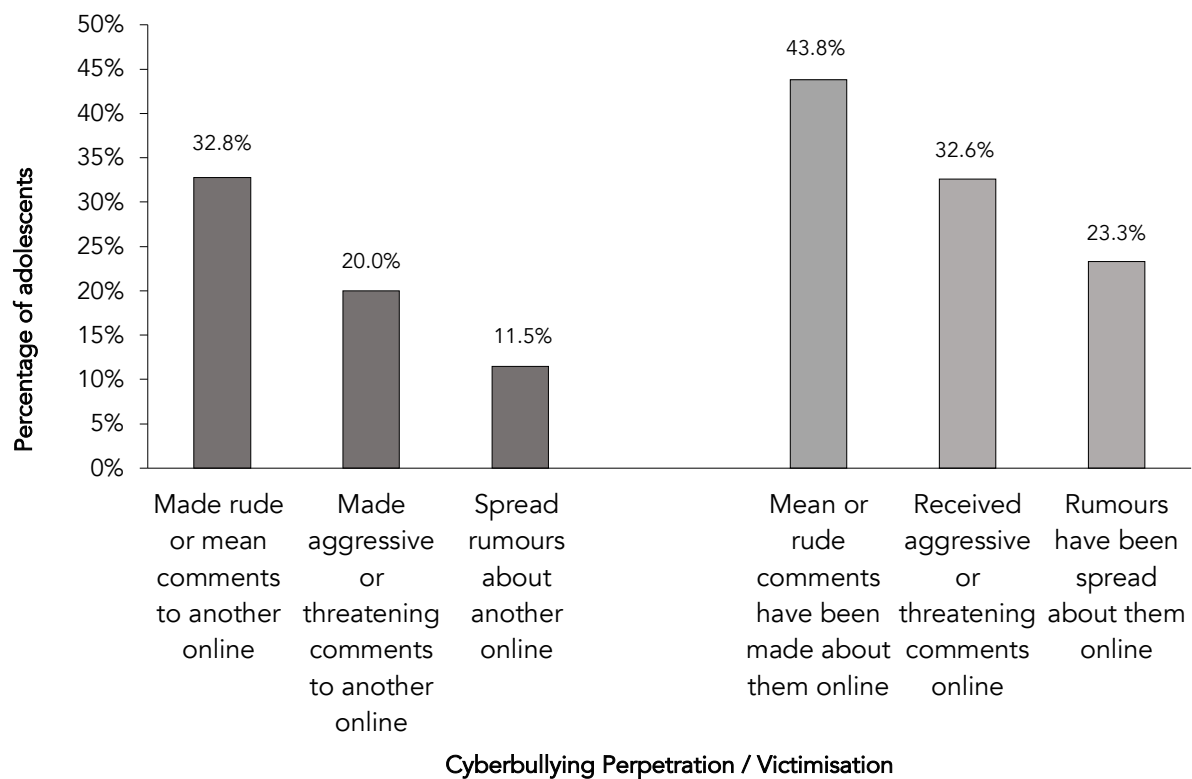


Figure 3.1. Percentage of participants reporting cyberbullying perpetration and victimisation based on the Cyberbullying Questionnaire.

Table 3.8.*Prevalence outcome cyberbullying perpetration.*

		Mean (\pm SD)	t	p	Effect size
Age	Year 8	3.72	-1.52	.128	>0.05
	Year 10	3.91			
Gender	Girls	3.56	-4.22	.000	<.001
	Boys	4.08			
Deprivation	50% most deprived	3.87	-.005	.996	>0.05
	50% least deprived	3.87			

Table 3.9.*Prevalence outcomes cyberbullying victimisation.*

		Mean (\pm SD)	t	p	Effect size
Age	Year 8	4.57	.963	.336	>0.05
	Year 10	4.42			
Gender	Girls	4.50	.251	.802	>0.05
	Boys	4.46			
Deprivation	50% most deprived	4.57	.828	.408	>0.05
	50% least deprived	4.40			

Aggression. A mean aggression score of 14.2 (from 24) was calculated. Eight in 10 adolescents (80.9%) reported that they had been angry with someone at least once in the last month; 54.4% reported they were angry most of the day; and 41% reported they had pushed or shoved another student (Figure 3.2). Adolescents within the most deprived quintile reported moderately higher levels of aggression compared to those from the least deprivation quintile ($M = 14.8$ vs $M = 13.8$, respectively; $p < 0.05$). No significant differences were found by gender or age group ($p > 0.05$; Table 3.10).

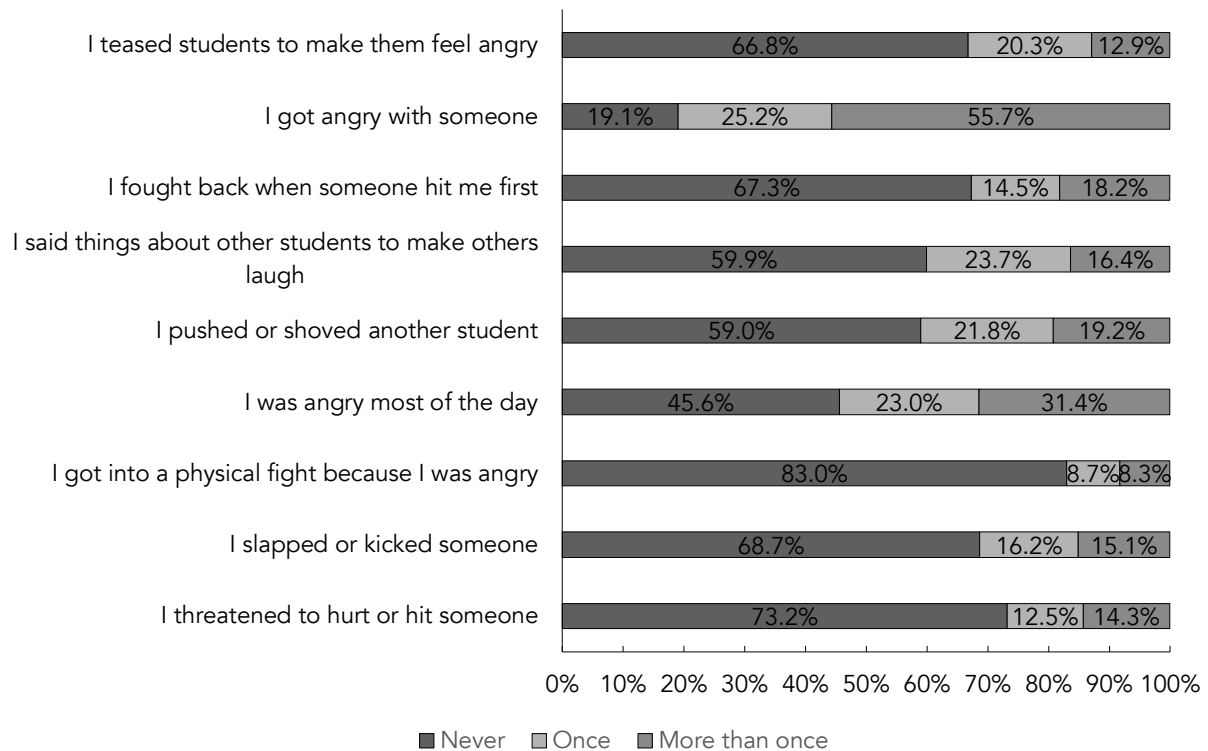


Figure 3.2. Percentage of participants reporting aggressive behaviours based on The Aggression Scale.

Table 3.10.

Prevalence outcomes aggression.

		Mean (± SD)	t	p	Effect size
Age	Year 8	14.37	.772	.441	>0.05
	Year 10	14.08			
Gender	Girls	14.12	-.733	.464	>0.05
	Boys	14.40			
Deprivation	50% most deprived	14.83	1.99	.047	<0.05
	50% least deprived	13.87			

Physical fighting. Nearly three in 10 adolescents (28.5%; n=173) reported they had been in a physical fight at least once or more over the previous 12 months. Boys had

been in a moderately higher number of fights than girls (32% vs 23%, respectively; $p < .0.05$), and the younger adolescents had fought more than the older adolescents (34.6% vs 22%, respectively; $p < .0.05$). No significant difference was found by levels of deprivation ($p > 0.05$; Table 3.11).

Table 3.11.

Prevalence outcomes physical fighting.

		Mean (\pm SD)	t	p	Effect size
Age	Year 8	1.69	2.43	.015	<0.05
	Year 10	1.47			
Gender	Girls	1.45	-2.50	.013	<0.05
	Boys	1.68			
Deprivation	50% most deprived	1.64	1.16	.246	>0.05
	50% least deprived	1.51			

Delinquent behaviour. A third of adolescents (31.9% $n=203$) had engaged in at least one form of delinquent behaviour in the previous month. Predominantly, over one in 10 adolescents (13.6%) reported they had skipped school; 13.4% reported cheating on a test; and 11.0% reported sneaking into a place without paying (Figure 3.3). The proportion of older adolescents reporting delinquent behaviour was moderately higher than younger adolescents ($M = 8.8$ vs $M = 8.4$, respectively; $p < .0.05$). No significant differences were found by gender or deprivation ($p > 0.05$; Table 3.12).

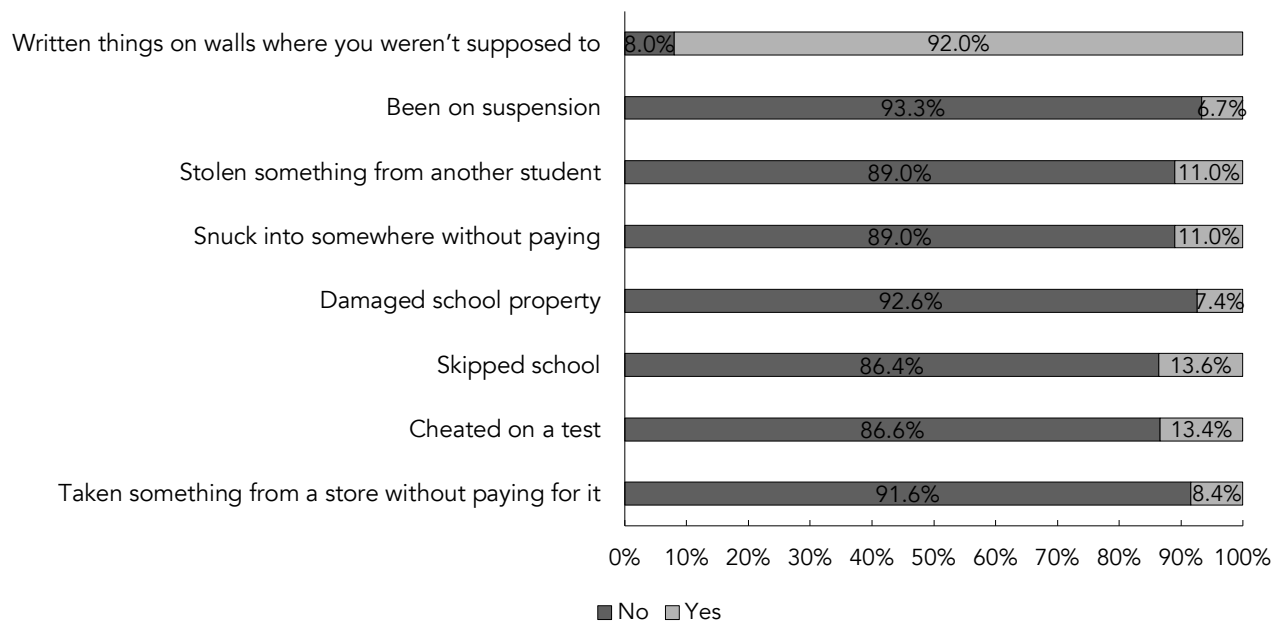


Figure 3.3. Percentage of participants reporting delinquent behaviours based on *The Behaviour Frequency Scale*.

Table 3.12.

Prevalence outcomes delinquent behaviour.

		Mean (\pm SD)	t	p	Effect size
Age	Year 8	8.49	-2.64	.008	<0.05
	Year 10	8.84			
Gender	Girls	8.62	-.842	.400	>0.05
	Boys	8.74			
Deprivation	50% Most deprived	8.48	1.20	.230	>0.05
	50% least deprived	8.64			

Drug and alcohol use. Almost half of adolescents (44.1%; $n=278$) had used at least one type of drug or alcohol within the last month. Four in 10 (41.8%) reported drinking alcohol, 22.6% reported smoking a cigarette or electronic cigarette; and 17.5% reported being drunk (Figure 3.4). Drug and alcohol use was moderately higher in girls than boys ($M = 7.5$ vs $M = 6.5$, respectively; $p < .005$). Additionally, older adolescents reported

significantly higher drug and alcohol use compared to younger adolescents ($M = 7.6$ vs $M = 6.2$, respectively; $p < .001$), as well as adolescents from the most deprived quintile in comparison to the least deprived quintile ($M = 7.8$ vs $M = 6.6$, respectively; $p < 0.05$; Table 3.13).

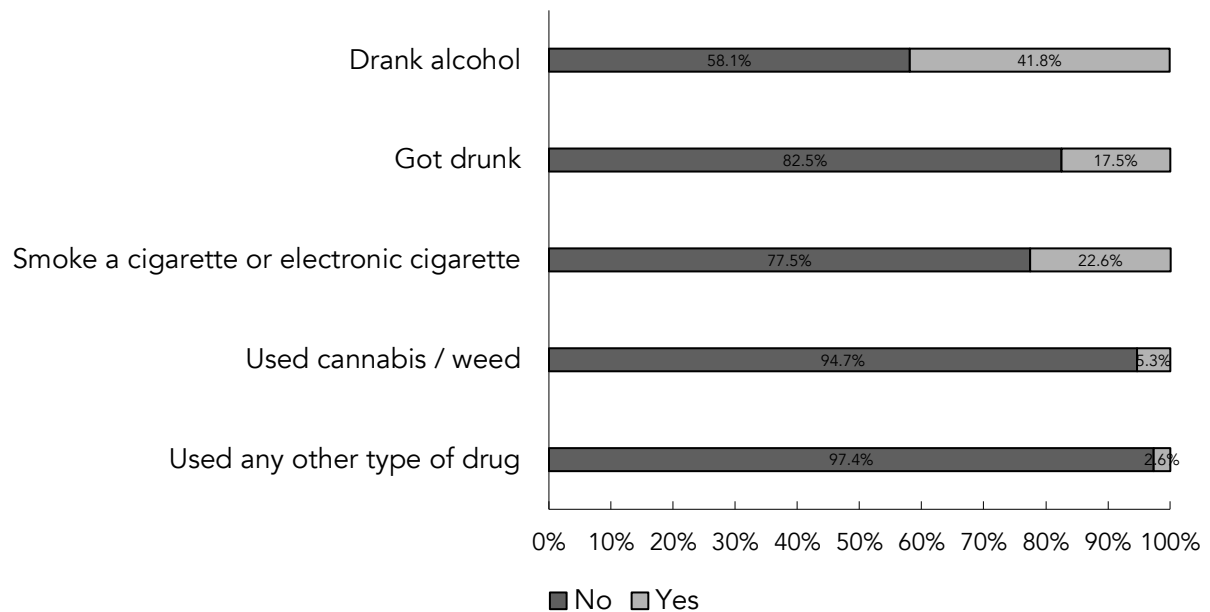


Figure 3.4. Percentage of participants reporting drug and alcohol use based on the Drug and Alcohol Use – Problem Behaviour Scale.

