

The relationship between screen time, socio-economic background and adolescent wellbeing: A time diary study of 14-year-olds

Introduction

The rapid rise and adoption of information and communication technologies (ICTs) in the 21st century has led to the widespread societal concern about the youth growing up with screens; time spent on TV, games consoles, social media and so on. As such, there is increasing and growing research interest especially since 2014 in examining the detrimental associations of screen time on young people's wellbeing such as mental health, depression, self-esteem and social engagement (see Dickson et al. (2018) and Orben (2020) for systematic reviews). However, the rapid use and transformations of screen time in our daily lives has left several gaps in our knowledge about adolescents' interaction with screens and their development. The term "screen time" is in itself ill-defined in academic discourse, a term used to refer to any one or several devices which have a screen. We know little about "productive" or "unproductive" types of screen activities for adolescents, and factors which may explain inequalities in adolescent interaction with such screen activities. Using time diaries from a longitudinal birth cohort survey born in 2000/01, I examine how 14-year-olds' screen time varies by socio-economic background, and their association to adolescent wellbeing. I contribute to the literature by distinguishing between the potentially "good" or "bad" types of screen activities, and examine these variations by socio-economic background and sex. Additionally, I explore variations depending on when the activity was performed (weekend or weekday), and examine whether other activities adolescents do when not on screen (e.g. sleep or physical activities) help mediate the relationship between screen activities and their wellbeing.

Underlying theory

The most commonly cited or implied mechanism in examining screen time and wellbeing is the displacement hypothesis or a 'crowding out' mechanism. The hypothesis suggests that screen time might displace other beneficial activities i.e. there is an opportunity cost to screen time. This is in line with a study by Wallsten (2013) who uses time diaries of Americans aged 15 and above, and demonstrates that each minute of online leisure time is correlated with 0.29 fewer minutes on all other types of leisure (e.g. offline socializing, watching TV, relaxing and thinking and being at parties). He also finds that each minute of online leisure is correlated with 0.27 fewer minutes working and 0.12 fewer minutes of sleep. However, while there is an acknowledgement that the 'displacement hypothesis' is often *implied* in most studies on screen time and wellbeing, authors such as Dickson et al. (2018) note that few studies explore *which* of these activities are displaced from excessive time on screen.

Using this hypothesis, my analysis examines how screen time may reduce time for different "beneficial" activities. First, screen time may reduce time for important physically health-related activities such as sleep or exercise. For example, Hisler et al. (2020) find that excessive time spent on electronic devices, especially social media or internet surfing, is associated with sleep impairments such as sleeping less and more mid-sleep awakenings. Goodman et al. (2020) find that video game use is associated to higher BMI, explained by irregular bedtimes and higher consumption of sugar-sweetened beverages. Second, screen time may reduce time for learning such as doing homework or school-related activities, although evidence on this is

scarce. Third, screen time might reduce time for face-to-face interactions or other leisure activities important for mental wellbeing and relationships (Twenge, 2017).

However, there is difficulty in establishing how much is “too much” screen time. It is possible that on average, adolescents spend moderate time on screen, which does not displace beneficial activities. Przybylski and Weinstein (2017) coin this the so-called “Goldilocks hypothesis” which suggests that modest screen use can be positive for mental health where screen use is common within society, or more specifically, among peers. Finally, there may be inequalities in how adolescents interact with screen activities based on their socio-economic status. Less privileged groups may have less ubiquitous and less private types of access to these activities. For example, Helsper (2012) find that parental education is strongly positively correlated to a child’s private home internet access and quality of mobile access in European countries.

Data

I use data from the MCS, a nationally representative, longitudinal birth cohort survey of adolescents born in the England and Wales between 1 September 2000 and 31 August 2001, and adolescents born in Scotland and Northern Ireland between 24 November 2000 and 11 January 2002. To date, there are seven sweeps of survey data, first collected when the adolescent was at the average age of 9 months old, followed by ages 3, 5, 7, 11, 14 and 17. To better represent disadvantaged children and ethnic minorities, the MCS oversampled children from deprived background as well as children from areas of relatively high ethnic minority concentration.

I focus on the time use diaries (TUD) of these adolescents, which was issued only in the sixth sweep of the data in 2015, when the adolescent is about 14 years old. From a total of 11,884 adolescents in the main survey, a sub-sample of 4,640 cohort members were randomly selected to participate in the TUD due to restrictions in activity monitors. Restricting my sample to all non-missing dependent, independent and control variables results in a final sample of 3,514 adolescents. The majority of the sample are 14 years old (73%), and the sample over-represents girls (55%), White adolescents (83%) who were interviewed in England (80%). To reduce response burden, the time diaries provided 11 general categories, which were then broken down into 44 pre-defined list of activities participants could choose from. Participants were required to record activities performed during a 24-hour period; either a randomly selected weekday, weekend day or both. They were also asked to provide a full record of where they were, who they were with and how much they liked the activity. Through the online and paper modes, the adolescents were required to fill in their daily activities in 10 minute slots beginning from 4am that day to 4am the next day. However, children using the app were allowed to input any period of time they spent for their activity recorded.

Variables of interest

For the purpose of my analysis, I re-categorised the 44 activities to create 9 distinct grouped activities. I distinguish between four types of screen activities; i) social screen time ii) browsing the internet/audio content iii) playing video games iv) watching TV, DVDs or downloaded videos. I also categorise 5 other time activities to examine them as mediating factors; sleep, education-related activities, physical exercise and sports, social events, outings and leisure activities (performed alone or with others).

