

The chosen research article titled “Technology and Children’s Screen-Based Activities in the UK: The Story of the Millennium So Far” (Mullan, 2018) published in Child Indicators Research, volume 11, pages 1781 – 1800, aims to assess how children are using screen-based devices as a result of the changes in technology and internet access between 2000 and 2015. The title accurately explains to the reader what it is that the paper aims to do, and the author writes 3 clear questions they aim to explore and answer. Mullan (2018) uses evidence collected by the Office for National Statistics to analyse whether time on screen-based activities has increased or whether children are using different technologies in place of TV screens and desk top computers. The author, Killian Mullan, working for University of Oxford at the time of writing (Aston University, no date), has authored other papers based on time use, using the same method of time-diary analysis in the UK and abroad and does not disclose any researcher biases or conflicts of interest within this paper. The author seems to approach research from a positivists paradigm as he clearly favors quantitative, statistical findings as opposed to descriptive findings of qualitative data (Mukherji and Albon, 2023). The questions which are explored within the research are in line with current issues, discussed within other recent writing (Ott and Bermingham, 2025; UK Parliament Post, 2020). Moreover, within this research Mullan (2018) explores multi-tasking on screens which can lead to an inconsistency in research data. This can be exemplified by findings from NHS Greater Glasgow and Clyde (no date) who lists the times that children spend at individual screen-based activities and further acknowledges the possible multi-use of screens at the same time, which they refer to as “multi-screening”. This is where Mullan (2018) states that there is missing data and attempts to expand on the available data within this paper.

The title of the article “Technology and Children’s Screen-Based Activities in the UK: The Story of the Millenium So Far” tells the reader what the author intends to analyse within the article. Thomas (2023) explains that the questions within the article should be “precise” and “doable”. Within the introduction the author offers three questions he hopes to address, which are “precise” as they have date limitations (2000-2015) and “doable” as the author aims to access the data from the ONS. The author’s abstract and introduction

also offer a good rationale for the need for this research paper. According to Denscombe (2010) new research should look to link to information, which is already known, adding to that body of knowledge and this should be portrayed to the reader so that there is confidence in its findings.

Mullan (2018) writes a clear introduction, which links the need for this research to a current context. It explains the authors hope to understand whether the use of modern devices is replacing old screen-based activities such as television watching and draws attention to the general concern over too much screen time influencing children's health and development. Additionally, acknowledging the lack of research into the time use changes of screen-based activity and suggests using Office of National Statistics data to achieve an understanding of this. The background is written clearly and is supported with relevant statistics from Ofcom (2015) and Office for National Statistics (ONS) (2002). Although ONS (2002) is an old document, it is required as the data within this is relevant to the time in which the author is analysing. However, these documents do not remain on the Office for National Statistics (ONS) website indefinitely and so are no longer available for viewing which makes it difficult to check validity of claims made, as discussed in Denscombe (2010).

Throughout Mullan (2018)'s introduction and background sections there are in-depth literature reviews and critiquing of current research. It is possible to find support for the author's viewpoint in Ott and Bermingham (2025) which states that children have been using devices for longer periods over the last 10 years. Additionally, UK Parliament Post (2020) is supportive of these opinions and states that weekly time online increased from 9 hours in 2009 to 15 in 2018, for 5- to 15-year-olds, which is in line with Mullan's findings. Furthermore, more recently, since the article's publication, Education Committee (2024) states that screen time has additionally increased by 52% in the 2 years following 2020. In Australia, the government recommends no more than 2 hours of screen time per day for children aged 5 to 17 (Active healthy kids Australia, 2022). This is also the stance of Fraser Health Authority, Canada, which is one of Canada's largest health authorities (Fraser Health, no date). Currently there is no government guidelines in place in the UK, although

UK Parliament (2024) calls for government to put guidance in to place for parents and carers and states that there needs to be a balance of screen activity, physical activity and social interaction for the wellbeing of children.