Table 3.13.

Prevalence outcomes drug and alcohol use.

		Mean (\pm SD)	t	p	Effect size
Age	Year 8	6.29	-.422	.000	<.001
	Year 10	7.61			
Gender	Girls	7.50	3.02	.003	<0.05
	Boys	6.52			
Deprivation	50% most deprived	7.80	2.68	.008	<0.05
	50% least deprived	6.65			

Adolescent mental health

Anxiety. The mean anxiety score for adolescents was 14.5 out of a maximum score of 28, with higher scores representing greater anxiety levels. Two-thirds (67%) of adolescents reported they had become easily annoyed or irritable in the previous two week reporting period; 64.0% reported feeling nervous, anxious or on edge; and 63% reported they worried too much about different things (Figure 3.5). The proportion of girls reporting anxiety was significantly higher in comparison to boys ($M = 17.6$ vs $M = 11.9$, respectively; $p < .001$). No significant difference was found by school year groups or levels of deprivation ($p > 0.05$; Table 3.14).

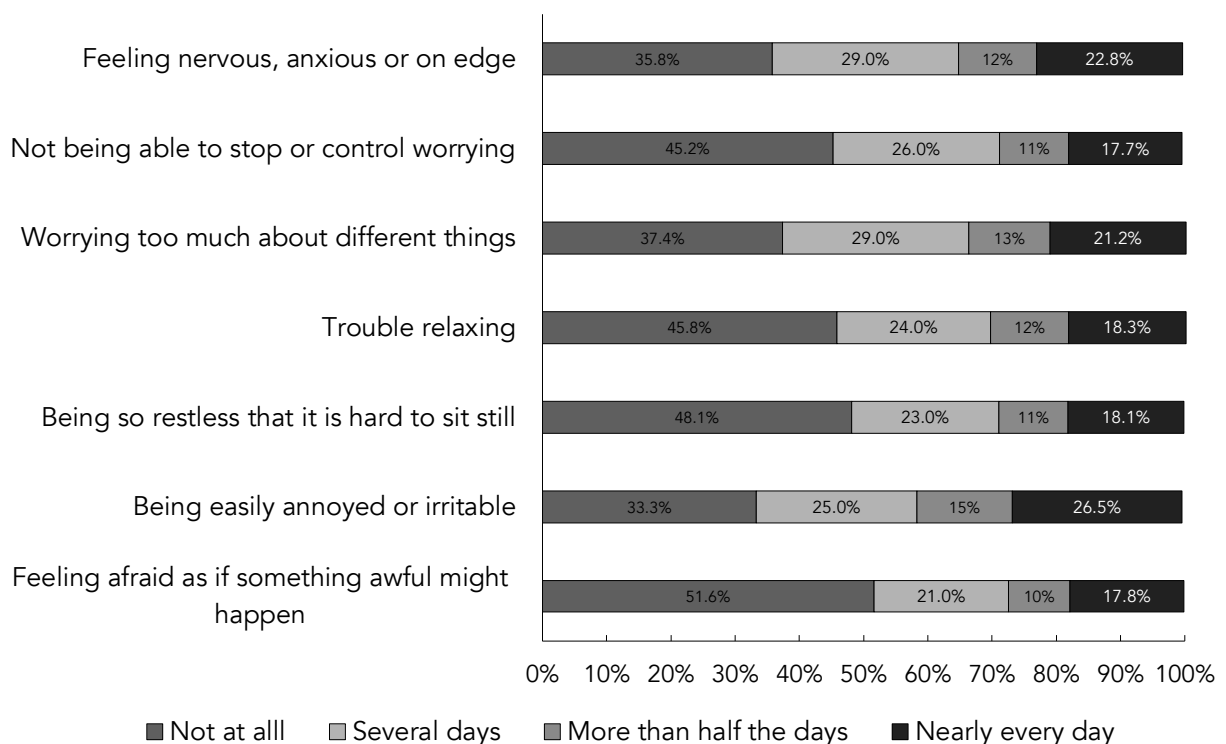


Figure 3.5. Percentage of participants reporting anxiety levels based on the Generalised Anxiety Disorder Assessment.

Table 3.14.

Prevalence outcomes anxiety.

		Mean (\pm SD)	t	p	Effect size
Age	Year 8	14.49	-.308	.758	>0.05
	Year 10	14.66			
Gender	Girls	17.69	11.26	.000	<.001
	Boys	11.92			
Deprivation	50% most deprived	14.89	.202	.840	>0.05
	50% least deprived	14.75			

Depression. The mean depression score for adolescents was 32.5, out of a maximum score of 60, with higher scores representing greater depressive symptoms. Two thirds of adolescents (69.7%) reported that they had trouble keeping their mind on what they were doing over the last two weeks, 56.4% reported everything they did was an effort; and 56% felt that they were as good as other people. Individual responses to the 20-item depression scale are shown in Appendix 3.8. The proportion of girls reporting levels of depression was significantly higher in girls than boys ($M = 36.3$ vs $M = 29.4$, respectively; $p = <.001$). No significant differences were found by school year groups, or levels of deprivation ($p > 0.05$; Table 3.15).

Table 3.15.

Prevalence outcomes depression.

		Mean (\pm SD)	t	p	Effect size
Age	Year 8	32.1	-1.07	.284	>0.05
	Year 10	33.03			
Gender	Girls	36.35	8.33	.000	<.001
	Boys	29.41			
Deprivation	50% most deprived	32.93	.082	.935	>0.05
	50% least deprived	32.84			

Digital distraction

When reporting on their own level of technoference, over half of adolescents (55.6% n=359) reported their engagement at least 'sometimes'. The mean score for adolescent technoference was 7.1 from a possible of score of 18. Almost half (49.1%) reported that they check their electronic device during a conversation with their parents (Table 3.16); 36.3% reported their parent struggles to get their attention when they are using their electronic device; and 32.7% reported that they ignore their parents when using their electronic device. Girls reported moderately higher levels of technoference than boys ($M = 7.45$ vs $M = 6.86$, respectively $p < 0.05$). No significant differences were found between school year groups or levels of deprivation ($p > 0.05$; Table 3.17).

Table 3.16.

Percentage of adolescent reporting their own technoference level, based upon The Technoference Scale.

	Never %	Rarely %	Sometimes %	Often %	Very Often %	Always %
I ignore my parent when I'm using an electronic device	25.4	42.4	23.4	3.9	3.1	1.7
My parent struggles to get my attention when I am on my electronic device	24.7	39.1	22.5	7.8	3.8	2.2
I check my electronic device even if I am right in the middle of a conversation with my parent	20.9	30.0	24.6	10.3	8.2	6.0

Table 3.17.*Prevalence outcomes adolescent technoference.*

		Mean (± SD)	t	p	Effect size
Age	Year 8	7.22	.546	.586	>0.05
	Year 10	7.09			
Gender	Girls	7.45	2.39	.017	<0.05
	Boys	6.86			
Deprivation	50% most deprived	7.29	.573	.567	>0.05
	50% least deprived	7.12			

When reporting on their parent's engagement with technoference, over a third of adolescent (34.8%; n=220) reported their engagement at least sometimes. The mean score for parental technoference was 6.1 from a maximum score of 18, with higher scores representing greater technoference engagement. A third of adolescents (32.4%) reported their parent 'sometimes' to 'always' check their phone even if they are right in the middle of a conversation with them (Table 3.18); 31.7% reported they struggle to get their parent's attention when they are using their electronic device, and 30.8% reported being ignored by their parent when they are using their electronic device. Girls reported significantly greater perceptions of parental technoference compared to boys ($M = 6.8$ vs $M = 5.4$ respectively $p < .001$). Additionally, adolescents within the most deprived quintile reported moderately higher parental technoference compared to the least deprived quintile ($M = 6.4$ vs $M = 5.7$ respectively $p < 0.05$). No significant differences were found by school year groups ($p > 0.05$; Table 3.19).

Table 3.18.

*Percentage of participants reporting perceptions of parental technoference based upon
The Technoference Scale*

	Never %	Rarely %	Sometimes %	Often %	Very Often %	Always %
My parent ignores me when they are using an electronic device	37.8	31.4	19.0	7.3	3.6	0.9
I struggle to get my parents' attention when they are on their electronic device	38.4	30.0	18.7	7.3	4.0	1.7
My parent checks their electronic device even if I'm right in the middle of a conversation with them	34.7	32.9	18.6	6.4	4.1	3.3

Table 3.19.

Prevalence outcomes parental technoference.

		Mean (\pm SD)	t	p	Effect size
Age	Year 8	5.96	-1.25	.208	<0.05
	Year 10	6.30			
Gender	Girls	6.81	5.22	.000	<.001
	Boys	5.45			
Deprivation	50% most deprived	6.45	1.94	.052	>0.05
	50% least deprived	5.79			

When asked to report on their feelings towards their parent's engagement in technoference during family activities, 16.2% (n=102) reported they feel 'sad' by their parent's technoference within at least one context. One in 10 adolescents (14.9%) reported that they feel 'sad' when their parent uses their electronic device whilst supporting them at an activity (Table 3.20); 9% during time spent as a family; and 7.9% during conversations between themselves and their parent. The proportion of girls reporting they feel sad towards parental technoference was moderately higher in comparison to boys (M = 7.9 vs M = 7.4, respectively $p < 0.05$). Additionally, older adolescents reported moderately higher levels of sadness toward their parent's technoference to younger adolescents (M = 7.9 vs M = 7.4 respectively $p < 0.05$). No significant difference was found by levels of deprivation ($p > 0.05$; Table 3.21).

Table 3.20.

Percentage of participants reporting attitudes on perceived parental technoference during family activities.

	Sad %	It doesn't bother me %	Good %	*n/a %
During a conversation between me and my parent	7.9	68.8	3.1	20.2
During time spent as a family	9.0	64.7	5.0	21.3
When my parent is supporting me at an event	14.9	51.1	8.8	25.3

n/a: they don't use their electronic device during this activity

Table 3.21

Prevalence outcomes attitudes towards parental technoference.

		Mean (± SD)	t	p	Effect size
Age	Year 8	7.42	-2.95	.003	<0.05
	Year 10	7.99			
Gender	Girls	7.94	2.61	.009	<0.05
	Boys	7.42			
Deprivation	50% most deprived	7.61	-.621	.535	>0.05
	50% least deprived	7.76			

Parental Warmth. Adolescents reported a mean score of 12.2 for parental warmth from a maximum score of 15, with higher scores representing greater parental warmth. One in 10 adolescent (10.2%) reported that their parents ‘not very often’ to ‘never’ have warm and loving times with them (Table 3.22); 9.7% reported their parent ‘not very often’ to ‘never’ gives them comfort and understanding when they are upset; and 9.2% reported their parent is ‘not very often’ to ‘never’ responsive to their feelings and needs. Girls reported moderately lower levels of parental warmth than boys ($M = 11.9$ vs $M = 12.5$ respectively $p < 0.05$). Additionally, younger adolescents reported moderately lower levels of parental warmth in comparison to older adolescents ($M = 11.8$ vs $M = 12.5$, respectively $p < 0.05$). No significant difference was found by levels of deprivation ($p > 0.05$; Table 3.23).

Table 3.22.

Percentage of participants reporting perceived parental warmth based upon the Parenting Styles and Dimensions Questionnaire-Short Version (PSDQ)

	Always %	Often %	Sometimes %	Not very often %	Never %
My parent gives me comfort and understanding when I am upset	57.0	22.2	11.2	6.9	2.8
My parent is responsive to my feelings and needs	51.8	25.6	13.4	7.4	1.8
My parent has warm and loving times together with me	44.4	28.9	16.5	7.7	2.5

Table 3.23.

Prevalence outcomes parental warmth.

		Mean (± SD)	t	p	Effect size
Age	Year 8	12.52	2.48	.013	<0.05
	Year 10	11.89			
Gender	Girls	11.97	-2.18	.030	<0.05
	Boys	12.52			
Deprivation	50% most deprived	12.21	-.812	.417	>0.05
	50% least deprived	12.47			

Correlational analysis between parental technoference and adolescent outcomes

Pearson Correlation Coefficient. Table 3.24 shows the means, standard deviations and Pearson correlations for all variables.

Adolescent internalising and externalising outcomes were significantly associated with parental technoference. A moderate positive correlation was found between parental technoference and adolescent technoference, ($r = .322$, $n = 622$, $p < .001$).

Parental technoference was also significantly associated with adolescent mental health, with moderate significant correlations found between parental technoference and anxiety ($r = .378$, $n = 612$, $p < .001$); and depression ($r = .394$, $n = 597$, $p < .001$), indicating that increased perceptions of technoference was related to decreased mental well-being.

Further, parental technoference was significantly associated with adolescent deviant behaviours. A small positive correlation was found between perceived parental technoference and adolescent aggression ($r = .240$, $n = 625$, $p < .001$); cyberbullying victimisation ($r = .223$, $n = 634$, $p < .001$); and adolescent drug and alcohol use ($r = .144$, $n = 621$, $p < .001$).

Additionally, a weak positive correlation was found between perceived parental technoference and the number of times adolescents had been in a fight ($r = .125$, $n = 601$, $p = .002$); as well as adolescent cyberbullying ($r = .113$, $n = 625$, $p = .005$). These findings indicate that adolescents who frequently perceived parental technoference were more likely to engage in deviant behaviours and be the victim of cyberbullying perpetration.