I use three aspects of wellbeing measured in the MCS data; the parent-reported strengths and difficulties questionnaire (SDQ), the self-reported Rosenberg self-esteem score and the self-reported life satisfaction questions. The SDQ is designed to be a brief emotional and behavioural screening questionnaire for young people, first developed by Goodman (1997). The SDQ contains 25 items related to the child, and their parents are asked to think about the behaviour of their child over the previous six months and answer according to a 3-point response scale (“Not true”=0, “Somewhat true”=1, “Certainly true”=2). Groups of five items are combined into a single total score for each socio-emotional dimension; 1) emotional symptoms, 2) peer problems, 3) conduct problems, 4) hyperactivity/inattention and 5) prosocial behaviour. I categorise these groups further to Internalising Problems (emotional and peer problems), Externalising Problems (conduct and hyperactivity/inattention) and Prosocial Behaviour. The Rosenberg self-esteem scale administered in the MCS is made up of five items to measure the respondents’ level of self-worth, half the number of items from the original Rosenberg scale (Rosenberg, 1965). Responses to each item range from 1=“Strongly disagree” to 4=“Strongly agree”. Lastly, the life satisfaction scores are made up of likert responses of 1=“Not at all happy” to 7=“Completely happy” on five domains of their life; school, school work, friends, family, the way the adolescent looks, and their life as a whole. All measures are standardised to have a mean of zero and standard deviation of 1.

Empirical strategy

To examine the relationship between adolescents’ screen time and their wellbeing, I first estimate a baseline ordinary least squares specification which does not include any potential time use channels, only controlling for individual characteristics.

For each adolescent, I estimate:

$$Y_{14w} = \alpha_{0w} + \alpha_{1w}S_{14w} + \alpha_{2w}Z_w + \alpha_{3w}P_{5w} + \alpha_{4w}X_{5w} + \alpha_{5w}c_{14w} + e_{6w} \quad (1)$$

where w represents whether the activity was performed on a weekday or weekend. Y_{14w} represents wellbeing outcomes at age 14, and S_{14} represents the vector of four screen activities defined above. I am interested in the coefficients α_1 which measures the association on the hours the adolescent spends a day on the specified screen activity, S_{14} , on their wellbeing. Z represents the adolescents’ time-invariant demographic characteristics such as their age, sex, whether their ethnicity is White or not, and whether the adolescent has any long-term illness, number of siblings and whether adolescent has both natural parents in the household. P_5 represents proxies of the family’s early socio-economic status which are main parent or partner’s highest education, occupational status, housing tenure and combined family income. X_5 represents the adolescents’ early family and child characteristics to control for any early demographic and biological differences such as parental mental health and early wellbeing indicators of the child. c_{14} are stratum indicator variables to control for regional differences and e_{14} is the error term. I run model (1) for the weekend, and the weekday, as I expect there to be different behaviours exhibited on a school day or on a weekend, especially if more educated parents have stricter rules around leaving the home on a weekday.

Then, to explore the potential time use mediators to this relationship, I next examine whether controlling for the “other” time use channels, T_{14} , significantly change the estimated association of time spent on screens on wellbeing in (1). The potential channels which I am particularly interested in relation to the mechanisms discussed are these potentially “beneficial”

activities: i) leisure activities with others ii) health-related activities iii) education-related activities iv) sleep.

For each adolescent, I estimate:

$$Y_{14w} = \beta_{0w} + \beta_{1w}S_{14w} + \beta_{2w}T_{14w} + \beta_{3w}Z_w + \beta_{4w}X_{5w} + \beta_{5w}T_{14w} + e_7 \quad (2)$$

I then test whether the coefficients on screen time, β_1 , is equal to the baseline estimate, α_1 and report the difference between them. This approach treats the potential channels as omitted variables and tests whether the inclusion of the channel results in a significant difference in the effect of time spent on screen on own wellbeing. Finally, I run model (2) by socio-economic background and sex.

Preliminary findings

I find that social screen time (i.e. email/texting or updating social networking sites) and internet browsing or listening to audio content are the most aversely associated to adolescent wellbeing in all domains; self-esteem, parent-reported SDQ and life satisfaction. For social screen time in particular, social screen time performed during the weekday have a larger negative magnitude compared to if the activity was performed on the weekend. Wellbeing associations to playing video games or watching TV or DVDs are more often than not, close to zero or statistically insignificant. When controlling for all other activities that may be important for adolescent wellbeing such as physical activity, sleep, educational activities and leisure time, the magnitude of the negative associations reduce slightly, but still remain statistically significant.

Girls seem to have lower self-reported wellbeing scores in association to social screen time and internet browsing/audio content compared to boys. However, these sex differences are not as obvious when comparing parent-reported SDQ measures except for girls having higher internal problems compared to boys in association to playing video games on the weekend.

When comparing these associations by parental education, the negative associations to social screen time are especially larger for adolescents with higher educated parents, if the activity was performed on the weekday. Internet browsing or listening to audio content on the weekend instead, are more negatively associated to adolescent wellbeing from lower educated parents.

My findings show that some, but not all screen activities are detrimental to adolescent wellbeing. There are variations by how wellbeing is reported, the adolescents' sex and socio-economic background, as well as whether activity was performed on the weekend or weekday.

Essential references

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