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Research paper

Evolution of screen use among youth between 2012 and 2020 in Switzerland

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ABSTRACT

Aim: To compare the evolution of screen and Internet use by youths between 2012 and 2020 in Switzerland. **Methods:** Cross-sectional studies of 10th-graders (age 13–14) were performed in Switzerland in 2012 and 2020, and compared in bivariate and multivariate analyses on sociodemographic, schooling, physical activity, emotional well-being, and screen use variables.

Results: We found that screen use had shifted to smartphones with 71.7% of youths primarily using this device in 2020 compared to 23.2% in 2012. In association with this change, young people's screen time had increased dramatically with an odds ratio (OR) of 11.90 for adolescents spending more than 4 h in front of screens in 2020 compared to 2012. No changes were found in the score on the Internet Addiction Test (IAT) to detect problematic screen use and for adolescents' emotional well-being. Furthermore, youths in 2020 engaged in less physical activity lasting 60 min daily, but the frequency of their extracurricular sport participation remained unchanged.

Conclusions: Young people spend more time on screens, especially because of an increase in smartphone use in 2020. However, youths do not seem to show more problematic behaviors regarding screen use, nor has this development affected their emotional well-being. The daily and continuous use of new devices is now an integral part of young people's lives. This process seems to be part of the growth of the digital world. However, Internet and screen addiction scales should be adapted to ensure that adolescents in need of help and counseling are identified.

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1. Introduction

The use of screens and digital media has become an integral part of young people's lives. Teenagers use screens mainly to communicate, socialize with friends, and to entertain and inform themselves [1]. The expansion of smartphone use in recent years has allowed adolescents to be constantly connected and to have unlimited access to the Internet. A study conducted in Switzerland illustrated the trend in media use by comparing the 2010 wave with the latest wave conducted in 2020: The use of cell phones and Internet services had increased, whereas watching TV, listening to the radio, and reading online magazines had decreased. On the other hand, playing video games remained stable.

Screen time is one of the methods used to quantify media consumption. Thus, researchers use it to analyze the evolution of media use between two given periods. For example, the JAMES study

(*Jugend, Aktivitäten, Medien – Erhebung Schweiz*, Youth, Activities, Media – Survey Switzerland) comparing 2018 with 2020 [2] showed a drastic increase in screen time, from 2 h and 30 min on weekdays and 3 h on weekends to 3 h and 5 h respectively, with screen use shifting significantly to smartphones. In a similar vein, Rideout and colleagues' report among 13–18-year-olds showed that entertainment screen use had increased on average by 2 h from 2015 (6:40 h) to 2021 (8:39 h) [3]. Moreover, a Greek study [4] concluded that Internet addiction among 12–18-year-olds had increased from 11% in 2008 to 16.1% in 2010.

By spending more time in front of screens, youths are more likely to have less time to devote to outdoor recreation and physical activity. The World Health Organization (WHO) recommends that young people get at least 60 min of physical activity every day [5], but the Health Behaviour in School-Aged Children (HBSC) 2018 survey in Switzerland estimated that less than one in five adolescents met these criteria [6], with a significant drop compared to the previous wave in 2014. A study conducted by Mihara et al. [7] showed that a lack of physical activity could be associated with excessive use of screens leading to depressive symptoms. Along the same lines,

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Kremer et al. [8] reported that higher levels of physical activity and lower levels of screen time were associated with fewer depression symptoms. In their systematic review, Stiglic and Viner [9] found moderately strong evidence for associations between screen time and depressive symptoms.

The rise of the digital world represents a major challenge, especially because it encourages young people to stay on their screens continuously. In our study, we aimed to compare the use of screens and Internet among young people in Switzerland between 2012 and 2020 in order to determine its evolution and the changes that have occurred. We hypothesized that (1) screen time will have increased, mainly due to the increase in smartphone ownership; (2) the rate of problematic Internet use will also have increased due to the increase in Internet availability; and (3) that these increases would result in a poorer emotional well-being. This study adds to the literature in that it takes into account the introduction of smartphones among young people, which has significantly changed their behavior with screens between 2012 and 2020.

2. Methods

Data were drawn from two surveys on media and Internet use conducted in 2012 and in 2020 among 10th-grade students (age 13–14 years) in a random sample of schools in the canton of Vaud (Switzerland) using an online questionnaire completed in the school's computer classroom. The final samples were 3067 youths in 2012 [10] (response rate: 91.1 %) and 3006 youths in 2020 [11] (response rate: 78.8 %). Passive parental consent was sought.