The author states he aims to use quantitative data analysis to explore whether children in 2015 were using screens more or less than at the turn of the millennium, whether they are accessing more than one screen-time based activity at the same time or consecutively and the differences certain factors make to the amount of time children spend on devices, such as gender and socio-economic status. Mullan (2018) argues that it is important to differentiate between consecutive and concurrent screen use as this not only allows us to have a more accurate understanding of how children use technology but can also have an impact on future studies into the links between screen-time and the wellbeing of children. Mullan (2018) acknowledges that there have also been changes to lifestyle and social concerns such as children's safety and supervision outdoors, which could have a knock-on effect to the amount of time children are indoors and therefore accessing screen-based activities. This is supported by Save the Children (2022) which states that only $\frac{1}{4}$ of children regularly play outside. Additionally, the author makes use of international research data to broaden the understanding and context and accessing similar study data from recall-based studies in the UK. Mullan (2018) uses this to show relevance of the need for the study and argues that recall-based studies can produce inaccuracies as participants mis-remember the lengths of time they spend within an activity. Additionally, Mullan (2018) highlights the findings of other studies such as Carson *et al.* (2016), which acknowledges the negative implications to children's health which occur when spending 2 hours or more watching TV per day.

The author hopes to achieve this aim by accessing data gathered by UK time use surveys (UKTUS) 2000-01 and 2014-15 from the ONS and comparing the findings within both sets of data. The researcher does not intend to support this with any of his own data gathering, nor exploring other qualitative methods such as interviews or case studies to triangulate the data. Crotty (1998) states that researchers must be able to justify their choices of methods. Mullan (2018) does this by stating several rationales for using time use surveys

including the unreliability of other methods such as time recall questionnaires, which he states is due to inaccuracies of memory of participants, the inability of similar studies such as Ofcom (2015) to assess whether the activities are independent or if they have occurred alongside each other (multi-screening) which would reduce the total number of hours a child is in front of a screen. However, the author does not establish why they do not conduct their own research. Doing so would provide the author with opportunity to use method triangulation for their findings, by using other means of collecting data, alongside the survey, such as an interview (Carter *et al.*, 2014). Furthermore, Mullan (2018) does not offer an in-depth explanation of the UK time use surveys, making it difficult for the reader to analyse the data thoroughly.

There is no explanation of how the participants that were selected were the most appropriate for the survey nor is there a description of how this information was gathered, as suggested in Vanderstoep and Johnston (2009), so that the reader can understand the methods and make informed decisions around its validity. Additionally, Mullan (2018) does not clearly explain if the data is gathered from the same participants, tracking the same participants use of devices across two different time periods, or if it uses the repeated independent sample design as discussed in Vanderstoep and Johnston (2009). Moreover, Vanderstoep and Johnston (2009) argue that there are pros and cons to using a repeated independent sample and state that some positives of using such methods are that it can be cost effective, and it is less likely to impact attrition rates. Additionally, in this instance the children that were nearing teenage years would be adults by the time the second survey was gathered. Table 3 mentions the number of participants as 5446, however the author does not state this elsewhere, if this is the total number of participants in the UKTUS or if the author further selected data from this study. Additionally, these surveys are not accessible through the authors reference list. ONS 2002 does not open, and the UK time use survey 2014-15 is not linked at all. Clear links to these documents would allow readers to check for validity and accuracy.

The author acknowledges that the UKTUS from the ONS use a representation of the population in a “clustered and stratified sample design” meaning that the population was

broken into subgroups, based on characteristics, with random representation in proportion to the population surveyed from each group (Sharma, 2017 and Vanderstoep and Johnston, 2009). This means that if there were data collected from 100 participants of a school of 1000 with 480 of those being girls, the researcher should select 48 girls to reflect the sample population (Vanderstoep and Johnston, 2009). Elfil and Negida (2017) also state that stratified sampling allows minority groups in the population to be represented in the findings. However, as stated it is difficult for the reader to conclude whether the author has used all the gathered data or further selected participants from this data. While it is not possible to find this information explicitly, ONS (2023b) explains that they collect data from a representation of the population in order to make approximations. However, the author acknowledges that data from 66 lone-father households is not included in the analysis and does not give reasons for this. This brings into question whether this sample is representative of the population, as discussed by Denscombe (2010) which states in order for the research to be representative it must proportionately represent the whole population – which, Elfil and Negida (2017) and Sharma (2017) state is possible through the stratified method of collection. Moreover, Martínez-Mesa (2016) states that with misrepresentation of the population it is impossible to draw reliable conclusions. Moreover, Martínez-Mesa (2016) argues that the type of data gathered by the ONS also has limitations as people who have no fixed abode would not be surveyed, and so again there is a possibility of under-representation of the data. Additionally, Sharma (2017) highlights that this misrepresentation of the population by researchers not subgrouping the population into representative categories, is one drawback to stratified sampling methods, however, when done well this method allows for generalization.

