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**Is the Growing Use of Technology Having
a Positive or Negative Effect on the Health
of Children and Adolescents? Current
Research, Evidence and Future Directions**

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1. Introduction

1.1 Background

There is absolutely no doubt that technology is advancing at an astonishing rate across a global scale. From twenty five to even twenty years ago, owning a mobile phone was something of a privilege for the vast population. In the present day, it is almost considered unusual to find someone without their mobile phone in hand or in their pocket. According to Ofcom (2008), as cited by Vincent (2010), mobile phones were omnipresent within the United Kingdom (UK) with 86% of adults and slightly less children between the ages of twelve and fifteen owning at least one device. Considering that this data was collected in 2008, and the rapid advancements of mobile phones which are now more commonly known as 'smartphones', the number of users has no doubt increased. However the term technology of course does not just relate to mobile phones, but a whole host of devices which can be used in a variety of ways. Devices such as gaming consoles, smart televisions, tablets and smart watches are now widely used by the general population for multiple purposes whether it be for entertainment, educational or occupational reasons. In the current day and age, it could be argued that technology is something that many people rely on. Whilst many adults use such devices, this dissertation will exclude the use of technology by adults, and will solely focus on children and adolescents under the age of eighteen. More recently Ofcom (2019), as cited by Girela-Serrano et al (2022), found that according to market research 83% of children in the UK between the ages of twelve and fifteen were in possession of a smartphone and 59% owned a form of tablet. Furthermore, 64% of children within the same age bracket were found to have owned three or more devices of their own. There is no doubt that children and adolescents have access to multiple forms of technology and such devices, now more than ever.

The human races' heavy reliance on technology certainly makes for it to be a topic that requires research. As technology continues to evolve and the use of technology continues to grow worldwide, it is important to understand what impact this could potentially have, particularly on those who are growing up around it and those who are born into a world in which they are instantly surrounded by it. More specifically, it is important to establish whether the impact is more positive or negative towards their overall health. Health being defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (Callahan, 1973).

Having been born in the year 2001 in the midst of technological evolution, it is a particularly interesting topic to me as devices such as gaming consoles, smart tablets and smartphones all featured in my life as a child and a teenager. I am intrigued to understand how my own health could have potentially been affected by my technological use, as well as the health across a physical, mental and social scope of those born in the years after myself in which more advanced devices came to fruition.

There are diverse opinions on the use of technology by children and adolescents. Babies that are only a few months old spending an hour a day watching television (Genc, 2014) can be seen as a positive for parents who purchase certain products such as DVDs with an expectation that their infant will learn from them (DeLoache, 2009). However, on the flip side, allowing an infant to watch television could cause problems such as irregular sleeping patterns (Thompson and Christakis, 2005) or overstimulation of what is still a developing brain (Anderson and Pempek, 2005). Studies have found that using games consoles to play video games that are social and collaborative can lead to an increase of prosocial behaviours among children (Kovess-Masfety et al, 2016). Whilst there are also concerns that young children are playing video games that are violent or destructive, which could affect them negatively mentally.

The purpose of this study is to explore the ways in which technology is used by children and adolescents, linking the usage towards factors that can affect social, physical and mental health in both positive and negative ways. Ultimately, with the use of pre-existing and relevant research, literature and data I aim to determine whether technological use has more of a negative or a positive effect on children and adolescents.

1.2 Question Strengths and Limitations

Due to this study being conducted on the basis of secondary data via pre-existing literature, data and studies it allows for an opportunity to explore and discuss both qualitative and quantitative data. As the field relating to the question is a relatively new topic, sources may be hard to come by. Nonetheless, pre-existing material is available.

2. Methodology and Research Methods

2.1 Research Design

As this study is literature based, the data collected will be solely secondary data. Secondary data is defined as a dataset not obtained by the author (Martins et al, 2018), in this instance myself, or “the analysis of data gathered by someone else” (Boslaugh, 2007). This data will be obtained via pre-existing peer reviewed literature, studies and reports relating to the field of the question. The decision to carry out a literature based study is primarily due to the fact that the key themes that will need to be explored in order to answer the study question are broad, and gathering primary data would be difficult. Much of the information and data needed to answer the question that this study poses would require months or years of observation and data collection. Data collected over a short-term time period would be insufficient. Therefore, the timescale of collecting primary data in this field would be unrealistic. Collecting primary data for all three of the key themes would also be unrealistic, as each theme differs from one another.

Measuring social wellbeing and mental health through primary data collection methods would be difficult and the results would be insufficient in relation to answering the question.

In order to eliminate any potential bias in this review, reliability and validity are essential. To ensure reliability and validity, the research gathered must relate to the study question 'Is the Growing Use of Technology Having a Positive or Negative Effect on Children and Adolescents?' as well as the key themes (research questions) that are drawn from the question; 'how does technology affect physical health', 'how does technology affect mental health', 'how does technology affect social wellbeing'. These three key themes drawn from the question will each be explored individually in depth and the information extracted relating to these themes will be drawn together and discussed in order to establish relevant links to help answer the question at hand.