Adolescent outcomes were also significantly associated with parental warmth. A strong negative correlation was found between parental warmth and parental technoference ($r = -.467$, $n = 615$, $p < .001$). Parental warmth was also moderately

associated with anxiety ($r = -.250, n = 601, p < .001$); depression ($r = -.312, n = 587, p < .001$) and drug and alcohol use ($r = -.144, n = 608, p < .001$).

A small negative association was also found between parental warmth and adolescent technoference ($r = -.179, n = 621, p < .001$), aggression ($r = -.101, n = 613, p = .012$); the number of times adolescents had been in a fight ($r = -.119, n = 589, p = .004$); and delinquency ($r = -.082, n = 612, p = .042$).

Partial Correlation. To explore the significant associations identified between parental technoference and adolescent outcomes, partial correlations were conducted to examine the association whilst controlling for parental warmth (Table 3.25). While controlling for parental warmth, a moderately positive partial correlation between perceived parental technoference and anxiety ($r = .305, n = 598, p = < .001$) and parental technoference and depression ($r = .295, n = 584, p = < .001$) was found. An inspection of the Pearson's correlation ($r = .378$) and ($r = .394$) respectively, suggested that controlling for parental warmth had little effect on the strength of the relationship between these variables.

Results also revealed a small significantly positive partial correlation between parental technoference and adolescent technoference ($r = .274, n = 612, p = < .001$); and parental technoference and aggression ($r = .220, n = 610, p < .001$). An inspection of the Pearson's correlation ($r = .322$; and $r = .240$, respectively) suggests that controlling for parental warmth had little effect on the strength of the relationship between the variables. Further, while controlling for parental warmth, a weak significantly positive partial correlation was found between parental technoference and adolescents fighting frequency ($r = .094, n = 582, p = .023$); parental technoference and cyberbullying perpetration ($r = .090, n = 610, p = .026$); and between parental technoference and drug and alcohol use ($r = .088, n = 605, p = .029$) was found. An inspection of the Pearson's correlation ($r = .125$;

$r = .133$; and $r = .144$, respectively) suggests that controlling for parental warmth had very little effect on the strength of the association between the variables.

Table 3.24

Pearsons' Correlation Coefficient: Means, standard deviations, and correlations for study variables.

Variable	2	3	4	5	6	7	8	9	10	11	12	13	M	SD
1. Electronic device use	0.292**	0.118**	0.167**	-0.067	0.203**	0.161**	0.184**	0.038	0.099*	0.140**	0.173**	0.140**	2.53	.551
2. Adolescent technofence		0.322**	0.240**	-0.179**	0.254**	0.203**	0.289**	0.136**	0.211**	0.313**	0.197**	0.243**	7.13	3.06
3. Parental technofence			0.385**	-0.467**	0.113**	0.223**	0.240**	0.125**	0.105**	0.144**	0.378**	0.394**	6.11	3.30
4. Feelings on parental technofence				-0.236**	0.144**	0.126**	0.119**	0.080	0.088*	0.119**	0.238**	0.236**	7.68	2.44
5. Parental warmth					-0.071	-0.097*	-0.101*	-0.119**	-0.082*	-0.144**	-0.250**	-0.312**	12.2	3.12
6. Cyberbullying perpetration						0.491**	0.444**	0.259**	0.350**	0.296**	0.034	0.052	3.82	1.52
7. Cyberbullying victimisation							0.421**	0.238**	0.209**	0.208**	0.269**	0.336**	4.50	2.00
8. Aggression								0.527**	0.427**	0.413**	0.291**	0.320**	14.2	4.69
9. Times in fight									0.352**	0.282**	0.140**	0.172**	01.58	1.12
10. Delinquent behaviour										0.510**	0.042	0.147**	8.66	1.64
11. Drug and alcohol use											0.165**	0.240**	6.93	3.91
12. Anxiety												0.744**	14.53	6.87
13. Depression													32.53	10.59

Note: p <.001 ** P<.005 *

Table 3.25

Partial Correlations: Means, standard deviations, and correlations for study variables whilst controlling for parental warmth.

Variable	2	3	4	5	6	7	8	M	SD
1.Parental technoference	0.220**	0.079*	0.094*	0.090*	0.088*	0.305**	0.259**	6.11	3.30
2.Adolescent technoference								7.13	3.06
3.Agression								14.2	4.69
4.Physical Fight									
5.Cyberbullying								3.82	1.52
6.Drug and Alcohol Use								6.93	3.91
7.Anxiety								14.53	6.87
8.Depression								32.5	10.59

Note: p <.001 ** P <0.05

Discussion

The primary aim of the present study was to investigate the attitudes of adolescents on digital distraction within the parent-adolescent relationship, and the measure the impact on adolescent mental health and deviant behaviours. The findings provide the first evidence that parental technoference may negatively impact adolescent internalising and externalising behaviours.

When asked to respond to their experience of parental digital distraction within the parent-adolescent relationship, one in three adolescents (32.4%) reported their parent's engagement in technoference; whilst one in two (55.6%) also reported their own technoference. Adolescents who reported experiencing their parent's technoference reported higher levels of their own technoference, suggesting that parent's device habits may be replicated by their adolescent. However, two-thirds of adolescents reported that they did not feel bothered by their parent engaging in technoference during time spent with them in family activities. These findings highlight that one in ten (16.2%) felt sad regarding the experience, with the highest percentage of adolescents (14.9%) indicating that they feel sad when their parent uses their device when supporting them in an activity compared to time spent as a family (9%) and during a conversation between themselves and their parent (7.9%). Thus, suggesting that the impact of parental technoference may be context specific.

The current study also provides a general insight into the levels of internalising and externalising behaviours of a cohort of adolescents. Adolescents who reported their parent's engagement in technoference were found to have higher levels of participation in deviant behaviours including cyberbullying, aggression, physical fighting, drug and alcohol use, and delinquent behaviour, in comparison to those who did not experience technoference. Additionally, this study found that adolescents who reported their parent's technoference had poorer levels of mental well-being, including anxiety and depression.

These outcomes corroborate the findings of the scoping review within chapter Two, identifying that parental technoference may be a risk factor in adolescent internalising and externalising behaviours.

Adolescents reported a high average score for parental warmth ($M = 12.2$). However, these findings identify that one in ten adolescents did not experience parental warmth. Adolescents who reported lower levels of parental warmth were found to perceive greater levels of parental technoference, which is consistent with the findings of our scoping review (see Chapter 2) identifying that parental technoference may reflect parental unresponsiveness. In addition, adolescents who reported lower levels of parental warmth were found to have higher levels of engagement in delinquent behaviour and poorer mental well-being. Furthermore, this study sought to build upon previous research by exploring whether the strength of the correlations between parental technology and adolescent outcomes would differ, depending on adolescents' perceptions of parental warmth. However, results revealed that there was no significant difference in the associations between parental technoference and adolescent internalising and externalising outcomes when controlling for parental warmth.

Conclusion

In summary, the current study aimed to explore the relationship between parental technoference on adolescent internalising and externalising behaviours, as well as the independent role of parental warmth in these associations. Findings suggest that parental technoference may contribute to adolescents' own engagement in technoference, as well as an increase in deviant behaviour and poorer mental well-being. Results also suggest that parental technoference may be related to parental unresponsiveness, illustrating the importance of parents being aware of their environment when using their electronic devices. The findings of the current study contribute to the understanding of the caveats of

parental technoference and provide evidence to inform policy and guidance on the management of digital devices within the family context. The results of this study will be discussed further with the General Discussion (Chapter 4).

CHAPTER FOUR: General Discussion

The advancement of digital technology has enabled electronic devices such as smartphones, tablets, laptops, and games consoles to become a key component within the family environment. Recent evidence highlights the potential for disruptions to in-person interactions due to digital technology use (Kildare and Middlemiss, 2017). The term ‘technoference’ refers to regular interruptions in interpersonal relationships or time spent together due to technological devices (McDaniel and Coyne, 2014). Research has begun to explore technoference within the parent-child dynamic, indicating the potential impairment to parent-child interactions, as a consequence of parental digital distraction, and further, the impact upon children’s internalising and externalising behaviours (McDaniel, 2019; Radesky, 2014; Wang et al., 2021a). However, the majority of research has focused on the impact of parental technoference on younger children and alternatively rely on parental proxy-reports (McDaniel, 2019). Consequently, the aim of this thesis was to investigate the evidence gap on the impact of parental technoference on adolescents’ deviant behaviours and mental well-being.

4.1. Research Summary

First, a scoping review (Chapter 2) was conducted to synthesise the literature on the internalising and externalising outcomes for adolescents associated with parental technoference. Second, an empirical cross-sectional study (Chapter 3) was undertaken to address the gaps within the literature by obtaining the attitudes of adolescents aged between 12 and 15 years, on technoference within the parent-adolescent relationship. This chapter revisits the overall aim of this thesis and considers the potential contribution of both the scoping review and the empirical study to the literature.

4.2. Scoping Review

Chapter Two provides a scoping review which is, to the best of the author's understanding, the first review to explore the impact of parental technoference on adolescent mental health and deviant behaviours. The scoping review summarises the available evidence exploring the behavioural and mental health impacts of parental technoference in adolescents aged between 10 and 20 years old.

4.2.1 Contribution to the literature

The review protocol, which followed the Preferred Reporting Items for Systematic Review (PRISMA; Tricco et al., 2018), identified a limited number of relevant papers (N=13). Nonetheless, findings concluded that parental technoference may be related to parental unresponsiveness. Further, adolescent perceptions of their parent's technoference were associated with poorer mental well-being, including anxiety, depression, life satisfaction and self-esteem, and to increased deviant behaviours, including cyberbullying and deviant peer affiliation. The review also validated potential psychological constructs which play an active role in how parental technoference can impact adolescent internalising and externalising behaviours.

However, major gaps within the literature were identified. Firstly, the review illustrated the scarcity of research exploring parental technoference, particularly within the UK, demonstrating the need for further research including the attitudes of adolescents, across broader geographies. Second, identified studies exploring the association between parental technoference and deviant behaviours focused solely on cyberbullying perpetration and deviant peer affiliation, highlighting a significant gap in the literature on the association between parental technoference and adolescent violence and aggression. In order to address the limitations within the current literature, a cross-sectional study was conducted, gathering the perspectives of a cohort of adolescents on electronic device use within the home.

The findings of the scoping review highlight parental technoference as a potential risk factor to adolescent health and behaviour and can aid in the development of evidencebased guidelines for families regarding the use of digital technology within the household. In addition, the review illustrates the significance and direction of future research exploring the caveats of parental technoference.

4.3. Empirical Study

A cross-sectional study was employed across three secondary schools in North Wales (Chapter 3). The attitudes of 673 adolescents aged between 12 and 15 years were gathered via a self-completion questionnaire, in order to explore the impact of technoference within the parent-adolescent relationship. The main aim was to investigate the implications of parental technoference on adolescent's own technoference; deviant behaviours (aggression, physical fighting, cyberbullying, delinquency, drug and alcohol use); and mental well-being (anxiety, depression), as mediated through parental warmth.

4.3.1. Contribution to the Literature

Electronic device use within the family context. Findings identified that almost all adolescents reported their own and their parent's electronic device ownership (97.5% vs 100%, respectively), with the mobile phone being the most popular choice of device for both adolescents and parents (97.1% and 97.4%, respectively). These figures are consistent with a recent Ofcom report (2021), which identified the mobile phone as the most commonly used device across all age groups. Almost all adolescents (97.3%) reported their electronic device use as 'average' to 'high', which coincides with the Children's Commissioner for England's report in 2020, revealing that 98% of children aged 10 to 15 years identified that they went online daily.

The findings also revealed that technology can be used as leverage, with one in three adolescents (35.6%) reporting having parents who use electronic device use as a form of punishment; whilst one in five (18.3%) stated that electronic device use is utilised as a reward. The characteristics of the sample not only provide insight into digital device use within the family context, but also illustrate the prevalence and power technology holds in the lives of families.

Parental electronic device use during interactions with adolescents. A relatively low number of adolescents (34.8%) reported their parent's engagement in technofence during interactions with them at least 'sometimes', suggesting that this is not a frequent experience for adolescents. Of these, 12% reported parental technofence as 'very often' or 'always'. Results for the higher end of the scale are consistent with the study by Stockdale et al., (2018) in which 12% of adolescents reported parental technofence 'quite a bit' or 'a great deal'. However, when considering the proportion of adolescents who stated that parental technofence occurred only 'sometimes', there is variability across locations, with 77.5% of adolescents in America reporting parental technofence as 'sometimes' (Stockdale et al, 2018); alongside a reported prevalence rate of 87.5% in Chinese adolescents (Lie et al., 2020a). A number of reasons could account for lower levels of reported parental technofence within the current study. One potential reason for the contrast could be the fact that the current study utilised a global scale (The Technofence Scale; McDaniel and Coyne, 2014) to assess the prevalence of parental technofence. Given that previous investigations have been conducted within America (Stockdale et al., 2018) and China (Lie et al., 2020a), there may be cultural differences in interpreting what constitutes 'sometimes'. Alternatively, the lower levels of parental technofence may be a reflection of the guidance provided by Chief Medical Officers within the UK on developing healthy and balanced family screen use (GOV.UK, 2019)

Attitudes of adolescents towards parental electronic device use. Over half of all adolescents reported that they did not feel bothered by their parent's technoference during family activities. These results suggest that for many adolescents, some form of parental technoference is a normative part of living in a digital world and therefore does not evoke a negative response (Stockdale et al., 2018). Alternatively, adolescents who consistently experience parental unresponsiveness due to parental technoference may become desensitised to the experience (Bai et al., 2020a). Children and adolescents are at risk of developing an avoidant attachment style when consistently exposed to parental unresponsiveness or rejection (Ainsworth and Bell, 1970) which is characterised by inhibited expression of distress. In the case of parental technoference, it is suggested to diminish parental responsiveness (McDaniel, 2019; Radesky et al., 2015), thus, adolescents with avoidance attachment styles will be less likely to report being impacted by the experience (Bai et al., 2020). The impact of avoidant attachment on adolescents means that they will be less trusting towards others and may fail to create secure attachments in the long term (Sadikaj et al., 2018). Considering the dominance of digital technology within families, opportunities for repeated parental unresponsiveness may be abundant, thus highlighting parental technoference as a risk factor to children's attachment styles.