Although the 2012 and 2020 surveys were conducted in a similar way, the composition of the samples was not identical and it was not possible to compare the samples directly. Indeed, in the case of differences, it would be difficult to distinguish between a real difference in the variables of interest and a difference due to the composition of the samples. For this reason, it was decided to apply a matching procedure between the two samples with the objective of constructing a sample for 2012 whose structure would be as similar as possible to that of the 2020 sample and that could thus represent the answers that the 2020 respondents would have provided if they had been interviewed in 2012.

Specifically, we used the propensity score method [12] with the following variables: age in years, gender (*female/male*), place of birth (*Switzerland/other*), area of residence (*urban/rural*), academic track (*pre-high school/general*), perceived academic level (*above average/average/below average student*), and family structure (*both parents live together, parents are divorced/separated, father is deceased, mother is deceased, both parents are deceased, other*) dichotomized into *parents together* and *other*.

Each 2020 respondent was matched with the 2012 respondent with the closest propensity score. This resulted in some 2012 respondents being selected multiple times and some other respondents not being selected at all. The weights were then adjusted so that the weighted number of respondents was the same for 2012 and 2020. This procedure resulted in samples with statistically the same structure in 2012 and 2020 with respect to the various variables listed above, except age. The respondents in the 2020 survey were slightly younger than those in the 2012 survey, and this difference could not be completely eliminated. On average, the 2020 sample were about 2 months younger than the 2012 sample.

Analyses were performed on a final sample of 2949 and 3006 youths in 2012 and 2020, respectively.

2.1. Dependent variable

Participants were compared based on data collected by year of participation. Thus, the survey year variable (2012 and 2020) was used to compare the two groups.

2.2. Independent variables

The two groups were compared on sociodemographic, schooling, physical activity, emotional well-being, and screen use (including parental rules) variables.

Sociodemographic variables included age, gender, place of birth (*Switzerland/other*), area of residence (*urban/rural*), and family structure (*parents together/other*). We also asked about the family's perceived socioeconomic status (SES) compared to other families in Switzerland with seven possible answers ranging from *very much below average* to *very much above average* (16), divided into *above average*, *average* and *below average*.

We asked students about their academic track (*pre-high school: students going to high school/general: those doing an apprenticeship*) and whether they considered themselves an *above average*, *average* or *below average student*.

Physical activity was measured by asking about the number of days of physical activity of at least 60-min duration in the past 7 days and the frequency of extracurricular sport participation per week with four possible responses: *none*, *about once a week*, *2–3 times a week*, and *almost every day*.

Emotional well-being was assessed using the WHO-Five Well-Being Index (WHO-5) [13]. This scale is composed of five items that refer to the previous 2 weeks (e.g., *I felt calm and quiet*) and six answers are proposed from *never* (0) to *all the time* (5). After adding the responses, a score below 13/25 was considered as a poor emotional well-being.

The screen time variable included self-reported screen time per day with three possible answers: *less than 2 h*, *between 2 and 4 h*, and *4 h or more* based on previous research [3,14]. Students were also asked which screen they mostly use with five possible answers: *cell phone*, *console*, *computer*, *tablet*, and *television*.

To identify problematic Internet use, we used the short version of the Internet Addiction Test (IAT) validated in French [15]. The scale is composed of 12 questions (e.g., *Do you ever neglect household tasks in order to spend more time on the Internet?*) and six responses ranging from 0 (*never*) to 5 (*always*) are provided for each. After adding up the 12 responses, problematic Internet use was defined as a score above 30 out of 60.

Three parental rules regarding screens and Internet were used in our study [16]. The first one was based on time spent online and included six items (e.g., *My parents allow me to go on the Internet as often as I want*) on a scale from 1 (*completely disagree*) to 5 (*completely agree*), the total score ranged from 6 to 30, with a higher score indicating stricter rules. The second rule measured the content of what was seen online with three items (e.g., *My parents allow me to visit all the sites I want*) on a scale from 1 (*absolutely false*) to 5 (*absolutely true*), ranging from 3 to 15, with a higher score indicating stricter rules. Finally, the third rule asked about discussions of screen use between youths and parents with four items (e.g., *How often do you discuss what you do on the Internet with your parents?*) on a scale from 1 (*never*) to 5 (*very often*), ranging from 4 to 20, with a higher score indicating more communication.

2.3. Statistical analysis

Statistical analyses were performed using STATA 16. We first ran a bivariate analysis comparing the two groups based on the year of participation using the chi-square test for categorical variables and analysis of variance (ANOVA) for continuous variables. The threshold for statistical significance was set at $p < 0.05$ (Table 1).

All significant variables in the bivariate analysis ($p < 0.05$) were then included in a logistic regression analysis using 2012 as the reference category. Results are presented as adjusted odd ratios (OR) with 95 % confidence intervals (Table 2).