Due to this study relying on secondary data, it allows for a mixed method data collection approach. Qualitative research can be carried out and extracted, which enables exploration and deeper insights into real-world problems (Moser and Korstjens, 2017). A big strength of qualitative research, particularly in this field of study, is that it has an ability to explain processes and patterns of human behaviour that are difficult to quantify (Foley and Timonen, 2015). This relates more specifically towards the key themes of 'technology and mental health' (3.2), and 'technology and social wellbeing' (3.3). A qualitative approach allows participants to explain what, how and why they were thinking, feeling or experiencing in relation to certain experiences or situations (Aspers and Corte, 2019). Quantitative data is more specific, drawing upon mainly numerical data that has been collected for analysis (Albers, 2017). Whilst this data can be used towards the mental health and social wellbeing themes of this study, it is more strongly suited towards the 'technology and physical health' (3.1) theme. The only limitation being that research within this field is relatively new and studies are ongoing.

2.2 Data Collection

In order to explore and answer the question 'Is the Growing Use of Technology Having a Positive or Negative Effect on Children and Adolescents', it is important to ensure that the literature researched is relevant towards the question in the aid of constructing an answer. To do this, it is essential to focus on relevant databases that will provide reliable, peer-reviewed literature that will be beneficial towards the key themes of the study. The databases that will be used for this study, such as ProQuest, will be accessed via the University of Wales Trinity Saint David online library 'Database Search', under specific database categories relevant to the study question. The main database category being 'Institute of Management and Health', specifically focusing on databases in Sport, health and outdoor Education as well as databases in Nursing, health and social care. These databases have been selected due to the centred focus around health, covering physical health, mental health and social wellbeing. In order to

ensure that the research is specific towards the study questions and to identify and extract the correct data and research from the literature, key search terms or keywords will be used in order to narrow the research down in order ensure that the findings are useful, reliable and relevant.

The first key word being 'health', as the study aims to identify whether the health of children and adolescents is affected by technology both positively and negatively. The term health covers social, mental and physical aspects which relate to the key themes of the study, however each aspect can be used as a keyword during the database research in order to ensure a more narrow and specific focus on each theme ('physical health', 'mental health', 'social wellbeing'). 'Technology' is also a keyword that will be included within the database search and similarly, it covers a wide range of devices yet it can be narrowed down to specific terms such as 'games consoles', 'smartphones' or 'television'. Two more keywords that are important and relevant towards the study are 'children' and 'adolescents', with a main focus of those primarily under the age of eighteen. It is important to exclude the term 'adults' within the database searches, as any information or data regarding adults within this field is irrelevant towards this study. To ensure the exclusions of adults the search term 'under 18' will be implemented and to broaden the research, any literature published pre-2016 will also be excluded in order to keep the literature relatively broad whilst also considering recent advancements in technology. Other key words used include 'digital', 'mental health', 'physical health', 'social wellbeing', 'socialising', 'online' and 'social media'.

As a guideline, the age range for children as a part of this study will be from the ages one through to twelve years old and adolescents ages thirteen through to seventeen years old.

2.3 Data Extraction and Critical Analysis

The data extraction will be based upon the three research questions presented in the themed chapters; 'How can Technology Affect Physical Health?' (3.1), 'How can Technology Affect Mental Health?' (3.2) and 'How can Technology Affect Social Wellbeing?' (3.3). The extracted data will be considered via the use of the key search terms, keywords and key phrases that relate towards the research questions and the overall scope of this study. Each research question will be presented individually, and the key findings within eligible literature regarding each research question will be presented prior to a brief introduction to each question. The key findings will then be critically discussed, and analysed through the means of identifying both positive and negative effects of technology. If the findings do not initially indicate positive or negative effects directly, analysis of the findings will be conducted through relevant literature in order to establish relevant links and connections.

3. Themed Chapters - Research Questions

3.1 How can Technology Affect Physical Health?

When the word health comes to mind, the mind is instantly drawn towards thoughts considering the physical state of the body. Physical health can be defined in many ways, one such definition being that physical health is “a normal function of an organism at all levels” (Koipysheva et al, 2018). Technological advancement has integrated itself into coinciding with physical health, via devices such as fitness trackers, smartwatches and smartphones. However, although technology has revolutionised the world of physical fitness it is also important to look on the flip side and observe how technology could perhaps impact physical health negatively particularly on children and adolescents, who are still in the midst of physical development.

A systematic review conducted in 2022 by Musa et al observed digital screen time and metabolic syndrome in adolescents, with an aim to establish a relationship between variations of screen time and the risk of metabolic syndrome. Metabolic syndrome is a complex condition, defined by factors that intertwine with each other such as Type 2 diabetes, coronary heart disease and other forms of cardiovascular atherosclerotic diseases (Kassi et al, 2011). It is important to note that this study was conducted in the context of the COVID-19 pandemic. During the years 2020 and 2021, the COVID-19 global pandemic forced governments across the globe to implement restriction policies such as local lockdowns, school closures and the introduction of social distancing (Musa et al, 2022). This of course naturally caused disruption towards children and adolescents such as taking away usual routines, social restriction and movement restriction. School closures meant that children and adolescents relied upon remote learning, and the measures brought upon children and adolescents as a result of the COVID-19 pandemic led to an increase in digital device usage (Musa et al, 2022). This study considered the number of screen time hours per day (self-reported), and used this data to establish links between sedentary habits and developing metabolic syndrome. Sedentary behaviour is traditionally defined as a lack of physical activity (Pate et al, 2008). Findings from the review noted a correlation between sedentary behaviour as a result of screen time and an increased risk of developing metabolic syndrome. The findings within this study were similar to that reported within a systematic review presented by Trembley et al (2011), as cited by Musa et al, in that a positive correlation was identified between an increase of sedentary behaviour (particularly viewing television more than two hours per day) and cardiometabolic sickness in children and adolescents.