It is important to note that approximately one in ten adolescents reported they felt negatively towards their parent's technoference. Over a tenth of adolescents (14.9%), revealed that they feel sad when their parent uses their device when supporting them at an event, compared to 9.0% who reported sadness when their parent uses their device during time spent as a family, and 7.9% during a conversation between themselves and their parent. During adolescence, individuals enter a new phase of social-psychological development which represents greater autonomy, meaning that adolescents require less proximity to parents (Mareti and Paled, 2004). Nonetheless, sensitive and attuned parenting continues to be essential in adolescent outcomes during this stage of development (Doyle, Moretti and Ottawa, 2000). Consistently, findings herein bring attention to the reality that

adolescents potentially expect their parents to be responsive and attentive at certain times that are important to them. This suggests that adolescents' feelings towards parental technoference may be context specific and is an area which requires further exploration.

Associations between parental electronic device use and parental responsiveness.

Adolescents who reported higher levels of parental technoference reported lower levels of parental warmth, echoing the existing literature within Chapter 2. This identifies that adolescents feel less cohesion from their parents when they are immersed in their electronic device. These findings also reinforce previous studies which suggested that parental technoference can result in parental unresponsiveness (Radesky et al., 2015); poorer quality parenting (Kildare and Middlemiss, 2017); and fewer parent-child interactions (Hiniker et al., 2015).

Parental warmth defines the nurturing, caring and supportive responses of a parent towards their child (Rettew, 2015). However, according to the displacement hypothesis (Newman, 1988), time spent on electronic devices may displace time a parent spends with their adolescent, decreasing opportunities for sensitive parenting and attuned interactions. Given that we are now experiencing a digital revolution, electronic devices are commonly present during family interactions, giving rise for parents to frequently displace their time on devices (Kildare and Middlemiss, 2017). When parents consistently allow electronic devices to interrupt parent-adolescent interactions, adolescents may feel ignored and neglected, which can discourage feelings of parental cohesion; a key foundation in adolescent attachment (Bowlby, 1979). Parental warmth is considered a protective factor to adolescent outcomes, thus, parental technoference as a reflection of parental unresponsiveness could make adolescents more vulnerable to mental illness and deviant behaviours (Stockdale et al., 2018).

Implications of parental electronic device use on adolescent's electronic device use.

Adolescents who experienced parental technoference reported greater levels of their own

technoference; which is consistent with previous research illustrating a positive correlation between parental technoference and adolescent technoference (Stockdale et al., 2018; Bai et al., 2020). This could be interpreted as the direct modelling of parental technological habits, which are replicated by adolescents (Bandura, 1971). Repeated parental behaviours, such as checking their device during a conversation, or ignoring others in favour of their device may be imitated by adolescents and allow the formation of mental representations of digital device use (Solecki, 2016). Moreover, the current study specifically focuses on adolescents, a period during which individuals begin to gain increased autonomy over their device use, compared to younger children (Ofcom, 2021). As such, parents may be setting an unhealthy precedent for the electronic device use of adolescents. In line with this assumption, studies have found associations between parental technoference and adolescent mobile phone addiction, which further suggests adolescent media use is informed by observing the electronic device behaviours of their parents (Xie et al., 2019). It is important to note that historically, researchers have consistently identified associations between parent and children's technology use, however, it is argued that digital technology easily surpasses that of previous technology components such as television and radio (Orben and Przybylski, 2019).

The impact of parental digital device use on adolescent deviant behaviour.

Adolescents who reported their parent's technoference were found to have greater levels of cyberbullying perpetration, which supports previous studies indicating that parental technoference can predict adolescent online bullying (Stockdale et al., 2018; Xie et al., 2019; Qu et al., 2020; Wang et al., 2020b; Wei et al., 2021). The current study is also the first to report associations between parental technoference and adolescent violence and aggression. Adolescents who experienced parental technoference were found to have increased levels of aggression and engagement in physical fighting, which corresponds with previous research by Wang et al., (2021), in which a positive association was found between parental technoference and aggressive behaviour in children aged four to 10 years of age.

Furthermore, this study is the first to examine the implications of parental technoference on the drug and alcohol use of adolescents, with results identifying adolescents reports of parental technoference were associated with increased use of at least one type of drug or alcohol. The association between parental technoference and adolescents' drug and alcohol use was significantly higher in older adolescents as well as within boys, and adolescents from the most deprived quintile. These results are consistent with previous research which demonstrate that the socioeconomic status of adolescents can predict negative behaviours, reporting associations between adolescents from poorer deprivation backgrounds and greater substance abuse (Patrick et al., 2012; Shaw et al., 2007).

Parental technoference as a risk to parental responsiveness, could potentially exacerbate the deviant behaviours of adolescents (Stockdale et al., 2018). When parents consistently allow their electronic device use to interfere with parent-adolescent interactions, it is possible that they are directly implying that their electronic device is more significant than their adolescent, which can lead to feelings of rejection and frustration (McDaniel and Coyne, 2016). According to the frustration aggression theory (Berkowitz, 1989), adolescents who have significant feelings of frustration in the face of their parent's technoference, may engage in displaced aggression such as bullying innocent victims online or aggression towards others offline.

In the same vein, whilst risky behaviour is a significantly prevalent and normative behaviour during adolescence, it is widely documented that those who experience unsupportive parenting are more likely to experiment with drugs and alcohol (Calafet et al., 2014; Hughes et al., 2019) tobacco use (White, Johnson and Buyske, 2000); and risky sexual behaviours (Deptula Henry and Schoeny, 2010). Research identifies that adolescents who receive less parental apathy are more likely to engage in negative behaviours in a bid for their parent's responsivity (Moretti and Peled, 2004). Thus, adolescent drug and alcohol use may be amplified in an attempt to gain parental attention. The current findings enrich

previous research, suggesting that parental technoference as a form of parental rejection could be a threat to the deviant behaviours of adolescents including cyberbullying, aggression and substance use.

Implications of parental technoference on adolescent mental well-being. Parental technoference was associated with adolescent anxiety and depression, which corresponds with previous research demonstrating that parental technoference can negatively influence adolescent mental health (Stockdale et al., 2018; Xie et al., 2019; Xie and Xie, 2020; Wang et al., 2020; Bai et al., 2020; Liu et al., 2020a; Liu et al., 2020b; Geng et al., 2021; Bai et al., 2021). The correlation was significantly higher in girls compared to boys, confirming prior evidence that female adolescents are twice as likely to develop anxiety and depression than male adolescents (Anderson and Teicher, 2009; WHO, 2017)

Securely attached adolescents are less susceptible to mental illness, such as anxiety and depression (Cooper et al., 1998; Howard and Medway, 2004). Further, supportive relationships with a parent allow adolescents to cope with adversities, and aid in the development of a healthy response system to stress (Hughes et al., 2020). However, when parents consistently allow electronic devices to interrupt parent-adolescent interactions, adolescents may have a strong sense of parental rejection which can significantly increase their vulnerability to mental illness (Wang et al., 2020b).

Adolescence is a period in which individuals are more receptive to social rejection and is a critical period for stress, due to the key neurological developments which occur during this phase (Orben and Przybylski, 2019). Adolescents are often perceived as being at their healthiest, nonetheless, diminished well-being during this period can have a detrimental and long-term impact to their quality of life (Grimes, Anderson, and Bergen 2008). Research identifies that almost half of all mental illnesses develop by the age of 14, thus, the findings herein highlight parental technoference as a critical risk factor to adolescent mental health (OECD, 2012).

Mediating mechanisms of parental technoference. Previous research highlighted that parental warmth can mediate the association between parental technoference and adolescent internalising and externalising behaviours (Stockdale et al., 2018, Xie et al., 2019). However, although adolescents who reported parental technoference within the current study were found to perceive lower levels of parental warmth, the strength of associations between parental technoference and adolescent deviant behaviours in addition to lower mental wellbeing were still significant, even after controlling for parental warmth. These findings suggest that there may be alternative factors which may mediate the indirect impact parental technoference on adolescent outcomes. Previous literature identified potential psychological constructs which may influence the implications of parental technology to adolescent internalising and externalising outcomes (Geng et al., 2021; Bai et al., 2020; Wang et al., 2020). Accordingly, the current findings contribute to the literature base which aims to identify those who are most vulnerable to the impact of parental technoference.

4.4. Future Implications

This thesis suggests that parental technoference can have a markable impact on adolescence outcomes. As such, it offers significant practical implications which be discussed. Firstly, the proportion of adolescents reporting their parents technoference was relatively low, which could illustrate a cultural difference between the existing literature. Digitalization is expected to continue into the future, thus it is crucial to fully understand the interface of parental technoference and adolescent outcomes within difference populations. Evidence presented herein also implies that the impact of parental technoference may be context specific, given that the highest percentage of adolescents indicated that they feel sad when their parent uses their device when supporting them in an activity. This suggests that adolescents expect their parents to be responsive during times they consider

themselves to be the pinnacle of activities. These findings highlight the need for further research exploring the contextual factors related to parental technoference, as well as the importance of reminding parents, that regardless of their increased autonomy, adolescents still require their proximity and responsivity during times they consider at important. Parental technoference was also identified as a potential predictor of adolescent avoidant attachment styles, with the majority of adolescents reporting that they were not impacted by the experience. Given the implications of avoidant attachment styles upon adolescents, future research is required to fully understand how parental technoference can impact parent adolescent attachment.

The current thesis illustrates the significance of parental technology use in shaping adolescent's own technology device use. Findings indicate that parental technoference can positively predict adolescent technoference. This is of concern, given that parents' screen time increased with adolescent screen time, which suggests that parents may not be modelling appropriate device use to adolescents. In view of parents as primary role models for adolescents (Grusec, 2011), it is important for parents to be aware of their influence on adolescent technological behaviours and set an example of where and when is appropriate to use devices. Furthermore, adolescents do not react favourably to parental hypocrisy, therefore, educating families regarding appropriate electronic device use would allow families to agree mutual boundaries regarding their electronic device use (Blum-Ross and Livingstone, 2016).

A strong association between parental technoference and adolescent anxiety and depression was found in the present study. This finding provides evidence that parental technoference, as a reflection of parental unresponsiveness, could be a risk factor to poorer mental well-being in adolescents. Mental illness represents a significant burden in 15 to 49 years olds, leading the WHO (2017) to emphasise the need for intervention. With half of all mental illnesses beginning at the age of 14 (OECD, 2021), raising awareness of the potential caveats of parental technoference to adolescent mental health is crucial. It is unrealistic to

cease the use of electronic devices, thus, interventions focusing on building resilience in adolescents through promoting supportive parenting are salient.

The current findings also enrich existing research on the association between parental technoference and adolescent cyberbullying, and address a major gap within the literature, that is, how parental technoference can impact adolescent aggression, drug and alcohol use and delinquent behaviours. It is well documented that antisocial behaviours recur in families over multiple generations (Farrington, 2011; Thornberry, 2009), and that supportive parenting is a major protective factor. Consequently, in order to reduce the intergenerational cycle of deviant behaviours that parental technoference may elicit, parents should be made aware of the potential risks to parent-adolescent relationships and the outcomes thereafter.

The empirical study found a strong association between parental technoference and parental warmth. However, even when including parental warmth as a confounder, negative adolescent outcomes were independently associated with experiencing parental technoference. These findings indicate a need for further research into the confounding factors between parental technoference and adolescent outcomes. Identifying those most vulnerable to parental technoference provides opportunities to construct resilience building strategies within adolescence which could lead to improved outcomes in adulthood.

On the whole, this thesis suggests that parents should be aware of their environment during their electronic device use and how this can directly and indirectly impact behaviours and well-being. Adolescent health and wellbeing form the foundation for society's future human capital, a tool for building prosperity in the future (Kane et al., 2017). Accordingly, ensuring the health and welfare of the next generation is the responsibility of national and international organisations (WHO, 2022). Technology is continuously evolving, and we are currently at the helm of a digital revolution, in which the potential ramifications of digital technology use will be unknown for years to come (Orben, 2016). However, to advise families to abstain from technology use altogether would be unrealistic, and instead a more

sustainable solution would be to enable individuals to gain control over their device use (Bellis et al., 2021). It is therefore essential that policy and guidelines are created to inform parental management of their devices within the family context.

Strengths

As technoference is considered a relatively new phenomena, the main strengths of this thesis is it's novelty. As such, the findings describe new outcomes which may yet to be reported within research. To the best of the author's knowledge, the scoping review is the first to identify studies which explore the implications of parental technoference upon adolescent mental wellbeing and deviant behaviour. In addition, the cross-sectional study design allowed the inclusion of a large sample of participants which enabled the comparison across variables, and to the best of the author's knowledge, is the first to investigate the association between parental technoference and adolescent internalising and externalising behaviours in the UK.

Further, the reliability and validity of the study is strengthened through the piloting of the data collection measure with a young people's advisory group (Cohen et al., 2018) . The findings contribute to the existing evidence base on adolescents' attitudes regarding digital device use within the family context and will inform policy and guidelines regarding family management of digital technology. The perspectives of adolescents have been relatively ignored when investigating parental technoference (Stockdale et al., 2018). Accordingly, this thesis provided a platform for adolescents to offer their views on issues which may impact them, which is recognised as their fundamental right under the United National Convention on The Rights of the Child (1989). Obtaining the attitudes of adolescents within this thesis also contributes to one the main principles of the United Nations Sustainable Development Goals, which aims to promote the wellbeing of all individuals with a focus on preventative problems (Kane et al., 2018).

Limitations

There were limitations in the present study, which can be addressed in future studies. First, the cross-sectional study design limited the opportunity to explore causal relationships, therefore, future longitudinal research would allow the evaluation of potential risk factors between parental technoference and adolescent outcomes by analysing the characteristics of participants over a length of time. Second, adolescents self-reported on digital device use and their internalising and externalising behaviours, which may be influenced by social desirability bias. Adopting multiple measurements in future research would increase the objectivity and validity of results. Third, the thesis concentrated on the developmental period of adolescence. Although some of the findings may be generalisable to other age groups, due to developmental differences, the reaction to parental technoference may be age specific (Abels et al., 2018). Subsequent research should place emphasis on more diverse age ranges.