In addition, the author also does not clarify whether it is the children submitting the responses or whether the parents are doing so for them. If the latter is the case, then there may be limitations to the data based around bias. That is to say that parents may look to socially accepted timeframes and answer the survey with what they perceive as being an amount which would be like that of other similar peers. Larson (2018) explains that this type of bias is called social-desirability bias and NHS England (2022) describes such

biases as conformity bias. However, Larson (2018) does continue to say that this can be reduced by making survey responses anonymous, which is what ONS (2024) states to be true of their surveys, albeit this is not made clear to Mullan (2018)'s readers.

Furthermore, without clear links to the documentation, it is difficult for readers to assess ethics. Ethics are principles to ensure that those taking part are kept safe and their data is used as they were intended with clear consent (Denscombe, 2010). BERA (2024) states that when researchers are using data they themselves did not gather, the researcher has a duty to ensure the consent that was in place when that data was initially collected and should consider whether it is appropriate to request further consent for it to be used in the way the researcher requires. These surveys are conducted by the Office for National Statistics (ONS) which is a service to collect data from the population to create a set of statistics (ONS, 2023) and follows ethical procedures. However, these are not explored within the paper and are difficult to research as a reader. ONS (no date a) explains that support is offered from the "Ethics Advisory Committee" to researchers to ensure that any data researcher access is used in line with their ethics procedure and ONS (2023a) explains the data protection procedures for the service to abide by General Data Protection Regulation (GDPR). Additionally, ONS (no date b) discusses ethical scrutiny and states that there must be an assessment of how data will be used prior to it being gathered and prior to researchers gaining access to data already gathered by the ONS. Moreover, Vanderstoep and Johnston (2009) explain that higher and further education institutions have committees in place to seek ethical approval before data collection begins. Readers can see that, when the paper was written, Mullan acknowledges his association with the University of Oxford, which has its own research committee that pledges to enforce ethical research (University of Oxford, no date). Add to this that Mullan (2018) was supported with funding from by two organisations. Firstly, the European Research Council (ERC), which states it offers grants to new or experienced researchers, who must conduct their research within a public or private research organisation (ERC, no date). Secondly, the Economic and Social Research Council (ESRC) which is funded by finances from the UK government. Therefore, it may be reasonable to assume that Mullan (2018) would have had to meet a

significant number of ethical criteria in order to access and use the data and funding for his research, however it would be better if this were made clear to the reader to enable them to determine the validity of the research.

As stated, Mullan (2018) claims to have used data gathered within the UKTUS in both 2000-01 and 2014-15. His data findings are structured in figures and tables, as well as in-depth discussion around the information within these infographics, which is accurately written to reflect the data within them. From table 1, the reader can see that the gender split of participants during both survey years are relatively equal across both genders and similar across both survey periods. This means that the samples have similar characteristics and demographics so that conclusions can be drawn and there is no concern over whether the different characteristics have impacted the findings. The same can be said of the age range of participants, household structure and access to a car within Mullan (2018). However, the mothers' education split is different by almost 20% across the two survey years, which could have a negative effect on the findings. Mullan (2018) acknowledges, and the data analysis considers, that there are certain factors out of children's control such as access to cars, mothers' education. Mullan (2018) analyses whether these factors may be impacting the use of screens in a variety of ways. Within the author's written analysis there are conclusions drawn which are relatable to the questions posed and linked to the findings within the data. As previously stated, Mullan (2018) has used previous research findings to validate those found within the UKTUS and it is possible to check the accuracy of Mullan (2018)'s use of Ofcom (2015)'s data, despite not being accessible from the reference list. When sourcing this document themselves the reader can see that the data within is set out in many different ways and can seem repetitive; however, it is possible to see from figure 20 (page 48) that Mullan (2018) has gathered relevant, accurate data from this document, albeit rounding his numbers. Ahmed and Ishtiaq (2021) state that the need for data which is accurately recorded in research papers is important to reach reliability, which they suggest is fundamental to research. Being able to source Mullan's data in the Ofcom document and check its accuracy helps the reader to inform its reliability. Again

however, it is very difficult for the reader to assess reliability when it is not possible to access the ONS data used.

The findings are separated into subsections with subheadings; however, it may be easier for readers to follow if these headings were in line with his three questions the paper aims to answer. The results are thoroughly explored; however, the tables and figures are somewhat difficult to follow as a new researcher and the discussions around these are lengthy. The paper looks to compare data from 2000 and 2015 and effectively does so, offering an insight into how technological advances have changed access to, and use of, screen time in children.