The findings of this study suggest that the use of technology can have a negative effect on the physical health of children and adolescents primarily through screen time, with a positive correlation being established between sedentary lifestyle behaviours and the development of metabolic syndrome.

An article published in 2017 by Saunders and Vallance titled *“Screen Time and Health Indicators Among Children and Youth: Current Evidence, Limitations and Future Directions”* also explored the issues that can become present as a result of screen time similarly to the systematic review conducted by Musa et al (2022), with an aim to provide an overview and understanding of the associations between screen time and physical health. The article notes that rates of screen time are increasing as the years go by as found by Bucksch et al (2016), as cited by Saunders and Vallance, by using the Health Behaviour in School Aged Children survey. It was found that the number of self-reported children watching television increased between the years 2002 and 2010, with eleven year old boys ranging from 2.2 to 2.6 hours per day and 2.4-2.1 hours per day for girls (Bucksch et al, 2016). This can be linked towards advancements of technology over the years, as technology continues to become more prevalent in homes. The article discusses screen time recommendations, with the American Academy of Pediatrics, as cited by Saunders and Vallance, recommending that children limit screen time to less than 1-2 hours per day (American Academy of Pediatrics Council on Communications and Media, 2013). The Canadian Society for Exercise Physiology has similar guidelines in place which are more specific and tailored towards age brackets; early years (0-4 years old), children (5-11 years old) and youth (12-17 years old) (Tremblay et al, 2016).

The increase in screen time by children reported in the article published by Saunders and Vallance (2017) and the implications reported in the review conducted by Musa et al (2022) that screen time sedentary behaviour directly correlates with developing metabolic syndrome, when linked can suggest that technology can have a negative effect on the physical health of children and adolescents. As technology continues to develop and children's and adolescents screen time continues to increase despite recommendations set by health regulators, it can be said they are at more of a risk of developing metabolic syndrome.

In 2019, Lee et al conducted a scoping review titled *“Efficacy and Effectiveness of Mobile Health Technologies for Facilitating Physical Activity in Adolescents: Scoping Review”* which sought to explore mobile health (mHealth) and the intervention strategies it can provide for facilitating physical activity among adolescents within the age bracket of twelve to eighteen years old (Lee et al, 2019). Mobile health is the use of mobile devices, such as smartphones or smartwatches, to support public health practice and medical health practice. As a part of this scoping review, sixteen studies were reviewed with ten being identified as having randomised control trials; 3 cluster trials, 3 quasi-experimental interventions with control and 3 with no control group (Lee et al, 2019). Observations in twelve of the sixteen trials indicated that mHealth could lead to higher physical activity over time. Taking into consideration studies with control groups, five of thirteen showed improvement among every group and five of thirteen showed significant intervention effect (Lee et al, 2019). Due to the number of studies within the

scoping review being randomised or cluster controlled trials which are strong interventions to show effect significance, despite the small number of studies showing significant intervention effect the study indicated that mHealth interventions are not inappropriate in relation to improving physical activity in adolescents (Lee et al 2019). Gamification interventions were lacking within this review unexpectedly, as research shows that gamification can be appealing towards adolescents (Turner et al, 2015). An example of gamification in this field would be a mobile app called Pokemon GO which has seen the number of young people reaching 10, 000 steps per day increase as a result of its usage (Xian et al, 2017).

However the scoping review notes that despite the positive affiliation between mHealth and increasing rates of physical activity in adolescents, the ways in which the mHealth was presented was important. There is evidence that mHealth presented in the form of mobile apps that are developed in collaboration with the target user are not only more likely to be used, but more likely to be effective (Arnhold et al, 2014 and Arsand et al, 2012). A company named Flurry, as cited by Lee et al, tracks the usage of apps across iOS and Android platforms, and saw a 330% growth in the usage of health and fitness apps over the 3 years prior to the article being released (Kesiraju and Vogels, 2018). This data coincides with the fact that technology is continuing to advance, and that the mHealth market growth is directly correlated towards technological advancements. Statista reported, as cited by Lee et al, that the worldwide mHealth market grew from \$21.1 billion to \$40 billion from 2016 to 2018, with an expected growth towards \$332.7 billion by 2025.

It can be said that the use of mHealth in the form of mobile apps is increasing. However whilst the scoping review conducted by Lee et al did identify that mHealth can be linked towards an increase in physical activity in adolescents, it is important that these mobile apps are constructed around the specific target audience of adolescents. That way they can tailor more specific goals, provide relevant exercises and realistic data. Whilst these aspects can be explored, perhaps gamification would better suit the mHealth sector that centres around adolescents in order for physical activity to increase.

In terms of the research question "*How can Technology Affect Physical Health?*", the findings from the literature published by Musa et al (2022) and Saunders and Vallance (2017) which both focused on screen time, deduced that screen time does have negative effects on the physical health of children and adolescents by increasing the risk of metabolic syndrome. The scoping review conducted by Lee et al (2019) had more a focus on mHealth and how it could provide opportunities of physical activity for adolescents. Whilst the study determined that mHealth is not inappropriate towards providing these opportunities, means of mHealth such as mobile apps must be tailored in collaboration with adolescents in order to increase effectiveness. Future research

towards gamification in the field of mHealth could be beneficial as noted by Lee et al using sources published by Turner et al (2015) and Xian et al (2017)

3.2 How can Technology Affect Mental Health?

Mental health is a term that is becoming more frequently used across the globe. The World Health Organization (WHO) (2004) defines mental health as “a state of well-being in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community”

Twenge and Farley conducted a study published in 2021 with an aim to examine the associations between various types of screen activities such as gaming, internet, TV and social media seeking to identify mental health indicators for boys and girls. With a focus on adolescents living in the UK between the ages of thirteen to fifteen ($n = 11,427$), the basis of Twenge and Farleys study was to establish a link between hours per day spent on various screen media activities and four indicators concerning mental health: self-esteem, self-harm behaviour, life satisfaction and depressive symptoms.

