

The Effects of Screen Time on Children's Physical Development.

Abstract

This paper examines the effects of screen time on children's physical development and the exposure to a variety of digital devices. The impact of technology on children's development and learning abilities is a topic of growing concern. While digital gadgets offer numerous benefits, they also come with drawbacks, such as reduced physical activity and potential harm to social, emotional, and cognitive growth.

Early intervention and safety measures can be used to navigate this complex interaction effectively. Research on the effects of screen time on children's physical development is underway, utilizing a hybrid methodology combining qualitative and quantitative feedback. Data from children aged three to four will be gathered through longitudinal studies, observations, and parent/carer questionnaires. This integrated approach aims to provide a comprehensive understanding of the importance of obtaining consent and promoting responsible digital gadget use among young children. Ensuring voluntary engagement from children and informed consent from parents/guardians is fundamental. Confidentiality, anonymity, and ethical issues are carefully considered, with a focus on minimizing harm and ensuring participant welfare. Adhering to legal and regulatory frameworks to safeguard personal information and uphold the integrity of the research process.

Screen Time

According to Hodge, Panourgia and Ventouris (2021) technology is progressing at a remarkable rate where digital devices have become a fundamental part of education and has proven to benefit everyday living. Furthermore, technology has had an influence on many areas of development and children's ability to learn (Werling, 2020). The Piaget theory considers sensorimotor stages such as touching, noticing, hearing, children who are exposed to digital media may substitute screens for activities for their neurological development (Gastaud *et al.*, 2023).

Twenty years ago, children would play outside by participating in self-lead activities where they were experts at making up games which become central elements of children's lives due to the upbringing of the digital world (Alanazi and Zahra, 2019).

Moreover, it is common to hear concerns about children using technology excessively in their daily lives and the link with limited exercise. Experts contend that children are not getting the opportunity to play and learn freely, while others have highlighted the advantages of technology and the opportunities it creates for learning (Spanswick, 2016). Furthermore, technology has the power to alter human behaviour and habits in people of all ages (Agil and Nurdiantami, 2020).

The use of technology has demonstrated educational increased success rates while also providing opportunities for children to become more absorbed as well as improved information gathering. Additionally, technology creates experiential learning opportunities that can be incorporated into all academic subjects by allowing learners to work together with their peers (Costley, 2014). Additionally, health benefits such as, enhanced cognitive creativity and physical well-being has been associated with the use of digital technology (Mena, Zeng and Ye, 2023). Furthermore, Hurwitz and Schmitt (2020) suggest that early digital skill development can lay the groundwork for young children to continue developing their digital abilities throughout childhood, to provide students with the confidence to use technology effectively.

According to George *et al.* (2023) questions have been raised concerning how the use of technology may affect children's mental and physical growth. In the area of cognition, sleep quality, memory span, reading comprehension, focus and face-to-face communication skills are frequently mentioned, along with the symptoms of anxiety that children experience when restrictions are enforced for the use of digital devices. Decreased concentration levels and learning abilities as well as increased rates of depression and obesity have been associated with screentime usage (Ricci *et al.*, 2022). Furthermore, Mustafaoglu *et al.* (2018) claims that technology has an influence on psychological, emotional and social development of the children which enhances day by day,

Muppalla *et al.* (2023) claims screen use may enhance education, However, overexposure has been linked with reduced academic achievement and executive functioning as the screen time decreases the quantity and intensity of interactions that occur between children and their parents. Furthermore, evidence indicates that young children who spend more time on screens are more likely to be obese and score poorer on tests of psychological health, cognitive development, and motor

development. These findings emphasise the importance of early intervention (McNeill, 2019 cited in Veldman *et al.*, 2023).

World Health Organization (2019) have introduced guidelines for children under five to reduce screen time by creating opportunities for more active forms of play by ensuring physical play is used more. Childhood is a phase of fast development and adaptation of family living patterns. Furthermore, Children from the age of two to four should only be exposed to one-hour of screen usage per day based on recommendations (World Health Organization, 2019). Additionally, research has suggested that three-to-four-year-olds spend an average of more than nine hours a week which exceeds the recommended usage. Also, children's early experiences have an impact on the way the brain's functions (Hwb, 2019).

