# HOW TO TACKLE SMARTPHONE OVERUSE THROUGH MEDIA EDUCATION. A RANDOMIZED CONTROLLED TRIAL

## AFFRONTARE IL SOVRA-UTILIZZO DELLO SMARTPHONE ATTRAVERSO LA MEDIA EDUCATION. UN ESPERIMENTO CONTROLLATO

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## ABSTRACT

In the last decade, digital media have increasingly become part of adolescents' daily lives, broadening their opportunities to access the internet in complete independence. However, the diffusion of these always-on devices has led to the emergence of unexpected side effects, related to media overuse and information and communication overflow. This article describes how the «Digital Wellbeing-Schools» project, a media education initiative promoted by the University of Milano-Bicocca in collaboration with Fastweb S.p.A., tackled this issue. The project involved more than 3,600 students at grade 10 from 18 upper secondary schools in the Milano and Brianza area. Indeed, one of four modules of the project training package focused on «time and attention management» in smartphone usage. Students were asked to reflect on their habits on the basis of quantitative data obtained using a self-monitoring app (RescueTime). The paper discusses the cognitive and educational techniques used in this module in the light of the literature. The effectiveness of the whole intervention was then tested through a randomized controlled trial. The results experimentally confirm that the activities carried out in this part of the project significantly contributed to a reduction in smartphone over-consumption and problematic use among treated participants compared with controls.







ISSN 2038-3002 – Vol. 10, n. 1, anno 2019, pp. 59-68
doi: 10.14605/MED1011904

## KEYWORDS

Smartphone overuse, problematic smartphone use, smartphone addiction, digital media education, randomized control trial, boosting, high school

## SOMMARIO

I media digitali sono ormai diventati parte integrante della vita quotidiana degli adolescenti, moltiplicando le loro opportunità di acceso alla rete in totale autonomia. Tuttavia, l'utilizzo di queste risorse senza limitazioni ha portato all'emergere di diversi effetti collaterali fra i più giovani, soprattutto riguardo il troppo tempo speso online e l'incapacità di fare fronte ai fenomeni di sovraesposizione informativa e comunicativa. In questo articolo viene discusso come il problema del «sovrautilizzo» sia stato affrontato all'interno del progetto «Benessere Digitale – Scuole», un intervento formativo di educazione ai media volto a formare gli insegnanti all'utilizzo consapevole e produttivo dei media, promosso dall'Università di Milano-Bicocca in collaborazione con Fastweb S.p.a. L'efficacia dell'intervento è stata testata attraverso un esperimento controllato che ha coinvolto 18 scuole secondarie di II grado e più di 3.600 studenti al grado 10 di istruzione. Il modulo analizzato in questo articolo si focalizza sulla «gestione del tempo e dell'attenzione» e prevede che gli studenti riflettano sulle loro abitudini basandosi su dati quantitativi ottenuti da un'app di monitoraggio delle attività online (RescueTime). Il paper discute le tecniche cognitive e educative usate nel modulo. I risultati confermano che l'intervento ha contribuito a ridurre significativamente il sovrautilizzo dello smartphone e le percezioni di uso problematico fra i partecipanti.

## PAROLE CHIAVE

Sovrautilizzo dello smartphone, uso problematico dello smartphone, dipendenza da smartphone, digital media education, esperimento randomizzato, boosting, scuola superiore.

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ISSN 2038-3002 – Vol. 10, n. 1, anno 2019, pp. 59-68
doi: 10.14605/MED1011904

## 1 Introduction (The problem of smartphone overuse, literature on its effects)

Nowadays, smartphones are essential companions of daily life, both for adults and young people (Mascheroni & Olafsson, 2016). Ubiquitous connectivity has opened a range of new opportunities for communicating, working and having fun more flexibly, quickly and extensively than ever. At the same time, however, smartphones are challenging tools to manage. In fact, they provide us with many stressful stimuli that we need to filter and regulate properly. For these reasons, sometimes a tendency towards «digital overuse» has been detected in smartphone users, where overuse can be considered as a typical case of a divorce between desires and actual choices (Bianchi, 2004). At a certain time, a user plans to spend a certain amount of time using a device. At a later time, the same person uses that device more than he/she previously intended. Hence, smartphone overuse entails users' dissatisfaction with respect to the allocation of their time during a certain period.