Results found that the hours spent on the internet and social media were strongly associated with self-harm behaviours, low life satisfaction, depressive symptoms and low self-esteem compared to the hours spent watching TV or gaming electronically (Twenge and Farley, 2021). Interestingly, girls demonstrated stronger screen media time and the four mental health indicators than boys with 166% of girls using the internet heavily more likely to show levels of depressive symptoms, as opposed to 75% of boys (Twenge and Farley, 2021). Therefore showing that girls are more susceptible to negative mental health factors due to the use of technology, however as part of this study the results will need to be analysed in order to establish how screen media activities affected the pool of thirteen to fifteen year old adolescents as a whole.

Overall time spent using screen time media across the whole pool of adolescents aged thirteen to fifteen in the sample of results was high. Combining the data gathered for both boys and girls it is shown that average hour per day usage means were the following: *2.31 hours per day using social media, 4.03 hours per day using the internet, 2.21 hours per day gaming and 3.24 hours per day watching TV*. The results collected in Twenge and Farleys study suggests that negative mental health and wellbeing directly correlated towards an increased time spent on each screen media activity. Analysis of the results collected by Twenge and Farley (*table 4*) presents the following data for the adolescents as a collective group in relation to over five hours spent using four types of screen media and negative mental health implications: *social media (23.8%), internet (22.2%), gaming (20.9%) and television (20.9%)*. Analysis also presents data for less than one hour spent using the screen media: *social media (12.0%), internet (10.8%), gaming (14.7%) and television (14.9%)*. These results imply that the more time adolescents, in this case aged between thirteen and fifteen, spend

using screen time media during the day, the more likely they are to experience negative mental health and wellbeing implications.

Gupta et al (2022) published a scholarly journal titled *“Reviewing the Impact of Social Media on the Mental Health of Adolescents and Young Adults”*, which used relevant research accessed via databases such as ‘PubMed’ reviewed multiple factors regarding social media such as the risks of using social media as well as the benefits. Terms such as “social media”, “teenagers”, “mental health”, “digital media”, “adolescents” and “social networking sites” were used in database searches (Gupta et al, 2022). Social media can be used as a tool in factors such as amusement and humour, identity creation as well as creative expression which in context are beneficial towards children and adolescents, as more teenagers own mobile phones now than ever before (Gupta et al, 2022). The increased use of mobile phones naturally leads to an increase in the use of social media. Connecting with friends and family was frequently seen as the main advantage of social media by teenagers and prior research conducted by Nesi et al (2019), as cited by Gupta et al, suggests that doing so can increase wellbeing through means of acceptability and creating a sense of belonging. According to Gupta et al (2022), 81% of students reported that social connection increased their sense of connectedness towards peers.

Gupta et al (2022) also explored how digital media has an extensive use for increasing adolescent mental health in the medical field via treatment, screening and prevention (Reid Chassiakos et al, 2016). Research conducted by Nesi and Prinstein (2015), as cited by Gupta et al (2022), found that browsing through social media pages for indications of drug misuse or depression is viable towards screening. Gupta et al (2022) notes that social media has potential to raise awareness regarding mental health issues, quoting that *“social media-based promoting health programmes have been evaluated for a variety of cognitive and behavioural health diseases”*.

The journal published by Gupta et al (2022) offers more positive insights towards social media and the effect it can have on the mental health of adolescents. Although the amount of time spent using social media is not directly mentioned in the extent of Twenge and Farleys study (2021), links can be established in that social media can be used to tackle the negative mental health impacts that increased media screen time can cause, such as feelings of depression. A major benefit of social media was identified as being the ability to connect with others, whether it be family or friends. Another benefit of social media was identified as its use in medical screening towards identifying depression or drug misuse, which can also be linked towards the question *“How can Technology Affect Physical Health?”* as a positive technology can bring towards that field.

3.3 How can Technology Affect Social Wellbeing?

The term social wellbeing is a difficult term to define in a concise manner. One definition of social meaning is “*the sharing, developing, and sustaining of meaningful relationships with others*” (Sinclair, BetterUp 2021). In specific relation to children and adolescents, social wellbeing is important in order to build relationships and develop meaningful skills such as communication skills which are essential throughout the course of life.

A report conducted by Charmaraman et al (2020) titled “*Social and Behavioral Health Factors Associated with Violent and Mature Gaming in Early Adolescence*” sought to examine how ‘risk’ level games (measured by levels of violence and maturity) was associated with social wellbeing factors such as online social interactions, social impacts and behavioural health. The report consists of two studies: *study 1 consisting of 700 participants with a mean age of 12.7* and *study 2 consisting of 772 participants with a mean age of 12.6*.