Table 1
Bivariate analysis comparing screen use among youth between 2012 and 2020.

	2012 (n = 2949)	2020 (n = 3006)	p
Mean age (years ± SE)	13.88 ± 0.03	13.69 ± 0.01	<0.01
Gender (female)	49.4 %	49.8 %	0.85
Swiss-born (yes)	82.6 %	80.8 %	0.28
Residence (urban)	55.5 %	52.9 %	0.20
Academic track (general)	52.2 %	55.4 %	0.11
Perceived academic level:			0.56
- above average student	24.8 %	23.0 %	
- average student	67.7 %	69.3 %	
- below average student	7.5 %	7.7 %	
Family structure (parents together)	71.4 %	68.7 %	0.14
Perceived socioeconomic status (below average)	5.1 %	5.2 %	0.86
Number of days/7, physical activity for at least 60 min (mean days ± SE)	3.27 ± 0.07	2.23 ± 0.04	<0.01
Frequency of extracurricular sport:			0.55
- none	22.5 %	24.7 %	
- about once a week	21.7 %	21.3 %	
- 2–3 times a week	37.9 %	35.5 %	
- almost every day	17.9 %	18.5 %	
Emotional well-being (poor)	23.1 %	25.4 %	0.20
Screen activity mainly on:			<0.01
- console	14.7 %	10.9 %	
- computer	44.0 %	9.6 %	
- tablet	10.5 %	3.4 %	
- cell phone	23.2 %	71.7 %	
- television	7.6 %	4.4 %	
Screen time per day:			<0.01
- <2 h	69.0 %	27.2 %	
- 2–4 h	25.1 %	41.8 %	
>4 h	5.9 %	31.0 %	
IAT screening (problematic)	11.3 %	11.2 %	0.97
Parental rules on time spent online (mean ± SE)	17.09 ± 0.11	17.36 ± 0.07	0.04
Parental rules on what is seen online (mean ± SE)	8.39 ± 0.11	8.37 ± 0.07	0.86
Discussions about screen use (mean ± SE)	6.58 ± 0.09	6.89 ± 0.06	<0.01

IAT: Internet Addiction Test; SE: standard error.

3. Results

In the bivariate analysis, screen-based activity significantly shifted to cell phones between 2012 and 2020, with 71.7 % of responders stating that they used their cell phone as their primary screen in 2020 vs. 23.2 % in 2012. Consoles, computers, tablets, and televisions were less used in 2020. Screen time had also increased significantly with almost one third of young people (31 %) spending more than 4 h a day on screens in 2020 versus 11.3 % in 2012. The number of youths identified as problematic according to the IAT scale remained almost the same (11.3 % in 2012 vs. 11.2 % in 2020). Parental rules regarding time spent online and discussion about screens between adolescents and parents increased significantly contrary to content rules, which were not significant (Table 1).

In addition, there were no significant differences in sociodemographic variables and academic track between 2012 and 2020, indicating that the two samples had similar characteristics. However, as stated above, in 2020 youths were significantly younger. Regarding physical activity, youths in 2020 spent significantly fewer days per week of at least 60 min of physical activity per day (average 2.23 days/week in 2020 vs. 3.27 days/week in 2012). However, the frequency of extracurricular sport participation was not significant. Moreover, there were no differences in emotional well-being between the two surveys (Table 1).

The multivariate logistic regression analysis showed that regarding screen-based activities, young people primarily used their

Table 2
Multivariate logistic regression analysis using 2012 as the reference category.

	2020 (n = 3006)	p
Mean age (years ± SE)	0.53 [0.45–0.63]	<0.01
Number of days/week of physical activity for at least 60 min (mean days ± SE)	0.79 [0.75–0.83]	<0.01
Screen activity mainly on:		
- console	reference category	-
- computer	0.27 [0.20–0.38]	<0.01
- cell phone	3.70 [2.73–5.00]	<0.01
- tablet	0.50 [0.32–0.77]	<0.01
- television	1.33 [0.88–2.02]	0.18
Screen time per day:		
- <2 h	reference category	-
- 2–4 h	3.56 [2.80–4.52]	<0.01
- >4 h	11.90 [8.43–16.81]	<0.01
Parental rules on time spent online (mean ± SE)	1.01 [0.97–1.04]	0.75
Discussions about screen use (mean ± SE)	1.05 [1.01–1.10]	0.01

SE: standard error.

smartphones as their primary screen in 2020 compared to 2012 (OR=3.70) while computer and tablet activities had significantly decreased (OR=0.27 and 0.50, respectively). Screen time was significantly higher in 2020, with young people being more than 3.5 times more likely to spend between 2 and 4 h per day on screens (OR=3.56) and almost 12 times more likely to spend 4 h or more (OR=11.90). In addition, participants were significantly younger (OR=0.53) in 2020. The number of days per week of physical activity of at least 60 min was significantly lower in 2020 than in 2012 (OR=0.79). No differences were found for parental rules on time spent online and discussion between parents and youths about screen use (Table 2).