4.5. Conclusion

This thesis included a scoping review which is the first to identify and summarise studies exploring the implications of parental technoference upon adolescent internalising and externalising behaviours. The cross-sectional study obtained the attitudes of adolescents to explore the association between parental technoference and adolescent outcomes. Overall, the findings of this thesis indicate that parental technoference, as a reflection of parental unresponsiveness, may predict adolescents' own engagement in technoference; increased deviant behaviours; and poorer mental well-being.

The findings contribute to the emerging evidence base on the implications of parental technoference and provide direction for future research on the association between parental electronic device use adolescent outcomes. Given the increasing diversity of digital technology and its prominent position in family life, it is critical that parents are

aware of the caveats of technoference, especially considering the impact to adolescent health and behaviours. Subsequently the findings of this thesis could inform the development of realistic, evidence-based guidelines on technology use within the family environment aimed at reducing technoference within the parent-adolescent relationship.

References

- Abels, M., Vanden Abeele, M., van Telgen, T., van Meijl, H. (2018). *Nod, nod, ignore: An exploratory observational study on the relation between parental mobile media use and parental responsiveness towards young children*. In Eva M. Luef M, Manuela M, Marin, M (Eds.) *The talking species: Perspectives on the evolutionary, neuronal, and cultural foundations of language* Graz, Austria: Uni-Press Verlag P. 195-228
- Ainsworth, M., & Bell, M. (1970). *Attachment, exploration, and separation: Illustrated by the behavior of one-year-olds in a strange situation* Child Development Vol 41(1) p. 49–67
- Amato, P., & Ochiltree, G. (1987). *Interviewing children about their families: A note on data quality* Journal of Marriage and the Family Vol 49(3) p. 669–675
- Andersen, S., & Teicher, M. (2009). *Desperately driven and no brakes: developmental stress exposure and subsequent risk for substance abuse*. Neuroscience Biology and behavior. Vol 33(4) p. 516-24
- Ashton, K., Bellis, M., Davies, A., Hardcastle K., Hughes, K. (2016). *Adverse Childhood Experiences (ACEs) and their association with chronic disease and health service use in the Welsh adult population*
- Backman, H. (2021). *Parental Warmth and Hostility and the Development of Psychopathic Behaviors: A Longitudinal Study of Young Offenders*. Journal of child and family studies. Vol 30(4) p. 955–965
- Bai, Q., Lei, L., Hsueh, F., Yu, X., Wang, X., Wang, P. (2020a). *Parent-Adolescent Congruence in Phubbing and Adolescents' Depressive Symptoms: A Moderated Polynomial Regression with Response Surface Analyses*. Journal of affective disorders Vol 275 p.127–135.

Bai, Q., Bai, S., Dan, Q., Lei, L., Wang, P. (2020b). *Mother Phubbing and Adolescent Academic Burnout: The Mediating Role of Mental Health and the Moderating Role of Agreeableness and Neuroticism*. *Personality and individual differences* Vol 155

Babbie, E., & Allen, R. (2010). *Research Methods for Social Work* 7th Edition. Canada: Brook Cole

Bandura, A. (1978). *Social Learning Theory of Aggression*. *Journal Of Communication*. Vol 28 p.12-29.

Barrance, R. (2019). *Beth Nawl? The survey results and analysis of the experiences and worries of children and young people in Wales and their priorities for the Children's Commissioner* Children's Commissioner for Wales

Beamish, N., Fisher., J. Rowe., H. (2018). *Parents' use of mobile computing devices, caregiving and the social and emotional development of children: a systematic review of the evidence* *Australian Psychiatry* Vol 27(2) p. 132–143

Bellis, M., Sharp, C., Hughes, K., Davies, A. (2021.) *Digital Overuse and Addictive Traits and Their Relationship With Mental Well-Being and Socio-Demographic Factors: A National Population Survey for Wales*. *Frontiers in public health* doi: 10.3389/fpubh.2021.585715

Bentley, K., Cohen, D, Kim, T Bullis, J. et al. (2001). *The Nature, Timing, and Symptom Trajectories of Dropout From Transdiagnostic and Single-Diagnosis Cognitive-Behavioral Therapy for Anxiety Disorders* *Behavior Therapy* Vol 52 (6)

Berkowitz, L. (1989). *Frustration-aggression hypothesis: Examination and reformulation*. *Psychological Bulletin* Vol 106 p. 59-73.

Blum Ross, A., & Livingstone, S. (2020). *Parenting for a Digital Future: How Hopes and*

Fears about Technology Shape Children's Lives New York: Oxford Academic

Bogenschneider, K., Small, S. A., Tsay, J. C. (1997). *Child, parent, and contextual influences on perceived parenting competence among parents of adolescents*. Journal of Marriage and Family Vol 59 p. 345–362.

Borawski, E., Levers-Landis, C., Lovegreen, L., Trapl, E. (2003). *Parental monitoring, negotiated unsupervised time, and parental trust: The role of perceived parenting practices in adolescent health risk behaviors*. Journal of Adolescent Health Vol 33 p 60–70

Borgers, N., de Leeuw, E., Hox, J. (2000). *Children as Respondents in Survey Research: Cognitive Development and Response Quality 1*. Bulletin Of Sociological Methodology Vol 66(1) p. 60-75.

Bornstein, M., Putnick, D., Lansford, J., Pastorelli, C., Skinner, A., Sorbring, E. (2014). *Mother and father socially desirable responding in nine countries: Two kinds of agreement and relations to parenting self-reports*. International Journal of Psychology. Vol 50 (3), p. 174-185

Bornstein, M. (2015). *Children's parents*. In M. H. Bornstein, T. Leventhal, & R. M. Lerner (Eds.), *Handbook of child psychology and developmental science: Ecological settings and processes* John Wiley & Sons. Vol 201 p. 55–132

Braune-Krickau, K., Schneebeil, L., Pehlke-Milde, J., Gemperl, M., Koch, R., Wyl, A. (2021). *Smartphones in the Nursery: Parental Smartphone Use and Parental Sensitivity and Responsiveness Within Parent–child Interaction in Early Childhood (0–5 Years): A Scoping Review*. Infant mental health journal. Vol 42(2) p. 161–175.

Brendgen, M., Vitaro, F., Tremblay, R. E., & Lavoie, F. (2001). *Reactive and proactive aggression: Predictions to physical violence in different contexts and moderating effects of*

parental monitoring and caregiving behavior Journal of Abnormal Child Psychology Vol 29 p. 293–304

Bowlby, J. (1979). *The Bowlby-Ainsworth attachment theory* Behavioral And Brain Sciences Vol 2 p. 637-638

Calafell, R., Gutiérrez-Maldonado, J., Ribas-Sabaté, J., Lemos-Giráldez, S. (2014). *Social Skill for people with Schizophrenia? What do we train?* Psicología conductual Vol 22

Chen, X., Liu, M., Li, D. (2000). *Parental warmth, control, and indulgence and their relations to adjustment in Chinese children: A longitudinal study* Journal of Family Psychology Vol 14(3) p. 401– 419

Chesley N. (2010). *Technology use and employee assessments of work effectiveness, workload, and pace of life* Information, communication & society Vol 4 p. 485–514

Cohen, L., Manion, L., Morrison, K. (2018). *Research Methods in Education*. 7th edition Hoboken: Taylor and Francis

Cooper, M., Shaver, P., Collins, N. (1998). *Attachment styles, emotion regulation, and adjustment in adolescence* Journal of Personality and Social Psychology Vol 74(5) p1380–1397

Dahlberg, L. (2005). *Measuring Violence-Related Attitudes, Behaviors, and Influences Among Youths: A Compendium of Assessment Tools* 2nd Edition Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control

David, E., & Roberts, J. (2017). *Phubbed and Alone: Phone Snubbing, Social Exclusion, and Attachment to Social Media*. Journal of the Association for Consumer Research. Vol 2: p. 155–163.

Davies S.C., Atherton F., Calderwood C., McBride M. United Kingdom. (2019). *Chief Medical Officers' commentary on 'Screen-based activities and children and young people's mental health and psychosocial wellbeing: a systematic map of reviews'*. Department of Health and Social Care

Deptula, D., Henry, D., Schoeny, M. (2010). *How can parents make a difference? Longitudinal associations with adolescent sexual behavior*. *Journal of Family Psychology*. Vol 24 p. 731–739

de Leeuw, E. (2012). *Counting and Measuring Online: The Quality of Internet Surveys*. *Bulletin de méthodologie sociologique* Vol 114(1) p 68–78

de Vellis, R. (2016). *Scale Development: Theory and Applications: 26 (Applied Social Research Methods)* London: Sage Publications

Dillman, D., & Smyth, J. (2007.) *Design effects in the transition to web-based surveys*. *Journal of Medicine* Vol 26(7)

Dillman, D. Smyth, J., Christian, L. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method* 4th Edition Hoboken: John Wiley & Sons, Inc

Doyle, A., and Moretti, M. (2001). *Attachment to parents and adjustment to adolescence: Literature review and policy implications*. Health Canada, Child and Family Division

Farrell, A., Anderson, J., McGuire, E., White, K., Valois, R. (2000). *The Structure of Self-Reported Aggression, Drug Use, and Delinquent Behaviors During Early Adolescence* *Journal of Clinical Child Psychology* Vol 29 (2) p. 282-92

Farrington, D. (2011). *Families and crime*. In: Wilson JQ, Petersilia J, editors. *Crime and public policy*. Oxford University Press: New York: p 130–157

Geng, J., Lei, L., Ouyang, M., Nie, J., Wang, P. (2021). *The Influence of Perceived Parental*

Phubbing on Adolescents' Problematic Smartphone Use: A Two-Wave Multiple Mediation Model. Addictive behaviors Vol 121

Gergen, K. (2002). *The challenge of absent presence.* In Katz J. Aakhus M. *Perpetual contact: Mobile Communication, Private Talk, Public Performance.* Cambridge: University Press p. 227-241

Gov.UK. (2019) Young persons behaviour and attitude survey 2019

<https://www.gov.uk/government/statistics/young-persons-behaviour-and-attitude-survey2019>

Grimes, T., Anderson, J., Bergern, L. (2007). *Media Violence and Aggression: Science and Ideology* London: Sage Publications

Grusec, J. (2011). *Socialization Processes in the Family: Social and Emotional Development.* Annual review of psychology. Vol 62: p. 243–269

Haeger, H. (2012). *Using Cognitive Interviews to Improve Survey Instruments* New Orleans: Association for Institutional Research

Harmon, E., & Mazmanian, M. (2013). *Stories of the Smartphone in everyday discourse.* CHI Conference on Human Factors in Computing Systems p. 1051-1060

Haw, N., & Rupert, M. (2015). *Impact of e-discipline on Children's Screen Time.* Cyberpsychology Behaviour Social Network. Vol 18 (6) p. 337-42

Howard, M., & Medway, J. (2004). *Adolescents' Attachment and Coping With Stress.* Psychology in the Schools Vol 41(3) p. 391–402

Hiniker, A., Sobel, K., Suh, H., Sung, Y., Lee, C., Kientz, J. (2015). *Texting while Parenting.* Proceedings Of The 33rd Annual ACM Conference On Human Factors In Computing Systems

- Hiniker, A., Schoenebeck, S., Kientz, J. (2016). *Not at the Dinner Table: Parent's and Children's Perspectives on Family Technology Rules*. Proceedings Of The 19Th ACM Conference On Computer-Supported Cooperative Work & Social Computing
- Hughes, K., Ford, K., Kadel, R., Sharp, C., Bellis, M. (2020). *Health and financial burden of adverse childhood experiences in England and Wales: a combined primary data study of five surveys*. BMJ Open Vol 10(6)
- Hughes, K., Bellis, M., Sethi, D., Andrew, R. et al. (2019.) *Adverse childhood experiences, childhood relationships and associated substance use and mental health in young Europeans* European Journal of Public Health Vol29(4) p. 741–747
- Ibarra, L., Diener-West, M., Leaf, P. (2007). *Examining the overlap in internet harassment and school bullying: Implications for school and intervention*. Journal of Adolescent Health Vol 41 p 42–50
- Inchley, J., Stevens G., Samdal, O., Currie D. (2018). *Enhancing Understanding of Adolescent Health and Well-Being: The Health Behaviour in School-Aged Children Study* Journal of adolescent health Vol 66(6)
- Jessor R., & Kessor, S. (1977). *Problem behaviour and psychological development: A longitudinal study of youth* New York: Academic Press
- Johnson, R. (2004). *Mixed Methods Research: A Research Paradigm Whose Time Has Come*. Educational Researcher Vol 33(7) p 14–26.
- Kane, J., Harris, K., Guilkey, D. (2018). *Pathways of Health and Human Capital from Adolescence into Young Adulthood*. Society Forces Vol 96 (3)
- Kildare, C., & Middlemiss, W. (2017). *Impact of parents mobile device use on parent-child interaction: A literature review*. Computers In Human Behavior Vol 75 p. 579-593

- Knitter, B., & Zemp, M. (2020). *Digital family life: A systematic review of the impact of parental smartphone use on parent-child interactions* Digital Psychology Vol 1(1) p. 29-43
- Kushlev, K., and Dunn, E. (2018). *Smartphones distract parents from cultivating feelings of connection when spending time with their children* Journal Of Social And Personal Relationships Vol 36 p. 1619-1639.
- LeBlanc, A., Katzmarzyk, P., Barreira, T., Broyles, S., Chaput, J., Church, T. (2015). *Correlates of Total Sedentary Time and Screen Time in 9–11 Year-Old Children around the World: The International Study of Childhood Obesity Lifestyle and the Environment* Vol 10(6)
- Lemish, D., Elias, N., Floegel D. (2019). *"Look at me!" Parental use of mobile phones at the playground.* Mobile Media & Communication Vol 8(2): p.170-187
- Liu, J., Chen, X., Lewis, G. (2011). *Childhood internalizing behaviour: analysis and implications.* Journal Of Psychiatric and Mental Health Nursing Vol 18 p. 884-894
- Liu, J. (2004). *Childhood externalizing behavior-theory and implication.* Journal of Child and Adolescent Psychiatric Nursing Vol 17 p. 93–103
- Liu, Q., Wu, J., Zhou, Z., Wang, W. (2020a). *Parental Technoference and Smartphone Addiction in Chinese Adolescents: The Mediating Role of Social Sensitivity and Loneliness* Children and youth services review Vol 118
- Liu, K., Chen, W., Wang, H., Geng, J., Lei, L. (2020b). *Parental Phubbing Linking to Adolescent Life Satisfaction: The Mediating Role of Relationship Satisfaction and the Moderating Role of Attachment Styles.* Childcare, health & development Vol 47(2) p. 281–289

Mann, F., Kretsch, N., Tackett, J., Harden, K., Tucker-Drob, E. (2015). *Person environment interactions on adolescent delinquency sensation seeking, peer deviance and parental monitoring*. *Personality Individual Differences* Vol 76 p. 129–134

Moretti, M., Paled, M. (2004). *Adolescent-parent attachment: Bonds that support healthy development*. *Paediatric Children's Health* Vol 8 p. 551-555

Mason, W., Windle, M. (2022). *Gender, self-control, and informal social control in adolescence: A test of three models of the continuity of delinquent behavior* *Youth & Society* Vol 33(4) p. 479-514

McDaniel, B., Coyne, S., Holmes, E. (2011). *New Mothers and Media Use: Associations Between Blogging, Social Networking and Maternal Well-Being*. *Maternal and child health journal* Vol 16 p. 1509–1517

McDaniel, B. (2015.) *"Technoference": Everyday intrusions and interruptions of technology in couple and family relationships*. In C. J. Bruess (Ed.), *Family communication in the age of digital and social media* New York: Peter Lang Publishing

McDaniel, B., and Coyne, S. (2016.) *"Technoference": The interference of technology in couple relationships and implications for women's personal and relational wellbeing* *Psychology Of Popular Media Culture* Vol 5 p. 85-98

McDaniel, B., and Radesky, J. (2018). *Technoference: longitudinal associations between parent technology use, parenting stress, and child behavior problems* *Pediatric Research* Vol 84 p. 210-218.