Table 2 clearly demonstrated the time use of different screen-based activities across the two survey years in columns 1 and 2. However, without an in-depth explanation, column 3 is difficult for readers to understand and seems to undermine the data in column 2. It is unclear whether the data in column 3 (“using device: 2015 (hrs:mins)”) is to be added to the previous column, or if it is time within the previous column where children additionally access a second device. For example, Total for 2015 use of TV as a primary activity (column 2) is 1 hour and 56 minutes, using the afore mentioned interpretation then Mullan is suggesting that of that time children are spending 28 minutes multi-screening with another device. Within the written explanation Mullan (2018) also uses data from Ofcom to support the findings, despite having critiqued the way in which this data was collected within the same article.

Table 3 could be difficult for a reader to understand. This aims to show Mullan’s multivariate analysis of time spent accessing a range of different screen-based activities, allowing for a number of the external factors which may impact this, which includes mothers’ work, age and time of week (weekday/weekend). This information, again, has been written about clearly in 4.1.2 and is much easier for the reader to interpret in this way. Mullan (2018) also links the data here to previous research findings, to synthesize and use data triangulation of his findings. Moreover, Mullan (2018) addresses when it is that children are using screens and links the times spent on devices to a percentage of their

time during that event, which may make these findings clearer in the reader's mind. For example, Mullan (2018) states:

“Children average 9 min using a device when they are studying, which is close to 30% of their average time studying overall (31 min)”.

During Mullan (2018)'s written explanation of this table in 4.1, he acknowledges and reasons the different findings by Ofcom whereby Mullan argues that the recall-based survey that Ofcom uses is an unreliable way to gather data as children may find it difficult to remember and differentiate between games on a video game console or game play on a device, for example while travelling. This is additionally supported by van der Ploeg *et al.* (2010) who state that time use surveys offer greater accuracy of data than other forms of information gathering, due to the frequency they are filled in. With that said, Mullan (2018) also uses the same data to support his findings when they align with ONS data, which makes it hard for the reader to trust the expert opinion that Mullan (2018) aims to provide. Additionally, when referring to Ofcom, Mullan (2018) does not date these findings and so it is hard for the reader to follow which of Ofcom's research he is discussing. Furthermore, within his findings, the author also addresses that it is found that boys are spending longer using video games than girls, and that this should be highlighted as a potential area for further research. Mullan (2018) states that this could ignite their passion for gaming and technology and could be an explanation as to why the technology industry is dominated by males. Additionally, Mullan (2018) argues that children are now using technology and screen-based activities in different way, with connecting and socialising through screens becoming more common, and therefore there is further research needed to understand their use of screens. This includes looking at what apps and uses they are accessing different devices for. This shows that Mullan (2018) is acknowledging some of the data limitations of this current study.

To conclude, this paper's research is valuable and is linked to the current context of international concerns over how much time children are engaging in screen-based activities. It highlights the need for researchers to be aware of the way in which children

now use their devices, due to the improvements in technology and the ability to use more than one device at a time, also while not tethered to a desk, as used to be the case. As highlighted by Mullan (2018) children are “taking technology with them” as well as their ability to access more than one screen-based activity at the same time. Additionally, within the research, Mullan (2018) highlights that children can be using some time on screen-based activities either in school or as part of studies, highlighting the importance of children accessing devices to support their learning. This research allows policy makers to establish the changes that have occurred since 2000, and establishes links between external factors, such as children from households with no car spending more time using screens for video games and television. While some international governments are publishing recommendations for parents and young people regarding placing limitations on the amount of screen time children and young people are participating in each day, there are no guidance documents from the UK government at present. There is a need for further understanding of the impact such constant access to technology has on children, whether all access is detrimental to children’s development or is supportive of this. This paper sets out to establish timelines and a more thorough understanding of the data, which it has succeeded in doing. If this study was conducted with more validity (expressed ethical process, triangulation of data and links to the original data) it would be good to inform the government for support towards their Online Safety Act 2023, a new act to protect adults and children from harmful online content and places legal enforcement on social media companies to adequately protect children from explicit and harmful material on their platforms (Department for Science, Innovation and Technology, 2024). However, the researcher needs to address more clearly his methods, the methods of the data gatherer, how the sample was selected, what ethical processes were followed and provide readers with clear links to the data used in order to check its validity.

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