Study 1 was related to a larger cross-sectional study carried out in the Northeast US focusing on adolescent use of social media in the years 2017-2018 (Charmaraman et al, 2020). The results found that moderate-risk gamers reported higher problematic internet behaviours than those who did not play video games, and that moderate-risk gamers were more likely to play online games with others than minimal-risk gamers (Charmaraman et al, 2020). High risk gamers reported the highest levels of problematic internet use and were reported to play games with strangers more often than minimum-risk gamers and moderate-risk gamers. High risk gamers also reported checking social media more frequently than any other category.

Study 2 used a different sample, recruiting a large suburban middle school and 3 urban after school programs. The study focused on digital media use including social media, YouTube and gaming in the years 2018-2019 (Charmaraman et al, 2020). The study was presented to the participants via a 40 minute online survey. This study also had a more predominant focus on everyday social consequences of online gaming towards daily adolescent life, with a particular focus on social withdrawal (Charmaraman et al, 2020). The results gathered by Charmaraman et al found that moderate-risk gamers and high-risk gamers reported more family-related withdrawals as well as educational withdrawals, however there was no association between risky gaming content and extracurricular activities withdrawal. Results also found that playing high-risk games was linked to foregoing family and self-care activities, raising the question as to whether online gaming is preferred over these activities or whether the gaming social interactions fulfilled social needs more than in-person activities (Charmaraman et al, 2020).

These studies show that those who considered themselves to be high-risk gamers seem to experience more negative implications towards social wellbeing. Problematic internet use could create negative relationships with others as issues such as online abuse, conflict or cyberbullying are of course considered negative and

something to avoid. Whilst social media use was more frequent with high risk gamers, family related withdrawals were also more frequent which would potentially impact family relationships. Educational withdrawals that were present with high risk gamers would certainly have an impact on studies and education, but also potentially damage relationships with peers due to physical absence. The fact that the studies show that high-risk gamers prioritised online gaming over family and self-care activities could further damage family relationships, and also have negative impacts on physical health in the form of hygiene.

Research relating to the use of technology and the effect it could have on the social wellbeing of children and adolescents was difficult to conduct and extract, primarily due to the term social wellbeing being difficult to define as a whole and much of the data found related towards the previous themed chapters.

4. Discussion

A major key finding from this dissertation study was obtained from the systematic review conducted by Musa et al (2022) titled “*COVID-19 and screen based sedentary behaviour: Systematic review of digital screen time and metabolic syndrome in adolescents*”, in that sedentary behaviour as a result of screen time directly correlated with the development of metabolic syndrome in adolescents. Sedentary behaviour is traditionally defined as a lack of physical activity (Pate et al, 2008) and screen time would involve children and adolescents remaining stationary. Examples of screen time in which children and adolescents remain stationary include watching television, playing video games on gaming consoles or the use of mobile phones or tablets. Remaining stationary for long periods of time limits the amount of physical activity an individual partakes in, this can lead to weight gain. This is where the link between digital screen time and metabolic syndrome can be made. Metabolic syndrome is a cluster of cardiometabolic abnormalities which combined can increase the risks of cardiovascular disease and type 2 diabetes (Reaven, 1988). Metabolic syndrome is more likely to occur in overweight individuals, with 3-4% of young people of normal weight developing it as opposed to 26-50% of obese children and adolescents (Marcovecchio and Chiarelli, 2013). Due to screen time causing children and adolescents to become more stationary, the likelihood of them gaining weight increases and thus the risk of developing metabolic syndrome presents itself. However it is important to note that not every overweight young person develops metabolic syndrome, though up to 90% will have at least one of the components relating to the syndrome (Cook et al, 2003). Another factor that could add to an increase of weight in adolescents and children relating to screen time, is snacking on high sugar foods or consuming high sugar-sweetened drinks (Gregory, 2019). Previous studies conducted in the past have shown that consuming sugar-sweetened drinks increasingly is related to increased body

mass (Ludwig et al, 2001). Consumption of such drinks can be easily done by children and adolescents partaking in such sedentary behaviours.

The article published in 2017 by Saunders and Vallance titled *“Screen Time and Health Indicators Among Children and Youth: Current Evidence, Limitations and Future Directions”* reported using research found by Bucksch et al (2016) that overall rates of screen time are increasing as the years go by, with a particular focus between the years 2002 and 2010. This can be linked towards the advancements of technology over those years and the years in between, and the fact that more children and adolescents are able to access various forms of technology. It is interesting to note that screen time guidelines do exist, such as the guidelines recommended by the American Academy of Pediatrics to limit children screen time to less than 1-2 hours per day (American Academy of Pediatrics Council on Communications and Media, 2013). However, as apparent in the research conducted by Bucksch et al (2016), these guidelines seem to be ignored as eleven year old boys spent 2.2 to 2.6 hours per day and girls 2.1 to 2.4 hours per day watching television between the years 2002 and 2010. Perhaps the guidelines are presented as publicly as they potentially should be, thus meaning parents are unaware of them.

The scoping review conducted by Lee et al (2019) titled *“Efficacy and Effectiveness of Mobile Health Technologies for Facilitating Physical Activity in Adolescents: Scoping Review”* sought to explore mobile health (mHealth) and the opportunities it can provide with regards to physical activity and adolescents. Mobile health relating to the use of digital mobile devices such as smartwatches and smartphones. The results of this study overall suggested that mHealth interventions are appropriate towards improving physical activity levels in adolescents, with observations in twelve of the sixteen trials indicating that mHealth could lead to increased physical activity over time (Lee et al, 2019). However mHealth in the form of gamification interventions were lacking in this review, and with research showing that gamification can be appealing towards adolescents (Turner et al, 2015) and the fact that Pokemon GO has been shown to aid young people in reaching 10,000 steps per day with its usage (Xian et al, 2019), future research may want to focus on gamification in order to ensure children and adolescents can gain more from what mHealth can offer. Gamification may be appealing to adolescents due to the high number of adolescents playing video games and the fact that physical activity is merely a background goal of the concept. The scoping review conducted by Lee et al (2019) did identify that mHealth can increase physical activity levels in adolescents, however the review also noted that such mHealth devices and apps must be tailored towards meeting the target audience of adolescents in order for them to be used frequently and effectively (Arnhold et al, 2014 and Arsand et al, 2012).