McDaniel, B. (2019). *Parent distraction with phones, reasons for use, and impacts on parenting and child outcomes: A review of the emerging research*. Human Behavior And Emerging Technologies Vol 1 p. 72-80.

Mannica, D., Davidson, K., Marshall, S. (2011). *A Meta-analysis of Interventions That Target Children's Screen Time for Reduction* Paediatrics Vol 128 (11)

Meeus, A., Eggermont, S., Beullens, K. (2020). *Digital Distraction or Stimulated SelfDisclosure: Preadolescents' Mobile Device Use in the Family Context* Journal of Computer- Mediated Communication Vol 26 (55) p. 328–345

Mitchell, M., and Jolley, M. (2010). *Research design explained* 7th Edition Belmont, CA: Wadsworth Cengage Learning

Moran, K., Turiann, N., Gentzler, A. (2018). *Parental warmth during childhood predicts coping and well-being in adulthood* Journal of Family Psychology Vol 32 (5) p: 610-621

Munn, Z., Peters, M., Stern, C., Tufanaru, C., McArthur, A. (2018). *Aromataris, E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach* BMC Medical Research Methodology Vol 18: 143

Neuman, S. (1988). *The Displacement Effect: Assessing the Relation between Television Viewing and Reading Performance*. Reading Research Quarterly Vol 23 p. 414.

Ofcom (2020). Communications report

Available at <https://www.ofcom.org.uk/research-and-data/multi-sector-research/cmr>

Ofcom 2021. Online Nation 2021 report

Available at https://www.ofcom.org.uk/__data/assets/pdf_file/0013/220414/online-nation2021-report.pdf

Oduor, E., Neustaedter, C., Odom, W., Tang, A., Moallem, N., Tory, P. (2016). *The Frustrations and Benefits of Mobile Device Usage in the Home when Co-Present with Family Members* Proceedings Of The 2016 ACM Conference On Designing Interactive Systems

Olson, J., Sandra, D., Colucci, E. (2022). *Smartphone addiction is increasing across the world: A meta-analysis of 24 countries* Computers in Human Behavior Vol 129

Omrani, A., Wakefield-Scurr, J., Smith, J., Brown, N. (2019). *The Development and Psychometric Properties of A Survey to Assess Breast Knowledge and Attitudes of Adolescent Girls*. American Journal of Health Education Vol 50(6) p 374-389

Orben, A., & Przybylski, T. (2019). *The association between adolescent well-being and digital technology use*. Natural Human Behaviour Vol 2 p.173-182

Orben, A., Tobias, D., Przybylski, T. (2019). *Social Media's Enduring Effect on Adolescent Life Satisfaction* Proceedings of the National Academy of Sciences Vol 161(21)

Orpinas, P., Frankowski, R. (2003). *The Aggression Scale* Jjournal of Youth and Adolescents Vol 21 p. 50-67

Park, A., Bryson, C., and Curtice, J. (2014). *British Social Attitudes: the 31st Report*, London: NatCen Social Research, available online at: www.bsa-31.natcen.ac.uk

Patton, G., Sawyer., Santelli, J., Ross, D., Afifi, R. et al. (2016) *Our future: a Lancet commission on adolescent health and wellbeing* Lancet Vol 11 p. 387

Patrick, M., Wightman, P., Schoeni, R., Schulenberg, J. (2012). *Socioeconomic status and substance use among young adults: a comparison across constructs and drugs* Journal Studies of Alcohol Drugs Vol 73(5) p 772-82

PEW Research Centre. (2022). *Mobile Factsheet*.

Available at: <https://www.pewresearch.org/internet/fact-sheet/mobile/>

Qu, J., Lei, L., Wang, X., Xie, X., Wang, P. (2020). *Mother Phubbing and Adolescent Cyberbullying: The Mediating Role of Perceived Mother Acceptance and the Moderating Role of Emotional Stability* Journal of interpersonal violence Vol 37 p. 11-12

Radesky, J., Miller, A., Rosenblum, K., Appugliese, D., Kaciroti, N., Lumeng, J. (2015). *Maternal mobile device use during a structured parent–child interaction task*. Academic Pediatrics. Vol 15 p. 238-244

Radesky, J., Kistin, C., Eisenberg, S., Gross, J., Block, G., Zuckerman, B., Silverstein, M. (2016). *Parent Perspectives on Their Mobile Technology Use*. Journal Of Developmental & Behavioral Pediatrics. Vol 37(9) p. 694-701

Radesky, J., Kistin, C., Zuckerman, B., Nitzberg, K., Gross, J., Kaplan-Sanoff, M. (2014). *Patterns of Mobile Device Use by Caregivers and Children During Meals in Fast Food Restaurants* Pediatrics Vol 133

Radloff, L. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*. Vol 1(3) p. 385–401
Rettew, D. (2015). Parental warmth: Simple, powerful, and often challenging

Richardson, W., Wilson, M., Nishikawa, J., Hayward, R. (1995). The well-built clinical question: A key to evidence-based decisions. *ACP Journal Club* Vol123 pp12-13.

Roberts, J., and David, M. (2016). *My life has become a major distraction from my cell phone: Partner phubbing and relationship satisfaction among romantic partners*. Computers In Human Behavior Vol 54 p. 134-141

Robinson, C., Mandleco, B., Olsen, S., Hart, C. (2001). The Parenting Styles and Dimensions Questionnaire (PSDQ)

Sadikaj, G., Moskowi, D., Zuroff, D. (2018). *What's Interpersonal in Interpersonal Perception? The Role of Target's Attachment on the Accuracy of Perception* *Journal of Personality* Vol 86(4)

Scaramella, L., Conger, R., Simons, R. (1999). *Parental protective influences and genderspecific increases in adolescent internalizing and externalizing problems*. *Journal of Research on Adolescence* Vol 9 p. 111–141

Schwartz, J., Barton-Henry, M., Pruzinsky, T. (1985). *Assessing child-rearing behaviors: A comparison of ratings made by mother, father, child, and sibling on the CRPBI* *Child Development* Vol 56 p 462-479

Shaw, M., Galobardes, B., Lawler, N. (2007). *The handbook of inequality and socioeconomic position: Concepts and measures* London: Policy Press

Solecki, S. (2016) *The Smart Use of Smartphones in Pediatrics* *Journal of Pediatric Nursing* Vol 55 p. 6-9

Spitzer, F., Kroenke, K., Williams, J., Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* Vol 166(10) p. 1092-7

Statistica. (2022).

Available online at: <https://www.statista.com/statistics/278204/china-mobile-users-bymonth/>

Stiglic, N., and Viner, R. (2019). *Effects of screentime on the health and well-being of children and adolescents: a systematic review of reviews* *BMJ Open* Vol 9(1)

Stockdale, L., Coyne, S., Padilla-Walker, L. (2018). *Parent and Child Technoference and socioemotional behavioral outcomes: A nationally representative study of 10- to 20 yearOld adolescents* Computers In Human Behavior Vol 88 p. 219-226

Sun, J., Liang, K., Chi, X., Chen, S. (2021). *Psychometric Properties of the Generalized Anxiety Disorder Scale-7 Item (GAD-7) in a Large Sample of Chinese Adolescents* Healthcare (Basel) Vol 9(12) p. 1709

Tarantino, N., Tully, E., Garcia, S., South, S., Iacono, W., McGue ,M. (2014). *Genetic and environmental influences on affiliation with deviant peers during adolescence and early adulthood.* Developmental Psychology Vol 50 p. 663–673

Thornberry, T. (2009). *The apple doesn't fall far from the tree or does It? Intergenerational patterns of antisocial behavior--the American Society of Criminology 2008 Sutherland Address* Criminology Vol 47 p. 297–325

Tricco, A., Lillie, E., Zarin, W., O'Brien, K. (2018). *PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation* Ann Intern Med Vol 169(7) p. 467-473

UNICEF. (2019). *The United Nations Convention on the Rights of the Child*. London: UNICEF Available at <https://www.unicef.org.uk/what-we-do/un-convention-child-rights/>

United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. Available at <https://sdgs.un.org/2030agenda>

Vanden Abeele, M., Abels, M., Hendrickson, A. (2020). *Are parents less responsive to young children when they are on their phones? A systematic naturalistic observation study.* Cyberpsychology, Behavior, and Social Networking Vol 23 p. 363-370

Wang, X., Qiao, Y., Li W., Lei, L. (2021). *Parental Phubbing and Children's Social Withdrawal and Aggression: A Moderated Mediation Model of Parenting Behaviors and Parents' Gender* Journal of interpersonal violence

Wang, X., Gao, L., Yang, J., Zhao, F., Wang, P. (2020a). *Parental Phubbing and Adolescents' Depressive Symptoms: Self-Esteem and Perceived Social Support as Moderators* Journal of youth and adolescence Vol 49 p. 427–437

Wang, X., Wang, W., Qiao, Y., Gao, L., Yang, J., Wang, P. (2020b). *Parental Phubbing and Adolescents' Cyberbullying Perpetration: A Moderated Mediation Model of Moral Disengagement and Online Disinhibition*. Journal of interpersonal violence Vol 37(1) p. 1-23

Wei, H., Ding, H., Huang, F., Zhu, L. (2021). *Parents' phubbing and cyberbullying among adolescents: the mediation of anxiety and the moderation of zhongyong thinking*. International Journal of Mental Health and Addiction

Welsh Government. (2014). *Welsh Index of Multiple Deprivation (WIMD)*. Crown. Available at: <https://statswales.gov.wales/Catalogue/Community-Safety-and-Social-Inclusion/WelshIndex-of-Multiple-Deprivation>

White, H., Johnson, V., Buyske, S. (2000). *Parental modeling and parenting behavior effects on offspring alcohol and cigarette use: A growth curve analysis*. Journal of Substance Abuse Vol 12 p. 287–310

WHO. (2017). World Health Organisation: Mental Health Disorders Available at: <https://www.who.int/news-room/fact-sheets/detail/mental-disorders>

WHO. (2022). World Health Organisation (2022) *Adolescent health* Available at: https://www.who.int/health-topics/adolescent-health#tab=tab_1.

Xie, X., & Xie, J. (2020). *Parental Phubbing Accelerates Depression in Late Childhood and adolescence: A Two-Path Model*. *Journal of adolescence* Vol 78 p. 43–52

Xie, X., Chen, W., Zhu, X., He, D. (2019). *Parents' Phubbing Increases Adolescents' Mobile Phone Addiction: Roles of Parent-Child Attachment, Deviant Peers, and Gender*. *Children and youth services review* Vol 105

Zhang, Y., Ding, Q., Wang, Z. (2021). *Why Parental Phubbing Is at Risk for Adolescent Mobile Phone Addiction: A Serial Mediating Model*. *Children and youth services review*. Vol 121

Zimmermann, J., Eisemann, M., Fleck, M. (2008). *Is Parental Rearing an Associated Factor of Quality of Life in Adulthood?* *Quality of life research* Vol 17 p. 249–255

Appendix 2.1.

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	No
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	6
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Attachment 2
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Additional File 1

Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	No
SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Additional File 1
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Additional File 2, 3 and 4
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	n/a
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Additional File 2, 3 and 4
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	6-9
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	10 - 15
Limitations	20	Discuss the limitations of the scoping review process.	15
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	15-16
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	16

JB1 = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and MetaAnalyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote). ‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JB1 guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: [10.7326/M18-0850](https://doi.org/10.7326/M18-0850).

Appendix 2.2

	Risk of bias domains					Overall
	D1	D2	D3	D4	D5	
Bai et al 2020						
Bi et al 2021						
Geng et al 2021						
Liu et al 2020a						
Liu et al 2020b						
Qu et al 2020						
Stockdale et al 2018						
Wang et al 2020b						
Xie et al 2019						
Xie and Xie 2020						
Zhang et al 2021						

Domains:

D1: Randomisation process

D2: Deviations from the intended intervention

D3: Missing outcome data

D4: Measurement of the outcome

D5: Selection of the reported result.

Judgment

Low



Moderate



Appendix 3.1

Behavioural and health impacts of raising children in a digital household

Student Questionnaire

You are being asked to take part in this research study by Bangor University and Public Health Wales which aims to understand the impact of parental use of electronic devices during interactions with their child. The answers that you give will help us learn about the impact on young people's electronic device use, risk-taking behaviour and mental health.

You have been asked to take part because your secondary school has agreed to take part and all students in year 8 or 10 have been invited. Please read each sentence carefully. There are no right or wrong answers and you can stop at any time for any reason.