Overconsumption is a systematic phenomenon in human consumption activities (Hsee & Hastie, 2006). However, in the digital world, finding a balance in the allocation of time to different types of use and more generally to time spent online, is particularly challenging for users. In recent years, the problem of technology overuse has become especially relevant among a large part of the population. For instance, 49% of British internet users in 2016 maintained that «on a daily basis, they spend longer than they intend browsing the internet, while four in ten (37%) said the same about social media» (Ofcom, 2016, p. 32). Smartphone overuse appears to be an even more widespread phenomenon. On the one hand, smartphones provide us with many pleasant stimuli, such as messages or social rewards, that being ubiquitous, quick and easy to obtain are difficult to resist (Bianchi, 2004, Fasoli, 2019). On the other hand, the business model behind many digital products pushes companies to systematically exploit users' attention by implementing «hooking» technology (Eyal, 2014). Students are affected by portable devices overuse especially when it comes to the use of social networking sites [SNS] and online videos (Panek, 2014). Furthermore, a negative link has emerged between the pervasive or problematic use of smartphones and students' academic performance (see Gerosa & Gui, 2018; Wentworth & Middleton 2014; Xu, 2015; Samaha & Hawi, 2016). At the same time, a major debate is globally taking place concerning the use of these devices as learning tools in the school system.

In this article, we will discuss a media education project that aims to address the problem of smartphone overuse among high school students. The effectiveness of this approach has been tested through a randomized controlled trial, the first study of this kind in Italy applied to media education. The project, entitled «Digital well-being – Schools», was carried out between 2016 and 2019 on a sample of 3600 Italian students from 18 high schools in the north of Milan and

the Brianza area. First we will briefly present the structure of this project and its related randomized controlled trial. Second, we will discuss the characteristics of the teacher training course and classroom activities concerning smartphones usage habits. Finally, we will show how the project has improved treated students' ability to manage time spent using smartphones compared with students in the control classes. Finally, we will discuss future developments of such strategies in schools.

## 2 The project: The Architecture of «Digital Well-being – Schools»

The «Digital Well-being - Schools» project developed and evaluated the impact of a structured digital media education course. The project focuses on 10th grade classes (high school) and is based on the delivery of a teacher training course aimed at developing a conscious relationship with new media and fostering students «digital well-being» (Fasoli, 2019; Gui, Fasoli & Carradore, 2017). Its effectiveness was tested in a randomized controlled trial framework, comparing the variations registered on a set of outcomes of interest across two different groups of classes: treated classes that received the training and control classes that did not, but were nevertheless monitored during the entire school year. In this way, the «Digital Well-being – Schools» project offered for the first time counterfactual experimental evidence on the efficacy of digital media education in Italy.

The training contents and materials were developed by a team of sociologists, education scientists and evaluation experts at the University of Milan-Bicocca[1] and cover the main areas of the European Digital Competence Framework for Citizens «DigComp 2.1» (Carretero, Vuorikari & Punie, 2017).

The project comprises four modules:

– Time and Attention Management;
– Communication and Collaboration;
– Information Research and Evaluation;
– Digital Content Creation and Publication.

The course requires the teachers involved to carry out a media awareness experience in their class for each of the four modules, lasting around three hours. The final outcome of each module is a «good digital habit», which students are asked to work out and to adopt both in and outside the school. Students' Families were also involved in the project through public meetings and ad-hoc activities.

[1] Marco Gui was the project coordinator; Andrea Garavaglia was the training area scientific supervisor; Livia Petti was in charge of the training design and development; Marco Fasoli had responsibility for operational training in 2018-19; Tiziano Gerosa carried out the impact evaluation.


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ISSN 2038-3002 – Vol. 10, n. 1, anno 2019, pp. 59-68
doi: 10.14605/MED1011904