Another key finding from this dissertation study was obtained and extracted from the study published in 2021 by Twenge and Farley titled *“Not all screen time is equal:*

associations with mental health vary by activity and gender”, as results drawn from this study identified a positive correlation between negative mental health and wellbeing of adolescents aged fifteen to seventeen and increased time spent on the following screen media activities: gaming, using social media, using the internet and watching TV. Using the data presented in the study published by Twenge and Farley (2021), analysis was conducted in relation to the research question to determine the percentage of negative mental health implications reported from 5 hours spent using the four types of screen media and the percentage of negative mental health implications reported from less than 1 hour spent using the four types of screen media. The negative mental health implications reported in social media and using the internet were two sets of data that stood out. Less than one hour of internet use showed a 10.8% negative effect, however the percentage rose to 22.2% with five hours spent using the internet. Past research has suggested that depression and mental health are positively correlated to internet addiction (Lebni et al, 2020). Outlets such as negative media presented in news articles on the web is one example of mental health of children and adolescents can be affected negatively by internet usage.

Less than one hour of social media use showed a 12.0% negative affect towards mental health, which rose to 23.8% with five hours of usage. This could be due to multiple factors such as cyberbullying or comparison of others to oneself. However in the scholarly journal titled *“Reviewing the Impacts of Social Media on the Mental Health of Adolescents and Young Adults”* published by Gupta et al (2022), social media is seen as a tool that can be used positively towards the mental health of adolescents. Gupta et al (2022) noted that social media can be used as a tool to provide amusement and humour, both of which can be beneficial towards the mental health of children and adolescents. Teenagers identified the main advantage of social media as being the ability to connect with friends and family (Gupta et al, 2022). This can aid in the boost of mental health, as it opens the door for children and adolescents to communicate to their friends and family essentially any time they want to, whether it be for just a general chat or seeking support regarding mental health. Gupta et al (2022) noted that 81% of students reported that social connection increased their sense of connectedness towards peers, most likely due to the fact that social media allows for them to communicate at any time.

The report conducted by Charmaraman et al (2020) titled *“Social and Behavioral Health Factors Associated with Violent and Mature Gaming in Early Adolescence”* explored how ‘risk’ level video games measured by violence levels and maturity could be associated with social wellbeing factors such as online social interactions, social impacts and behavioural health. The key findings from this study included the report that high-risk gamers and moderate risk gamers reported more family related withdrawals and educational withdrawals. Family related withdrawals could cause arguments and disagreements which potentially could see positive family relationships break and

mental health take a plunge. Educational withdrawal not only affects one's education which may be crucial when looking at the field of children and adolescents in terms of factors such as cognitive development or even GCSES, but it could also affect friendships and relationships with peers negatively.

4. Conclusion

The overall aim of this library based dissertation was to conduct a study using pre-existing secondary data in the forms of relevant literature, data, studies, articles and journals in order to answer the main research question within the title of the dissertation: *“Is the Growing Use of Technology Having a Positive or Negative Effect on the Health of Children and Adolescents?”*. In order to conduct the research thoroughly, the term ‘health’ was dissected using its definition as presented by Callahan (1973), identifying three key themes to conduct research upon; *physical health, mental health and social wellbeing*. These three key themes were used within the themed chapters, and presented in the following questions: 3.1 *“How can Technology Affect Physical Health”*, 3.2 *“How can Technology Affect Mental Health”* and 3.3 *“How can Technology Affect Social Wellbeing?”*

In terms of technology and what effect it can have on the physical health of children and adolescents, the information gathered and data collected leaned towards a more negative outlook. The publications of Musa et al (2022) and Saunders and Vallance (2017) identified clear links between high screen time usage and increased sedentary behaviours, with sedentary behaviours directly correlating an increased risk of weight gain and potential development of metabolic syndrome. Rates of screen time are likely to continue to increase based upon the studies of Bucksch et al (2016) cited in Saunders and Valances (2017) work. Although the scoping review conducted by Lee et al (2019) identifies links between mHealth and increased physical activity in adolescents, the field of mHealth is still developing and devices within the field such as apps must be tailored towards children and adolescents in order to gain the most significant benefits. A suggestion for future research in this field would be gamification, as past research has shown benefits within this area yet it was not included within the scoping review.

Mental health was again directly related to screen time as results and data gathered based upon Twenge and Farleys study published in 2021, found that adolescents that spent more time using screen time media during the day were more likely to experience negative mental health and wellbeing implications. Once again, this data leans towards more of a negative effect of technology this time on mental health, due to screen time. The scholarly journal published by Gupta et al (2022), provided a much more positive insight by presenting relevant information regarding the positive aspects of social media, such as its ability to provide humour and entertainment which can boost mental health. The use of connecting to family members and friends was also

seen as a positive regarding social media, and Gutpa et al (2022) also briefly noted how social media can be used in medical screening to identify signs of depression and drug use. However given the information provided above regarding increased screen time and the negatives that coincide with it, these positives can only be seen as short term solutions towards improving mental health.