Panjeti-Madan and Ranganathan (2023) explains children's screen time has increased due to schools moving to remote learning for a period due to the coronavirus. However, before the crisis, screen usage was lower, concerns over the potential harm that excessive screen time may do to children has appeared because of the dramatic growth (Wiederhold, 2020).

Practitioners are exposed to the complicated nature of digital usage when examining the consequences of screen usage on young children, considering both the positive and negative effects, including the long-term implications of the pandemic. Future studies should keep looking into ways to give children more opportunities to play unstructured to limit screen time and improve their development and health.

Practitioners should also make sure that screen time is used wisely and in accordance with policy requirements. Welsh Government (2020) claims there are concerns about internet safety being related to the behaviour of children. Therefore, it is necessary that policies and procedures for online are created with the intention of changing user behaviour.

Methodological consideration

Research method.

This research will involve conducting observations, questionnaires, and longitudinal studies to offer a mixed approach while focussing on qualitative and quantitative feedback to understand the effects of screen time on children's physical

development. Furthermore, the use of quantitative and qualitative research addresses a variety of questions while capturing various forms of data to produce more opportunities to understand the chosen subject through research (Wasti *et al.*, 2022).

Kandel (2020) defines qualitative research as subjective and employs a variety of information-gathering techniques such as, focus groups and one-on-one, in-depth interviews where quantitative research technique is a methodical approach to investigating occurrences and their relationships that work with numbers and anything quantitative. Moreover, quantitative research is understanding the relationship between an independent, population dependent, or outcome variable, is the primary goal of quantitative study design. This research approach is either experimental or descriptive, the analysis forms relationships between variables as well as an experiment (Abuhamda, Ismail and Bsharat, 2021).

Sample Size

Hossan and Alhasnawi (2023) claims that sample size equates to the number of observations that are used to estimate a particular group of people. Moreover, Sharma (2023) suggests that sampling is a significant aspect of the quantitative research project. An explicit strategy for selecting a sample from a certain population is known as a sampling design. Researcher's must carefully choose a small number of components. Furthermore, Bhardwaj (2019) suggests that sampling is one of the primary factors that influences the accuracy of the study, when sampling is conducted by qualified and experienced researchers, the results are more accurate. When samples are small, they require less room and equipment to study where resources are limited, sampling is the most effective method to gain the correct research. Additionally, Andrade (2020) claims the sample size should be estimated at the time it is proposed a sample that is too big is unneeded and unethical, while a sample that is too small is unscientific and unethical as well.

According to Summers, 1991 and Sweeney (2013, cited in Ahren and Zaščerinska, 2014) the use of probability sampling is the most effective method for choosing such a sample in educational research, as non-probability sampling cannot guarantee the creation of a population's statistic. Furthermore, the key difference between the two domains is that, whilst the results of non-probability sampling studies can only be

applied to the organisation where the sample was investigated, those of probability sampling studies can be applied to the target population. Every element in the population has a known likelihood of being included in the sample, which is the primary feature of a probability sample. Also, probability sampling can offer an equal chance for everyone to be included in the sample. Creating a sampling frame beforehand and selecting a sample from it using a computer programme that generates random numbers is one method of conducting random sampling (Zikmund, 2002 cited in Taherdoost, 2018).

The appropriate sample sizes promote more effective research, producing trustworthy data while using less resources and abiding by moral standards. The computation of sample size has a direct impact on research outcomes. Studies with exceedingly small sample sizes have problems with both internal and external validity. Inaccurate conclusions could be drawn by researchers due to the possibility that large sample numbers could transform small variations into statistically significant ones (Faber and Fonseca, 2014).

Participants

Two groups of ten children with a mixed ability between the ages three to four from a rural town in South Wales, with group A consisting of a classroom full of technology and group B will be in the outdoors with access physical activity-based equipment. The caregivers and parents will be directly involved with the open-ended questionnaires to gather information. The research project's overall success depends on its ability to successfully recruit and retain study members. Finding research volunteers and giving them the information they need to determine whether to participate in a proposed study (Manohar *et al.*, 2018).

Observations

Observations can provide an informative data source and can be especially effective, for both novice and more experienced researchers, observations can provide a direct means of obtaining a deeper comprehension of real-world events (Rozsahegyi, 2019), Children will be observed to understand screen time habits in natural settings, such as schools.