Schools were enrolled through an open call extended to three different areas («ambiti territoriali») of the provinces of Milano and Monza-Brianza. Among the 42 high schools located in the selected areas, 18 of them agreed to sign our research agreement and therefore participated to the project. Under the agreement, researchers received a complete list of their 10th grade classes from the participating schools and allocated them to the treatment or the control group following a clustered randomization process based on school type («liceo», «istituto tecnico», «istituto professionale») and courses of study (e.g. «tecnico commerciale», «tecnico tecnologico», etc.). Of the 171 classes that were involved in the project, 41 of them were treated, while the remaining 130 served as controls for the impact evaluation. The equivalence analysis between the two groups proved the existence of observable homogeneity across the main socio-demographic characteristics of treated and control students, avoiding the risk of selection biases. Two phases of data collection were then implemented across the entire sample of students before and after the project, administering standardized questionnaires focused on internationally validated measures of smartphone overuse and personal well-being. We then used the *Smartphone Pervasiveness Scale* (Gerosa & Gui, 2018), measuring the frequency of smartphone usage at key times of the day, and the «Smartphone Addiction Scale for adolescents» (Kwon et al., 2013), measuring the level of problematic smartphone usage. Following a difference-in-difference approach, the overall impact of the training initiative was finally estimated as the average variations shown by the treated on the outcomes of interest net of spontaneous dynamics measured on the controls. For further details about the sample, methodology and overall results (see Gui, Gerosa, Garavaglia, Petti, & Fasoli, 2018).

In this paper we focus on the work carried out in relation to the first of the four modules: «Time and Attention Management». This module addresses the use of smartphones in students' everyday life in relation to their time and attention management, and ultimately to their well-being levels. In the following paragraph we will describe the activities carried out in this module and their rationale.

## 3 Our proposal (The cognitive, pedagogical and social rationale of the proposal)

The first module of the project aims to improve students' ability to manage the time they spend on their smartphone, thus reducing habitual overconsumption. The module is designed to give each student the opportunity to analyse their smartphone usage habits, both quantitatively and qualitatively, and then decide whether and how to intervene by developing a more explicit and conscious strategy. This process is carried out in different phases by means of a document to complete, the «Attention Management Plan».

At the beginning of the module, students watch an introductory video that aims to strike up a dialogue between them and their parents on their everyday



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ISSN 2038-3002 – Vol. 10, n. 1, anno 2019, pp. 59-68
doi: 10.14605/MED1011904

smartphone usage. Students are then asked to identify what apps they think they use the most in their everyday life and to estimate how much time they normally spend on each. Finally, students are invited to download an app onto their smartphone (RescueTime, www.rescuetime.org), to monitor the quantity and quality of their mobile time use in the following week.

At the end of the week, they compare their initial estimate with the actual data provided by the monitoring application, and write some qualitative observations about this experience. Students are then asked to discuss their results and their observations in small groups. They also have to identify some strategies for better controlling the time they spend online. Finally, each group presents the strategies identified in a plenary session, and the best solutions are collected together in a poster which is then permanently hung in the classroom. In the final stage of the experience, according to their personal goals, each student develops a personal «Attention Management Plan» that they undertake to comply with during the entire school year.

The choice to work on time monitoring was taken by the research group in the light of many recent results in the field of cognitive sciences. In fact, according to the *bias and heuristics program* theory (Kahneman, 2011), our choices are often guided by unconscious reasons and are difficult to manage when we feel desire (Thaler & Sunstein 2009). Sometimes this has consequences also for our life satisfaction (Fasoli, 2019).

Given the existence of these biases, we can improve our decision-making capabilities in many different ways. For instance, we can try to increase the amount of information we have about our behaviour. In fact, people who use technology (not necessarily in a problematic way) don't normally have a report of the amount of time spent online every day. Such time is often fragmented, and therefore difficult for subjects to quantify on the whole. In this perspective, a comparison between data provided by an App such as Rescue time (as well as by the new «Digital well-being» functionality implemented by Google for Android devices) with personal estimates is a useful awareness process for users. This kind of intervention can be classified as a «boosting technique» (Grüne-Yanoff & Hertwig, 2016) that aims «to improve people's competence to make their own choices» (Hertwig & Grune-Yanoff, 2017, p. 974).

This awareness process, however, only represents the starting point of a broader process. In fact, after comparing their estimate with the actual data about digital consumption, students, helped by their teacher and classmates, have to identify ways to more consciously allocate time and attention to online activities. In this way, they acquire skills to improve their self-regulation capabilities, which are necessary in order to use technologies to foster personal well-being. Moreover, they do not apply regulations imposed by others but participate in person in the co-construction of their rules (Bruni, Garavaglia & Petti, 2019).