4. Discussion

The main objective of this study was to determine the evolution of screen use among youths in Switzerland between 2012 and 2020. In concordance with our first hypothesis, we found that adolescents in 2020 were almost 4 times more likely to spend between 2 h and 4 h on screens and 12 times more likely to spend more than 4 h than their peers in 2012. This increase in screen time is consistent with the JAMES study comparing the 2018 and 2020 waves [2] and with the report by Rideout et al. comparing 2015 and 2021 [3]. However, contrary to the Rideout et al. report [3], we found no gender differences. In addition, the primary screen used by teenagers in 2020 was the cell phone with almost 4 times more users compared to 2012. This result was also reported by other studies [2,3]. For other screens such as the console or the computer, a decrease in their use was observed between these two waves.

In parallel to this drastic increase in cell phone screen time, the number of young people identified as problematic Internet users on the IAT has remained stable (around 11 %), contrary to previous research [4] and to our second hypothesis. Also contrary to our third hypothesis, we found that youths' emotional well-being did not change between 2012 and 2020. These findings have two possible explanations. First, we can assume that current scales such as the IAT are not adapted and do not allow for the detection of youths with problematic screen use [17]. In this case, it would be necessary to implement new tools to allow all youths to benefit from screening, advice, and prevention adapted to their needs. On the other hand, we can hypothesize that these young people are part of a new generation permanently connected to their devices (mainly to the smartphone), so that the number of hours spent on screens does not represent a problematic behavior but rather a new norm that most young people adopt. Smartphones, which were not as widespread in 2012, could explain this difference. Since their rise, young people can be connected anywhere at any time, promoting their continuous use. An explanation for their increased popularity could be new and different

features, easier accessibility, availability, portability, and social networking services among others. Moreover, mobile applications have exploded with the rise of smartphones, with a drastic increase of their use by young people.

In line with the 2018 HBSC survey [6], our study also showed a decrease in the number of days per week with a physical activity lasting at least 60 min. However, the frequency of extracurricular sport practice per week did not change. It seems that young people do not follow the WHO recommendations [5,18], but that most of them continue to practice a weekly sport activity. This finding disagrees with the results from the study by Kremer et al. [8]. We can then assume that screens are part of their daily lives, without necessarily changing some of their habits.

Although only significant in the bivariate analysis, we noticed that in 2020 parental rules were stricter regarding screen time but not regarding the content viewed on the screens. We can assume that parents are aware of the impact of screen time on their children's health, as voiced by adults [19]. On the other hand, we can suppose that they were not very concerned about contacts, activities, and sites visited by their children. In her study among French parents, Danet [20] found that for more than half of the sample, screen use by their offspring was a source of concern and almost two out of every three considered that it affected (positively or negatively) their relationship with them.

Finally, we found that discussion between youth and their parents was significantly more frequent in 2020, suggesting that parents have become aware of the importance of technology in the lives of youths and that this topic is more often discussed at home. However, we do not have information about the content of these discussions, which would require further research. In addition, as there has been a lot of prevention on the use of screens in recent years, we can assume that parents are informed of it and certainly have more tools. However, there is still a need to help and support them in this area.

This study investigated the use of screens and the Internet in a large sample of young people in Switzerland between 2012 and 2020. It adds to the literature on the evolution of this use and the changes that took place within a span of 8 years. However, this study has several limitations. The cross-sectional design of the study did not allow for conclusions on causality. Secondly, the data were collected in a self-reported format, which did not exclude the presence of possible response or social desirability bias. Moreover, self-reported screen time is not always accurate [21].

5. Conclusion

Our results confirmed that young people were spending significantly more time on screens in 2020 compared to 2012, due to a large increase in smartphone use. Despite this finding, young people did not appear to be more addicted to the Internet according to the score on the IAT scale, which remained stable. Furthermore, we also found that their emotional well-being was comparable between the two waves.

Implications for practice: Although young people spend more time on screens, they do not seem to show more problematic behaviors regarding screen use, nor does this evolution seem to affect their emotional well-being. The daily and continuous use of new devices is now an integral part of youths' lives. As the growth of the digital

world will continue to expand, Internet and screen addiction scales should be adapted to ensure that adolescents in need of help and counseling are identified.

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Declaration of Competing Interest

Authors declare that they have no conflict of interest.

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