Observations will assist the research to gain access to social interactions and produce systematic records of a variety of formats and circumstances (Simpson and Tuson, 2003 cited in Cohan 2017). Furthermore, the benefit of observation as a research approach is that it offers first-hand knowledge of a condition, or event in the natural environment while also addressing the correct behaviour instead of the behaviour that has been reported (Wellington, 2020).

Participant observation can be a great technique to watch real behaviours and collect qualitative data if the observer does not alter the participant's behaviour from expectations. Oswald, Sherratt and Smith (2014) claims that the Hawthorne effect is a type of behaviour modification, which occurs when people alter their behaviour when they are aware that they are being observed or examined. The successful use of participant observation may produce innovative and thorough study results for the researcher. When an individual's usual behaviour changes, it is known as the Hawthorne effect and can be attributed to their awareness that their actions are being observed or examined (Oswald, Sherratt and Smith ,2014).

Social psychology has thoroughly investigated the impact of a single trait's perception on an individual's overall assessment. The events, which is commonly referred to as the Halo effect, has been studied for more than a century. Over that time, discoveries have been made about the relationship between aesthetic perception and other personality attributes, such competence and trustworthiness, which is important in social relationships (Gabrieli *et al.*, 2021).

Limitations

Kumar (2022) claims that there are constraints on observations due to the stability of the environment, which may function as a hindrance, as working in unstable environments can be challenging. The procedure is slow, expensive, and time-consuming. The observer's skill, dependability, expertise, and familiarity all affect the information gathered. It may not be feasible to see or examine everything at once and the study's scope might be restricted. Furthermore, one of the problems with observation is the observer bias, which occurs when different conclusions are drawn from actions and behaviours that are observed. Challenges emerge because the subject may be aware that they are being watched and adjust their behaviour to match what they believe the watcher wants to see. Another drawback is that there

are a lot of uncontrollable factors at play, making it challenging to pinpoint the precise cause of behaviour (Lombardo, 2015, cited in Bradley, 2019).

Despite the compelling benefits of using mixed approaches, there are certain drawbacks to the approach. The main reasons why mixed technique research designs are not often utilised are that a lack of time, energy, and resources. There are challenges of the research technique types and the theoretical foundation in addition to the practical problems (Hafsa, 2019).

The parents and caregivers will be involved as part of the questionnaire element of the research to understand screen time habits, the types of content the children engage with and any observed effects on behaviour and development. However, Holmes (2023) suggests that questionnaires pose difficulties with research, which are mostly related to the respondent's completion of it. A thorough design procedure may be able to stop the majority issues to reduce the impact if they are foreseen and designed-out during the design phase.

Longitudinal studies

Longitudinal studies involve researchers that track people over extended periods of time often years or decades use continuous or recurring measures. Typically, gathering quantitative and qualitative data on any combination of exposures and outcomes without the application of outside influences. A more thorough approach to study that enables an understanding of the pace and direction of change throughout time (Caruana *et al.*, 2015).

Interviews

Rutledge and Hogg (2020) claims that in-depth interviews could introduce obstacles, due to the requirement for filming or transcription services, conducting in-depth interviews and doing the analysis can be time-consuming and expensive, even with a small sample. Since the effectiveness of an interview hinges on the interviewers' abilities and people skills, training is frequently necessary. Therefore, in this research it will not be necessary to complete interviews.

Triangulation

Bell and Waters (2018) and Newby (2014) claims that triangulation is a method that gathers information from two or more sources to verify its authenticity while the researcher compares the results of one approach with those of another to verify or dispute the findings of the former by looking at the same subject from different angles. Furthermore, Roberts-Holmes (2018) has identified triangulation as a qualitative and quantitative data set which uses a special strength of mixed methods research for instance, if both sets of data agree, there is a good degree of agreement between two distinct however, complementary sources of information. This enhances the validity of the research findings and provides the researcher with confidence regarding their accuracy.

Researchers can employ numerous sources of evidence to corroborate or clarify their conclusions by gathering and analysing both quantitative and qualitative data. This process is known as triangulating data. In a mixed methods study, data triangulation is widely acknowledged as a validating tool for individual method outcomes (Bergman, 2008 cited in Sharma *et al.*, 2023). Therefore, emphasis will be placed on the use of triangulation during this research project to allow a more accurate way to produce reliable results based on the use of testing theories to obtain answers that are most accurately matched to reality (Bans-Akutey and Tiimub, 2021).