The report conducted by Charmaraman et al (2020) identified mostly negative elements regarding technology and the social well being of children and adolescents. One such being that high-risk and moderate-risk gamers reported more family-related and education based withdrawals, potentially impacting studies and important family relationships as well as friendships. High-risk gamers were also shown to prioritise gaming over family activities and self-care activities (Charmaraman et al, 2020), which could further damage family relations and also have negative affect on physical health in the form of hygiene. One minor positive found with high-risk gamers was that they checked social media more frequently, providing a narrow opportunity for mental health to be increased.

To answer the question of the study *“Is the Growing Use of Technology Having a Positive or Negative Effect on Children and Adolescents?”*, the answer leans more towards technology having a predominantly more negative effect. However it is not the technology itself that is the concern, but the amount of screen time spent on technological devices, as screen time was a negative factor in each key theme relating to the study question.

Reference List

1. American Academy of Pediatrics Council on Communications and Media. (2013) Children, adolescents and the media. *Paediatrics*, 132, pp. 958-961
2. Anderson, D.R. and Pempek, T.A (2005) Television and very young children. *American Behavioural Scientist*, 48(5), pp.505-522
3. Arnhold, M., Quade, M. and Kirch, W. (2014) Mobile applications for diabetics: a systematic review and expert-based usability evaluation considering the special requirements of diabetes patients age 50 years or older. *J Med Internet Res*, 16(4). <https://doi.org/10.2196/jmir.2965>
4. Arsand, E., Froisland, D.H., Skrovseth, S.O., Chomutare, T., Tatara, N. and Hartvigsen, G et al (2012) Mobile health applications to assist patients with diabetes: lessons learned and design implications. *J Diabetes Sci Technol*, 6(5), pp. 1197-1206. <https://doi.org/10.1177/193229681200600525>
5. Aspers, P and Corte, U. (2019) What is Qualitative in Qualitative Research? *Qual Sociol*, 42(2), pp.139-160. doi:10.1007/s11133-019-9413-7
6. Boslaugh, S (2007) An introduction to secondary data analysis. *Secondary data sources for public health: A practical guide*, pp.2-10
7. Bucksch, J., Sigmundova, D., Hamrik, Z et al (2016) International trends in adolescent screen-time behaviours from 2002-2010. *J Adolesc Health*, 58, pp. 417-425
8. Callahan, D. (1973) The WHO definition of 'health'. *Hastings Center Studies*, pp.77-87
9. Charmaraman, L., Richer, A.M. and Moreno, M.A. (2020) Social and Behavioral Health Factors Associated with Violent and Mature Gaming in Early Adolescence. *International Journal of Environmental Research and Public Health*, 17(14), pp. 4996 <https://doi.org/10.3390/ijerph17144996>
10. Cook, S., Weitzman, M., Auinger, P., Nguyen, M. and Dietz, W.H. (2003) Prevalence of a metabolic syndrome phenotype in adolescents: findings from the third National Health and Nutrition Examination Survey, 1988-1994. *Arch Pediatr Adolesc Med*, 157, pp. 821-827 <https://doi.org/10.1001/archpedi.157.8.821>
11. DeLoache, J.S. and Chiong, C. (2009) Babies and baby media. *American Behavioural Scientist*, 52(8), pp.1115-1135
12. Foley, G and Timonen, V. (2015) Using Grounded Theory Method to Capture and Analyze Health Care Experiences. *Health Serv Res*, 50(4), pp. 1195-1210
13. Genc, Z. (2014) Parents' perceptions about the mobile technology use of preschool aged children. *Procedia-Social and Behavioural Sciences*, 146, pp.55-60

14. Girela-Serrano, B.M., Spiers, A.D., Ruotong, L., Gangadia, S., Toledano, M.B. and Di Simplicio, M. (2022) Impact of mobile phones and wireless devices use on children and adolescents' mental health: a systematic review. *European child & adolescent psychiatry*, pp.1-31
15. Gregory, J.W. (2019) Prevention of obesity and metabolic syndrome in children. *Frontiers in Endocrinology*, 10, p. 669. <https://doi.org/10.3389/fendo.2019.00669>
16. Gupta, C., Sangita, J.D. and Kumar, M (2022) Reviewing the Impact of Social Media on the Mental Health of Adolescents and Young Adults. *Cureus*, 14(10). <https://doi.org/10.7759/cureus.30143>
17. Kassi, E., Pervanidou, P., Kaltsas, G et al (2011) Metabolic syndrome: definitions and controversies. *BMC Med*, 9(48). <https://doi.org/10.1186/1741-7015-9-48>
18. Kesiraju, L. and Vogels, T., Flurry (2018) Health & Fitness App Users Are Going the Distance.
19. Koipysheva, E., Lebedinsky, V and Koipysheva, M. (2018) Physical Health (Definition, Semantic Content, Study Prospects). *Research Paradigms Transformation in Social Sciences*, vol 50, pp. 601-605
20. Kovess-Masfety, V., Keyes, K., Hamilton, A., et al (2010) Is time spent playing video games associated with mental health, cognitive and social skills in young children? *Social Psychiatry & Psychiatric Epidemiology*, 51, pp.349-357
21. Lebni, J.Y., Toghroli, R., Abbas, J., NeJhaddadgar, N., Salahshoor, M.R., Mansourian, M., Gilan, H.D., Kianipour, N., Chaboksavar, F., Azizi, S.A. and Ziapour, A. (2020) A study of internet addiction and its effects on mental health: A study based on Iranian University Students. *Journal of Education and Health Promotion*, 9, https://doi.org/10.4103/jehp.jehp_148_20
22. Ludwig, D.S., Peterson, K.E. and Gortmaker, S.L. (2001) Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. *Lancet*, 357, pp. 505-508
[https://doi.org/10.1016/S0140-6736\(00\)04041-1](https://doi.org/10.1016/S0140-6736(00)04041-1)
23. Lee, A.M., Chavez, S., Bian, J., Thompson, L.A., Gurkha, M.J., Williamson, V.G. and Modave, F. (2019) Efficacy and Effectiveness of Mobile Health Technologies for Facilitating Physical Activity in Adolescents: Scoping Review. *JMIR mHealth and uHealth*, 7(2)
24. Marcovecchio, M.L. and Chiarelli, F. (2013) Metabolic syndrome in youth: Chimera or Useful Concept? *Curr Diab Rep*, 13, pp. 56-62.
<https://doi.org/10.1007/s11892-012-0331-2>
25. Martins, F., da Cunha, J and Serra, F. (2018) Secondary Data in Research - Uses and Opportunities. *Iberoamerican Journal of Strategic Management*, 17(4), pp.1-4
26. Moser, A. and Korstjens, I. (2017) Practical guidance to qualitative research. *Eur J Gen Pract*, 23(1), pp.271-273