You will be completing this questionnaire anonymously, this means your name and the answers you give, cannot be put together. This also means, once you submit your answers, we will not be able to know which answer is yours, so you won't be able to take your answers out (withdraw). As your answers will be anonymous, if anything upsets you or you would like to speak to someone about a topic in the questionnaire, please speak to a member of staff in your school or a trusted adult. You will also be given a leaflet of places that offer support at the end of the session.

Please provide your consent to take part

☐

I consent to take part (please tick the box)

Part 1 - General information

To start, please answer the questions below to help us know a bit about you

1. What is your gender?

Girl	Boy	Prefer not to say

2. What is your age? _____ Prefer not to say _____

3. Please enter your full postcode
_____ Prefer not to say _____

4. All families are different (for example, not everyone lives with their parents, sometimes people live with just one parent, or they have two homes or live with two families). Please answer the question based on **where you live most of the time**. If you live in each house for equal amounts, please answer based on the house you were at this morning.

Who do you consider to be the main parent/caregiver within your home? Please select one of the following:

Mum	
Dad	
Step Mum	
Step Dad	
Sibling (brother/sister)	
Grandmother	
Grandfather	
Aunt	

Uncle	
Foster Carer	
Other	
I don't want to answer	

Part 2 - Your electronic device use

We would like to find out about your electronic device use. In this section, you will be asked questions about how you use electronic items.

5. Do you own any of the following electronic devices (please tick **all that apply**)

Tablet / I Pad	
Desktop computer	
Laptop	
Mobile phone	
Games console e.g.Xbox	
Other electronic device	
I do not own an electronic device	
I don't want to answer	

6. How would you rate the amount of time you spend on electronic devices? (please select **one** of the following)

Low	
Average	
High	
I don't want to answer	

The following questions relate to a parent / caregiver. Please answer each question thinking of the person you answered as your main parent / caregiver at the beginning of the questionnaire.

7. When using your electronic device during interactions with your parent / caregiver, how would you rate the following behaviours on a scale of 1-6

	6 Never	5 Rarely	4 Sometimes	3 Often	2 Very often	1 All the time	I do not want to answer
I ignore my parent / caregiver when I'm using an electronic device							
My parent/ caregiver struggles to get my attention when I am on my electronic device							

I check my electronic device even if I'm right in the middle of a conversation with my parent / caregiver							
---	--	--	--	--	--	--	--

8. Does your parent/caregiver do any of the following?

	Never	Often	Sometimes	I don't want to answer
limit your time or remove your electronic devices as a form of punishment or discipline?				
reward your achievements by allowing you to spend an increased amount of time on your electronic device?				

Part 3 – Your parent / caregiver's electronic device use

In this section you will be asked questions relating to a parent/caregiver. Once again, please answer the questions thinking of the person you answered as your main parent/caregiver at the beginning of this questionnaire

9. Does your parent / caregiver own any of the following electronic devices (please tick **all that apply**)

Tablet / I Pad	
Desktop computer	
Laptop	
Mobile phone	
Games console e.g. Xbox	
Other electronic device	
They do not own an electronic device	
I don't want to answer	

10. When your parent / caregiver is using their electronic device during interactions with you, how would you rate the following behaviours on a scale of 1- 6

	6 Never	5 Rarely	4 Sometimes	3 Often	2 Very often	1 All the time	I don't want to answer
My parent / caregiver ignores me when they are using an							

electronic device							
I struggle to get my parent/ caregiver's attention when they are on their electronic device							
My parent / caregiver checks their electronic device even if I'm right in the middle of a conversation with them							

11. How does it make you feel when your parent/ caregiver uses their electronic device during the following activities:

	Sad	It doesn't bother me	Good	They don't use electronic devices during this activity	I don't want to answer
During a conversation between me and my parent / caregiver					
During time spent as a family					
When my parent / caregiver is supporting me at an event					

Part 4: Your relationship with your parent / caregiver

This section will ask you about your relationship with your main parent/caregiver. Please continue to answer the question based on the person you identified at the start of the questionnaire.

12. Please respond to the following statements on a scale of 1 – 5

	5 Always	4 Often	3 Sometimes	2 Not very often	1 Never	I don't want to answer
My parent / caregiver gives comfort and understanding when I am upset						
My parent / caregiver is responsive to my feelings and needs						
My parent / caregiver has warm and loving times together with me						

Part 5 – Your recent behaviours

This section will ask about your recent online and offline behaviours.

13. Within the **last month**, how many times have you done the following when on the internet?

	Never	Once	More than once	I don't want to answer
Spread rumours about someone online whether they were true or not				
Made rude or mean comments to anyone online				
Made aggressive or threatening comments to anyone online				

14. Within the **last month**, how many times has the following happened to you when on the internet?

	Never	Once	More than once	I don't want to answer
Rumours have been spread about me online				
I have received rude or mean comments online				
I have received aggressive or threatening comments online				

15. Based on your behaviours offline, how many times have you done the following within the **last month**.

	Never	Once	More than once	I don't want to answer

I teased students to make them angry				
I got angry with someone				
I fought back when someone hit me first				
I said things about other students to make others laugh				
I encouraged other students to fight				
I pushed or shoved another student				
I was angry most of the day				
I got into a physical fight because I was angry				
I slapped or kicked someone				
I called another student a bad name				
I threatened to hurt or hit someone				

16. Based on your behaviour offline, how many times did you get into a fight during the **last twelve months**

I have not been in a physical fight	
1 time	
2 times	
3 times	
4 times or more	
I don't want to answer	

17. Based on your behaviours offline, have you done any of the following within **last month**

	Yes	No	I don't want to answer
Been on suspension			
Stolen something from another student			
Snuck into a place without paying eg cinema/bus/sports centre			
Skipped school			
Cheated on a test			
Taken something from a store without paying for it			
Written things on sprayed walls or sidewalks where you weren't supposed to			
Damaged school property			

18. Based on your behaviours offline, how many times have you done the following within the **last month**

I did not feel like eating; my appetite was poor					
I felt that I could not shake off the blues even with help from my family or friends					
I felt I was just as good as other people					
I had trouble keeping my mind on what I was doing					
I felt depressed					
I felt that everything I did was an effort					
I felt hopeful about the future					
I thought my life had been a failure					
I felt fearful					
My sleep was restless					
I was happy					
I talked less than usual					
I felt lonely					
People were unfriendly					
I enjoyed life					
I had crying spells					
I felt sad					
I felt that people dislike me					
I could not get "going"					

You have reached the end of the questionnaire.

Thank you for taking the time to respond to each question.

Appendix 3.2

Behavioural and health impacts of raising children in a digital household

FEEDBACK FORM

What is your age? ____ I don't want to say (please tick) ____

	Yes	No	I don't want to answer
At the beginning of the survey, was it clear that you did not have to take part if you did not want to?			
At the beginning of the survey, was it clear that you would be completing it anonymously, so nobody at all would know who you are or what you answer.			
At the beginning of the survey, was it easy to understand what the survey was about?			
Do you think that topics covered in the survey were suitable for your age group?			
Did you think that the questions in the survey were written in an easy to understand way?			
Do you think any words need to be changed to suit your age group? If yes, please state which ones below;			
Do you think any items or questions should be included? If yes, please state below:			
Please provide any other comments you would like to make about the online survey:			

Thank you for piloting the survey and providing feedback.





Dear [Headteacher]

RE: Bangor University Research Project in collaboration with Public Health Wales

My name is Donna Dixon, and I am currently a postgraduate research student within the School of Education Sciences at Bangor University. We are currently undertaking a research project in collaboration with Public Health Wales which will explore the impact of parental use of electronic devices on children's wellbeing and behaviour. Digital technology is ever-increasing within society and there is growing concern on the encroaching impact technology is having on the family environment. Research has begun to find associations between distracted digital parenting and children's internalising and externalising behaviours, anxiety, depression and cyberbullying. Children may struggle to get their parents attention whilst they are using electronic devices and are beginning to notice the impact technology is having on their relationship with their parents. This research study aims to provide new knowledge on the impact technology is having on children's behaviour and mental health in Wales, which will help to design guidelines and interventions to combat the negative effects in order to improve children's health.

We intend to recruit a selection of secondary schools within a range of demographic areas within Flint and Wrexham and would like to invite [school name] to participate within the study.

Full ethical approval has been obtained from Bangor University School of Education for the research project.

We seek to gather the perspectives of young people in school years 8 and 10 through the completion of an online survey. The study will involve a researcher attending the setting within the months of January and February, 2022 to administer the online questionnaires. We anticipate that following a brief introduction to the project, by the researcher, the online questionnaire will take participants approximately 25 minutes to complete. Parents and children will be provided with information on the study and given the option to withdraw at any point prior to data collection.

We would be most grateful if you would be willing to participate in what we consider to be an extremely relevant and important study. If you are interested in being a part of this research project, or wish to discuss any queries you may have, please contact me via email dnd18dql@bangor.ac.uk or by telephone 07814 515875.

I look forward to hearing from you in due course.

Yours sincerely

Donna Dixon

Appendix 3.4



RESEARCH AGREEMENT

For the purposes of the study entitled: **“Behavioural and health impacts of raising children in a digital household”** funded by **Bangor University and Public Health Wales**

This agreement dated _____ is made between:

[name] led by [name] who is based at [address]

AND

[school name] [school address]

IT IS AGREED AS FOLLOWS:

1. Commitment from the study team

The study team will

- Work with schools to identify the most convenient times to administer online student surveys
- Cover postage costs for parent consent letters for student surveys
- Provide a study team member to administer each survey data collection session
- Provide sources of support organisations to everyone who completes a survey
- Comply with the school’s child protection requirements
- Report back anonymised school-specific data from the student surveys at the end of the final study period
- Disseminate a final report about the study findings to all participating schools, and be available for oral feedback about the findings if the school requests this (e.g. at governors’ or staff meetings)
- Anonymise all published data from the study, so no school or individuals can be identified from any reports

2. Commitment from the schools

All participating schools will

- Provide a contact in the school to liaise with the research team and co-ordinate all research activities
- Identify approximately 30 minutes of class time during which the study team will collect survey data from all year 8 and year 10 students during the first term of 2022. This can be done over several visits. A teacher must be present at all data collections to assist in keeping control and to comply with child protection requirements, but will not be asked to assist in the data collection
- Post or e-mail information letters home to parents and students completing a questionnaire and inform the study team of any withdrawal of consent by parents (postage covered by the study team)

AS AGREED BY:

For and on behalf of:

Study Team

Name:

Position:

Signature:

Date:

For and on behalf of:

[school]

Name:



Participant Information Form

Ethics System Reference number: 14012022-1244

Project Title: Behavioural and health impacts of raising children in a digital household

Dear Parent/Guardian,

We would like to invite your child(ren) to take part in a research study titled *Behavioural and health impacts of raising children in a digital household*. Before you decide to participate, you need to understand why the research is being undertaken and how it would involve your child. Please take time to read the following information carefully.

Why have I been asked to take part?

Your child's school has agreed to take part in the study. All students in year 8 and 10 will be invited to complete a short online survey

What does the study involve?

Bangor University and Public Health Wales are looking at how parental use of technology is impacting children's behaviour and health. As part of this study, we kindly ask for your child to complete an online questionnaire during lesson time. This study has been granted ethical approval by Bangor University Education Department ethics committee (Ref: 14012022-1224).

What are the benefits of taking part?

Technology use is an ever-increasing part of society, and the long-term impacts of its use are currently unknown. It is well-documented that behaviours children establish during adolescence will track into adulthood. Understanding the positive and negative impact of technology on children's behaviour and mental health will help to design guidelines and interventions to help combat the negative effects in order to improve children's health.

What are the possible risks?

Some of the questions asked which aim to gather information on the participant's emotional health and wellbeing may cause distress. The questionnaire will be designed to minimise the risk of causing any harmful effect, and in addition, a leaflet of relevant support will be provided to all participants.

Who is organising or sponsoring the study?

This research study is being undertaken by Bangor University in collaboration with Public Health Wales.

What will happen to my data?

No one at the school will see what individual students have written, only the research team will have access to data collected via the online survey. The questionnaire does not include names or any other identifying features. The responses will be electronically uploaded onto a database which is password protected, and only visible to the research team. Data gathered will be used to help us better understand the impact of parental use of technology on children's wellbeing and will be shared with other people who are interested such as other academics and policy makers, and we may publish them for example in academic journals. However, all the finding will be anonymised, so no school or individuals will be identified. Your data will be held securely by Bangor University, with oversight from the School of Educational Science.

What if I don't want my child to take part?

Participation within this study is voluntary. If you are happy for your child or daughter to complete the survey, then you **do not** need to do anything. If you do not want your child to take part in the survey, then please complete the withdrawal form and return with your child to school by 5/5/22. You have the right to withdraw your child from the study at any time up until the point of data collection. Deciding not to take part or withdrawing your child will not impact any other aspect of working with Bangor University in the future.

Who do I contact about the study?

Please do not hesitate to contact the principal researcher Donna Dixon (dnd18dql@bangor.ac.uk) with any queries you may have regarding this study. If you wish to make a complaint about the research, please contact the Interim Director of Research, School of Educational Science: Dr Huw Roberts, College Manager (huw.roberts@bangor.ac.uk) 01248 383136. This study has received ethical approval from School of Education Ethics Committee.

Thank you in advance for your support.

Prof. Karen Hughes
Public Health Wales

Dr. Nia Williams
Bangor University

Dr. Catherine Sharp
Swansea University

WITHDRAWING FROM THE STUDY

Participation within this study is voluntary and is based on a full understanding of what taking part will involve. Any individual is entitled to withdraw from the study at any point prior to data collection without any consequences.

If you wish to withdraw participation within this study, please complete the section below and return to your child's school.

PARTICIPANT WITHDRAWAL

Reference Number: 14012022-1224

Title of Project: Behavioural and health impacts of raising children in a digital household

Name of Principal Investigator: Donna Dixon

Name of the person to whom this form should be submitted: Your child's class teacher or you can return to the school via e mail.

Participant to complete this section

Participant name: _____ **Year Group** _____

Please initial one of the following boxes:

I confirm that I would like to withdraw my child from the study prior to completion of data collection by the researcher.	
---	--

Signature of participant:	Date:
Signature of research team member responsible for ensuring the participant has been withdrawn:	Date:

In accordance with Data Protection guidelines this form will be stored for securely for five years and subsequently destroyed.