Ethical Considerations

Consent

Consent plays a role in ensuring that parents or guardians are fully informed about the potential impacts of screen time on young children. The parents should be provided adequate information about the risks and benefits of digital screen time, understand these implications, and make an informed decision on whether to allow their children to engage in screen activities. By obtaining voluntary consent from parents or guardians, promoting responsible and mindful use of digital devices in early childhood development (Manandhar and Joshi, 2020).

In this study, informed consent could be obtained verbally from children or informally from parents who can choose to opt out of the research and in writing from the head teacher. Throughout the course of the research, teachers could speak to the entire class to make them aware of the potential research to provide opportunities to

accept or decline. Researchers should make sure the children are happy to continue by asking them to verbally confirm their well-being, using the card system and observing their body language (Department for Education, no datea).

The choice to participate is entirely optional and participants are free to change their mind at any time. In addition, to emphasising this to participants during recruitment the researcher should also remind them at the start and finish of the research session and at any time if they are not sure if they have their ongoing consent. If a participant withdraws their consent during a research session, the researchers must stop and destroy any research data that has been already collected (Government UK, 2018a).

Considering the ethical considerations related to sharing scientific data, especially concerning digital screen time, it is important to engage parents, caregivers, educators, and children in conversations about screen time and its effects on early development. This ensures that policies are shaped by the input of those directly impacted. This inclusive approach fosters a comprehensive understanding of digital technology's benefits and risks in early childhood, facilitating more effective decision-making (Resnik, 2023).

Research integrity encompasses honesty in reporting, adherence to discipline norms, transparency in disclosing conflicts of interest and data gathering techniques, respect for all study subject and accountability for fostering a research environment that empowers staff and students (University of Wales Trinity Saint David, 2022).

The foundation of excellent qualitative research is the reliability of the findings. Member checking is a method for examining the veracity of results. It is sometimes referred to as responder or participant validation. Participants receive data or results back to verify accuracy and fit with their experiences, one technique that is frequently included in lists of validation procedures is member checking (Birt *et al.*, 2016).

Information sheet

The information sheet will give potential participants study details, including contact info, ethical approval, an invitation to join, voluntary participation, withdrawal procedures, study summary, risks, benefits, and data handling. Informed consent involves researchers providing participants with adequate and clear information

about the study so they may decide for themselves whether to participate (Alderson & Morrow, 2011 cited in Arnott *et al.*, 2020).

Obtaining informed consent is useful for building trust with study participants. Consideration of participants' specific needs, such as helping with complex language. Adhering to ethical principles, being honest and prioritizing participants' well-being are areas of importance. By working at their pace, being open and respectful and fostering trust, everyone can feel comfortable participating (Walker and Solvason, 2014).

The consent principles are applicable to both adults and children. For people under the legal consent age in the context/culture, this is known as assent. However, the ability of children to make well-informed judgements varies depending on their age. British Educational Research Association supports (BERA) the United Nations Convention on the Rights of the Child which states that children's best interests should always come first and that children old enough to form their own opinions should be allowed to voice them freely (British Educational Research Association (BERA), 2024).

It is normal practice to provide cash incentives to study subjects in exchange for their involvement. This helps with recruiting however, it also raises ethical questions about excessive motivation, exploitation and biased enrolment (Resnik, 2016). Therefore, there will not be any rewards associated within this research endeavour.

Confidentiality and Anonymity

Every participant is entitled to privacy, prioritising the safeguarding of their personal data for the duration of storage or usage. Even in cases where data collection cannot be anonymous, confidentiality should come first. Signed consent forms are securely kept in a locked file drawer and all survey data files are password-protected.

Participants in research have a right to privacy and the ability to withhold certain data, which is becoming more widely recognised both inside and outside of schools and covered by an assortment of laws (Bos, 2020).

Inadequate confidentiality and anonymity practices performed by the researcher not only causes participants to suffer extraordinary and unseen damage, but also impact the critical evaluation of the research's overall findings. The ethical norms of

confidentiality and anonymity in research aid in obtaining participants' informed permission by guaranteeing the protection of their personal information. According to research bodies and organisations, all research processes should meet these criteria's to be considered credible (Kang and Hwang, 2023).

In most forms of qualitative research, anonymity is never fully maintained because the researcher is aware of all research participants. The participants' only assurance that their identities would be kept private in front of their colleagues and the public is confidentiality. To protect participant confidentiality, qualitative researchers may employ a variety of techniques, including codes or anonymous identities throughout data analysis (Petrova, Dewing and Camilleri, 2014).