27. Musa, S., Elyamani, R and Dergaa, I. (2022) COVID-19 and screen-based sedentary behaviour: Systematic review of digital screen time and metabolic syndrome in adolescents. *PLoS One*, 17(3), pp.1-18
28. Nesi, J. and Prinstein, M.J. (2015) Using social media for social comparison and feedback-seeking: gender and popularity moderate associations with depressive symptoms. *J Abnorm Child Psychol*, 43, pp. 1427-1438
<https://doi.org/10.1007/s10802-015-0020-0>
29. Nesi, J., Wolff, J.C. and Hunt, J. (2019) Patterns of social media use among adolescents who are psychiatrically hospitalised. *J Am Acad Child Adolesc Psychiatry*, 58, pp. 635-639. <https://doi.org/10.1016/2019-03-009>
30. Pate, R.R., O'Neill, J.R. and Lobelo, F. (2008) The evolving definition of "sedentary". *Exerc Sport Sci Rev*, 36, pp. 53-61
31. Reaven, G.M. (1988) Role of insulin resistance in human disease. *Diabetes*, 37, pp. 1595-607. <https://doi.org/10.2337/diabetes.37.12.1595>
32. Reid Chassiakos, Y.L., Radesky, J., Christakis, D. and Moreno, M.A. (2016) Cross C: Children and adolescents and digital media. *Paediatrics*, 138
<https://doi.org/10.1542/peds.2016-2593>
33. Saunders, T.J. and Vallance, J.K. (2017) Screen Time and Health Indicators Among Children and Youth: Current Evidence, Limitations and Future Directions. *Applied Health Economics and Health Policy*, 15(3), pp. 323-331
34. Sinclair, J., BetterUp (2021) What is social well-being? Definition, types, and how to achieve it. Available at:
<https://www.betterup.com/blog/what-is-social-well-being-definition-types-and-how-to-achieve-it> (Accessed: April 20 2023)
35. Statista (2018) Total mHealth market size worldwide 2025 forecast. Available at:
<https://www.statista.com/statistics/938544/mhealth-market-size-forecast-globally/>.
36. Thompson, D.A. and Christikas, D.A. (2005) The association between television viewing and irregular sleep schedules among children less than 3 years of age. *Paediatrics*, 116(4), pp.851-856
37. Tremblay, M.S., Carson, V., Chaput, J.P. et al (2016) Canadian 24-hour movement guidelines for children and youth: an integration of physical activity, sedentary behaviour, and sleep. *Appl Physiol Nutr Metab*, pp. 311-317
38. Tremblay, M.S., LeBlanc, A.G., Kho, M.E., Saunders, T.J., Larouche, R., Colley, R.C., et al (2011) Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *International journal of behavioural nutrition and physical activity*, 8(1), pp.1-22. <https://doi.org/10.1186/1479-5868-8-98>
39. Turner, T., Spruijt-Metz, D., Wen, C.K. and Hingle, M.D. (2015) Prevention and treatment of paediatric obesity using mobile and wireless technologies: a systematic review. *Pediatr Obes*, 10(6), pp. 403-409.
<https://doi.org/10.1111/ijpo.12002>

40. Twenge, J.M. and Farley, E. (2021) Not all screen time is created equal: associations with mental health vary by activity and gender. *Social psychiatry and psychiatric epidemiology*, 56(2), pp. 207 - 217.
<https://doi.org/10.1007/s00127-020-01906-9>
41. Vincent, J. (2010) Living with mobile phones. *Mobile media and the change of everyday life*, pp.155-170.
42. World Health Organisation (2004) *Promoting mental health: Concepts, emerging evidence, practice: Summary report*.
43. Xian, Y., Xu, H., Xu, H., Liang, L., Hernandez, A., Wang, T. et al (2017) An initial evaluation of the impact of Pokemon GO on physical activity. *J Am Heart Assoc*, 6(5). <https://doi.org/10.1161/JAHA.116.005341>