GWYBODAETH I FYFYRWYR YM MLWYDDYN 8 A 10

Hoffem eich gwahodd i gymryd rhan mewn astudiaeth ymchwil gan Brifysgol Bangor ac Iechyd Cyhoeddus Cymru. Cyn i chi benderfynu, mae'n bwysig i chi ddeall beth yw pwrpas yr astudiaeth a beth fydd cymryd rhan yn ei olygu. Darllenwch y daflen hon yn ofalus a gofynnwch i ni am unrhyw beth nad ydych yn ei ddeall.

Beth yw pwrpas yr astudiaeth?

Mae'r astudiaeth hon yn ceisio gwella'r ddealltwriaeth o sut y gall defnydd rhieni o ddyfeisiau fel ffonau symudol, tabledi, gliniaduron, a chonsolau gemau o amgylch eu plant effeithio ar emosiynau ac ymddygiad plentyn. Rydym yn gweithio gyda myfyrwyr ym mlwyddyn 8 a 10 mewn llawer o ysgolion yng Ngogledd Cymru. Bydd canlyniadau'r astudiaeth hon yn ein helpu i ddeall sut mae defnydd rhieni o ddyfeisiadau electronig yn effeithio ar sut mae plant yn teimlo ac yn ymddwyn.

Pam ydw i wedi cael fy newis i gymryd rhan?

Mae eich ysgol uwchradd wedi cytuno i gymryd rhan, ac mae pob myfyrwr ym Mlynnyddoedd 8 a 10 wedi cael gwahoddiad.

Beth fydd yn digwydd os byddaf yn cymryd rhan?

Byddwn yn gofyn i chi lenwi arolwg ar-lein yn ystod eich amser gwersi arferol. Bydd yr holiadur yn gofyn i chi sut rydych chi a'ch teulu yn defnyddio technoleg yn ogystal â chwestiynau am eich iechyd meddwl a'ch ymddygiad.

Oes rhaid i mi gymryd rhan?

Na - nid oes yn rhaid i chi gymryd rhan yn yr astudiaeth hon, eich dewis chi ydyw. Os dewiswch gymryd rhan ac yna'n newid eich meddwl ar unrhyw adeg, gallwch roi'r gorau i gwblhau'r holiadur.

Beth fydd yn digwydd i fy nata?

Ni fydd eich atebion unigol yn cael eu rhannu ag unrhyw un yn eich ysgol. Dim ond y tîm ymchwil fydd â mynediad at eich arolwg ar-lein gorffenedig, fodd bynnag ni fyddant yn gwybod pa atebion oedd rhai chi gan y byddwch wedi llenwi'r holiadur yn ddiennw. Bydd eich ymatebion yn cael eu defnyddio mewn adroddiadau ysgol ac allbynnau eraill i rannu'r hyn a ddysgwyd o'r astudiaeth, ond ni fydd eich enw yn cael ei ddefnyddio ar unrhyw adeg.

Os oes gennych unrhyw gwestiynau, cysylltwch â ni unrhyw bryd.
Enw cyswllt: Donna Dixon e-bost: dnd18dgl@bangor.ac.uk ffôn: 07814515875

Diolch am gymryd yr amser i darllen y daflen wybodaeth hon.

Teitl y Prosiect: Yr effeithiau iechyd ac ymddygiadol o fagu plant mewn cartref digidol

TYNNU’N ÔL O’R ASTUDIAETH

Nid oes rhaid i chi gymryd rhan yn yr astudiaeth hon, eich dewis chi ydyw. Os penderfynwch beidio â chymryd rhan, llenwch yr adrannau isod:

Nid wyf eisiau cymryd rhan yn arolwg Prifysgol Bangor / Iechyd Cyhoeddus Cymru.

Enw’r disgybl:	
Enw’r ysgol:	
Blwyddyn:	
Dosbarth:	
Llofnod:	
Dyddiad:	

Dychwelwch y ffurflen hon at eich athro dosbarth erbyn 5 Mai 2022

INFORMATION FOR STUDENTS IN YEAR 8 AND 10

We would like to invite you to take part in a research study by Bangor University and Public Health Wales. Before you decide, it is important for you to understand what the study is about and what taking part will involve. Please read this leaflet carefully and ask us about anything you don't understand.

What is the study for?

This study is trying to improve the understanding of how parents' use of devices such as mobile phones, tablets, laptops, and gaming consoles around their children can affect a child's emotions and behaviour. We are working with students in year 8 and 10 in many schools in North Wales. The results of this study will help us to understand how parental use of electronic devices affects how children feel and act.

Why have I been chosen to take part?

Your secondary school has agreed to take part, and all students in Years 8 and 10 have been invited.

What will happen if I take part?

We will ask you to fill out an online survey during normal lesson time. The questionnaire will ask you about how you and your family use technology as well as questions about your mental health and behaviours.

Do I have to take part?

No - you do not have to take part in this study, it is your choice. If you choose to take part and then change your mind at any stage, you can just stop completion of the questionnaire.

What will happen to my data?

Your individual answers will not be shared with anybody at your school. Only the research team will have access to your completed online survey, but they will not know which answers are yours as you will have completed the questionnaire anonymously. Your responses will be used in a school report and other outputs to share the learning from the study, but your name will never be used.

If you have any questions, please contact us at any time.
Contact name: Donna Dixon e mail: dnd18dql@bangor.ac.uk tel: 07814515875

Thank you for taking the time to read this information leaflet.

Project title: Behavioural and health impacts of raising children in a digital household

PARTICIPANT WITHDRAWAL

You do not have to take part in this study, it's your choice. If you decide not to, please fill in the sections below:

I do not want to take part in the Bangor University / Public Health Wales survey. ☐

Pupil's name:	
School name:	
Year:	
Class:	
Signature:	
Date:	


Please return this form to your class teacher by 5 May 2022.

GWASANAETHAU CYMORTH I BOBL IFANC

SUPPORT SERVICES FOR YOUNG PEOPLE

Gan eich bod wedi cymryd rhan yn yr astudiaeth "Effeithiau ymddygiadol ac iechyd trwy magu plant mewn cartref digidol" ar ran Prifysgol Bangor ac Iechyd Cyhoeddus Cymru, mae'r taflen hon i'ch sylw. Os oes angen unrhyw gefnogaeth arnoch chi ynglŷn ag unrhyw un o'r pynciau a gafodd ei drafod yn ein holiadur, dyma rai sefydliadau defnyddiol sy'n cynnig cefnogaeth a chynghor emosiynol a lles i bobl ifanc.

You are being given this leaflet as you have taken part in the "Behavioural and health impacts of raising children in a digital household" study on behalf of Bangor University and Public Health Wales. If you need support about any of the topics that were covered in our questionnaire, here are some useful organisations which offer emotional and wellbeing support and advice to young people.



Young Minds
www.youngminds.org.uk
 Neges destun/Text: 85258



Samaritans
www.samaritans.org.uk
 Ffôn/Tel: 116123



N.S.P.C.C.
www.NSPCC.org.uk
 Ffôn/Tel: 0800 1111




CALL
 Llinell gymorth iechyd meddwl Cymru /
 Mental health helpline Wales
www.callhelpline.org.uk
 Ffôn/Tel: 0800 132 737



**PRIFYSGOL
BANGOR**
UNIVERSITY



kess
Kess is a Welsh word for 'to be' or 'to have'.



Crefft Cymdeithasol Ewrop
European Social Fund

Appendix 3.8.

Individual responses to the Centre of Epidemiology Depression Scale (Radloff, 1977)

	Rarely or none of the time (less than 1 day)	Some or a little bit of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)
Score Value	1	2	3
I was bothered by things that usually don't bother me	61.4%	26.4%	12.2%
I did not feel like eating; my appetite was poor	54.3%	24.1%	21.6%
I felt that I could not shake off the blues even with help from my family or friends	62.7%	18.5%	18.8%
I felt I was just as good as other people	56.2%	20.7%	23.1%
I had trouble keeping my mind on what I was doing	30.3%	33.7%	36.0%
I felt depressed	61.5%	18.6%	19.9%
I felt that everything I did was an effort	43.6%	29.6%	26.8%
I felt hopeful about the future	41.1%	31.8%	27.0%
I thought my life had been a failure	65.9%	19.6%	14.5%
I felt fearful	66.1%	20.6%	13.3%
My sleep was restless	51.6%	22.4%	26.0%
I was happy	20.7%	30.2%	49.1%
I talked less than usual	52.2%	31.0%	16.9%
I felt people were unfriendly	66.6%	20.5%	12.9%
I felt lonely	57.9%	22.9%	19.2%
I enjoyed life	27.3%	29.9%	42.7%
I had crying spells	65.1%	16.3%	18.6%
I felt sad	46.5%	30.5%	23.1%
I felt that people dislike me	49.6%	25.4%	25.0%
I could not get "going"	55.8%	25.4%	18.8%

Behavioural and Health Impacts of Raising Children in a Digital Household: A Scoping Review

Donna Dixon^{1,2}, Karen Hughes^{1,3}, Nia Williams², Catherine. A. Sharp⁴

1) Public Health Collaborating Unit, College of Human Sciences, BIHM, Bangor University, Wrexham Technology Park, Wrexham, United Kingdom.

2) School of Educational Sciences, Bangor University, Bangor, Gwynedd, United Kingdom.

3) Policy and International Health, WHO Collaborating Centre on Investment for Health & Wellbeing, Wrexham Technology Park, Wrexham, United Kingdom

4) Applied Sports, Technology, Exercise and Medicine Research Centre, Swansea University, Swansea, United Kingdom.



BACKGROUND



• Digital technology is ever-increasing within society and there is growing concern on the encroaching impact technology is having on the family environment.

• UK Chief Medical Officers have highlighted a need for research to inform the development of evidence-based parental guidelines on raising children in a digital household.

• The term 'technoference' has been adopted to describe habitual interruptions in interpersonal relationships or time spent together due to technological device (McDaniel & Coyne, 2016).

• Emerging evidence associates frequent parental digital distraction with diminished parent-child interactions.

- Associations between distracted digital parenting and children's internalising and externalising behaviours are being identified.
- Evidence on the impact of parental responsiveness whilst using electronic devices around adolescents is limited.

OBJECTIVE

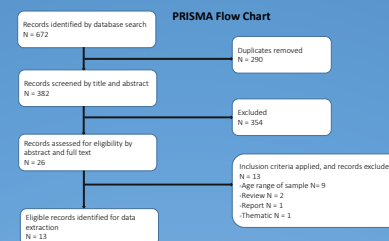
- Review existing literature on the impact of parental technoference on 11-18 year olds, focusing on the mental health and deviant behaviours.
- Identify gaps in the existing literature to inform future research direction.

RESEARCH QUESTION

- **Primary research question:** What research evidence is available on the impact of parental electronic device use during interactions with their adolescent and what are the gaps within the current literature?
- **Secondary questions**
 - (1) What is the impact of parental technology distractions on adolescent mental health?
 - (2) What is the impact of parental technology distractions on adolescent deviant behaviour?

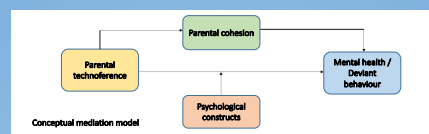
METHODOLOGY

- Searched 6 databases: APA PsycINFO, MEDLINE, ASSIA, ERIC, Social Sciences Premium Collection, SciTech Premium.
- Articles systematically gathered via PRISMA (Tricco et al., 2018) guidelines.
- Inclusion Criteria: Original data on the impact of parental technoference or parental phubbing on adolescents aged 11-18 years; the impact on adolescent mental health (i.e., depression, anxiety, self-esteem, addiction); the impact on adolescent deviant behaviours (i.e., aggression, bullying, risk taking).



RESULTS

- 13 studies identified.
- 10 studies found a negative correlation between parental technoference and adolescent **mental health** (e.g. depression, anxiety, addiction).
- 5 studies identified a positive correlation between parental technoference and adolescent **deviant behaviour** (e.g. cyberbullying).
- Adolescent perceptions of frequent parental technoference was related to **adolescent technoference**.
- Parental cohesion and psychological constructs were significant **mediating factors**.



Author	Country	Sample and Design	Technoference		Mental health	Deviant Behaviour	Reliability Quality	Psychological Construct
			Parental	Adolescent				
Rai et al. (2020)	China	N=1,000 adolescents Cross Sectional						
Rai et al. (2021)	China	N=1,022 adolescents Cross Sectional						
Geng et al. (2021)	China	N=1,667 adolescents Cross Sectional						
Liu et al. (2020)	China	N=103 adolescents Cross Sectional						
Liu et al. (2020)	China	N=100 adolescents Cross Sectional						
Qin et al. (2020)	China	N=1,213 adolescents Cross Sectional						
Stockdale et al. (2018)	USA	N=177 adolescents Cross Sectional						
Wang et al. (2020)	China	N=1,407 adolescents Cross Sectional						
Wang et al. (2020)	China	N=1,407 adolescents Cross Sectional						
Wei et al. (2021)	China	N=174 adolescents Cross Sectional						
Xie et al. (2019)	China	N=1,007 adolescents Cross Sectional						
Xie & Xie (2020)	China	Study 1: N=103 adolescents Study 2: N=103 adolescents Cross Sectional						
Zhang et al. (2021)	China	N=103 adolescents Cross Sectional						

CONCLUSION

Our review indicates that internalising and externalising behaviours of adolescents as a result of parental digital device use within the family context may be associated with parental unresponsiveness. Thus suggesting that parents should be encouraged to be aware of their environment in which they use electronic devices and how this can directly and indirectly influence adolescent health and behaviour.

IMPLICATIONS

- Research should be conducted to inform practical guidelines for parental management of their devices within the family context.
- Research should continue to consider the evolving capacities of adolescents in order to contribute to parents' moderation of their electronic device use and support the establishment of practical limits for use within the family context.
- Research identifying mediating mechanisms which can exacerbate the effect of perceived parental technoference could identify adolescents at risk of the behaviour.
- Research has focused on online deviant behaviours, highlighting a gap within current literature to explore offline deviant behaviours such as aggression.

REFERENCES

Tricco, L., O'Brien, K., Colquhoun, H., Levac, D. (2018) PRISMA Extension for Scoping Reviews Checklist and Explanation
McDaniel, B., & Coyne, S. (2016). "Technoference": The interference of technology in couple relationships and implications for women's personal and relational wellbeing. *Psychology Of Popular Media Culture*, 5(1), 85-98. doi: 10.1037/ppm0000065