To protect confidentiality and anonymity in research, key requirements include clear policies for handling sensitive information, secure data storage and transmission, consent before sharing personal details, limited access to confidential records, staff education on confidentiality, regular privacy practice reviews, open communication, and prioritizing data security. These measures establish a secure environment where confidentiality and anonymity are upheld. When gathering, evaluating, and reporting participant data for a study, the protocols of anonymity and confidentiality are employed to safeguard the privacy of human subjects. Maintaining integrity and correctness are requirements when gathering data for study (Hoft, 2021).

Safeguarding is the process of defending an individual's health, wellbeing, and right to live in safety, free from abuse and neglect. The researchers must disclose to participants any situations in which they are aware of a danger of harm to a minor or other vulnerable person, a major and urgent risk to their own safety, or a serious and immediate risk to the safety of others (Department for Education, no dateb).

Risks and Mitigations

The participants run the risk of suffering from physical injury, psychological discomfort, or embarrassment. Any disadvantages and hazards must be outlined in detail on the informed consent form. Moreover, researchers should try to minimise suffering, Children must give up time from their regular activities to participate in

research. Involvement is a selfless deed that takes up their time regardless of any potential rewards, it is critical to portray involvement as a free decision. Respecting their time, talking about preferred times, planning effective activities, and expressing gratitude (Brady and Graham, 2019).

Ethical Research Involving Children (2023) discusses the strategies that can be used to decrease the discomfort experienced by children taking part in the study, making sure that any necessary child support has been accounted for both before and after the study process is necessary, while taking steps to guarantee that the distribution of the research findings does not hurt families, communities, or children. Competent research methodology, including the use of proper techniques for data collection and analysis is paramount. If incorrect improper or non-scientific methods are employed throughout the data collection and analysis phase of the research process, harm may be caused because of this (Ethical Research Involving Children, 2023).

Researchers should think about the hazards to themselves and to anyone else who might be impacted by or participated in the research. Researchers should take the right actions to reduce these hazards (Queen Mary University of London, no date). Additionally, risks in research ethics include social risks, legal hazards, economic harm, reputational risk, and safeguarding concerns are among the dangers associated with research ethics. Early risk assessments conducted during the planning stage aid in determining whether project modifications are required and whether the resources currently available are adequate for risk management. These evaluations help to determine the funding proposal's expenses as well. After project approval, research-specific risk evaluations must be conducted, and ethical approval might be necessary for studies posing serious hazards to participants, investigators, or the institution (University of Essex, 2024).

The University is committed to maintaining the highest levels of honesty and thoroughness in all its research projects. With an emphasis on fostering a research environment based on honesty, sound governance and the professional growth of the researcher and that research is conducted in compliance with ethical, legal, and professional frameworks to improve research integrity, seeking collaboration with other universities, to manage complaints of research misconduct through

transparent, timely, and fair processes. Regular and transparent reviews of progress should be conducted to guarantee continuous enhancement and compliance with these standards (University of Wales Trinity Saint David ,2022).

Maintaining standards in line with the University's values, policies and procedures, applicable law and regulation and funding body requirements is useful when conducting collaborative research. Understanding the legal and regulatory frameworks in which the research partners operate, as well as their standard operating procedures for research management, to reduce the probability that such circumstances will arise and to be prepared to manage them when they do (University of Dundee, 2021).

The research should comply with the General Data Protection Regulation (GDPR) to ensure the protection of personal data. The research should obtain explicit consent from participants, clearly explain how their data will be used, stored, and processed to ensure that data is kept secure and confidential. Additionally, researchers should only collect the necessary data for the research purpose and adhere to GDPR guidelines on data retention and deletion. By following GDPR regulations, researchers can conduct ethical and lawful research while safeguarding the privacy and rights of participants (Government, 2018b).

The management of personal data and privacy is outlined in the Data Protection Act 2018 (DPA) and the General Data Protection Regulation (GDPR). Any research effort that manages personal data is subject to the law. Data protection and privacy must be integrated into the study planning process before project approval to conduct research in a way that meets with ethical and legal criteria. Planning the results of the study is a necessity for ensuring that it is conducted in a way that complies with regulations for record keeping, data protection, and freedom of information. (The University of Edinburgh, 2023).

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