For instance, they can establish the need to protect some moments in their life, during which smartphones would be turned off or put in silent mode (for instance, during meals). Or they could start to tackle FOMO (fear of missing out) by inform-



ISSN 2038-3002 – Vol. 10, n. 1, anno 2019, pp. 59-68
doi: 10.14605/MED1011904

ing their close friends when they intend to disconnect for a while. In fact, as FOMO is «a pervasive apprehension that others might be having rewarding experiences from which one is absent» (Przybylski, Murayama, DeHaan, & Gladwell, 2013), we can try to manage it by informing our circle of friends that we will not be online for a period of time. In this way, they probably will write to us about important events and facts when we are back online, thus reducing the cost and stress related to a temporary disconnection. Moreover, our absence from the conversation will not be interpreted by others as a lack of interest towards them.

## 4 Results

In this section we discuss the results concerning the initial level of smartphone overconsumption measured in students before the project, and the impact of the training initiative on the same outcomes at the end of the year.

At the beginning of the experiment year, students of the complete sample showed a highly pervasive use of smartphones. More than 25% of them admitted to often using their device at night, 35% as soon as they woke up, 50% while doing their homework and 60% while involved in leisure activities and sports. The above-mentioned information on students' frequency of smartphone use at specific times of day has been summarised in a single index of smartphone pervasiveness, which has been validated and normalised to values of between 0 (no pervasiveness) and 100 (extreme pervasiveness). In the pre-project survey, students' average score on the scale was 49. It is also interesting to note that female students were greater smartphone users than their male counterparts.

In addition to the fact that students of the complete sample declared they used their smartphone a lot before the project, they also showed a significant level of distress deriving from such online activity. 30% of them could be classified as being at risk of «problematic smartphone use» following the threshold suggested for interpretation of the «Smartphone Addiction Scale» scores (Kwon et al., 2013). Again, female students appeared more distressed by smartphone usage (32%), confirming the results of the original paper validating this measure on a sample of Korean adolescents (Kwon et al., 2013).

After the intervention, we found a fall in both the pervasiveness of smartphones and their perceived problematic use among treated students. Moreover, these average reductions were significantly higher than those measured on students in the control classes. That means that the training project significantly contributed to a decrease in our outcomes of interest net of any kind of spontaneous dynamic external to the experiment.

More specifically, while control students showed almost the same level of smartphone pervasiveness before and after the intervention, treated students saw their average score decrease from the initial mean score of 49 to around 45 (the scores of the normalized index of Smartphone Pervasiveness ranged from 0 to 100). In female students the project had an even greater effect on such outcomes.

With reference to the «Smartphone Addiction Scale», after the training, both control and treated students showed a decrease in the percentage of subjects considered «at risk», due to a spontaneous dynamic. However, among treated students, the level of «smartphone addiction» decreased significantly more than among controls. Female students, in particular, seemed to benefit more in terms of addiction reduction, as demonstrated by the fall in problematic use of the devices in the treatment group from the initial 32% to 22% after the project (4% more than the decrease recorded in the control group).

Based on these results, we can conclude that the «Digital Well-being – Schools» training course — and specifically the above-described module — led students to significantly moderate their smartphone usage in socially and physiologically key moments of the day, also reducing their risk of problematic use.

Given that the training package has been tested as a whole, we cannot exclude that the results we recorded after the intervention could have been generated, in part, also by the other three modules of the course. However, being the first module specifically aimed to tackle overconsumption-related issues, we assume it has played at least a prominent role in generating this encouraging evidence.

## 5 Conclusions and Perspectives

It is clear that one of the new goals of media education is to help students deal with digital overconsumption. Although time and attention management in some respects goes beyond the traditional scope of this discipline, it is a fundamental characteristic of a conscious media user in a hyperconnected world.

In this article we discussed «good practice» included in the first module of the project «Digital well-being – Schools». This practice has been developed in the light of interdisciplinary literature focusing on the phenomenon of overconsumption and of cognitive sciences literature about how it is possible to steer good decisions in subjects. In particular, we draw on recent research about so-called «boosting» or «educational nudging». The choice made by the research team to work on: (1) automated time monitoring through the use of an app and (2) personal setting of time and attention management goals, proved to be effective, with a reduction of both on a scale of smartphone pervasiveness at critical times of the day (Gerosa & Gui, 2018) and of «smartphone addiction» as measured by the Kwon et al. (2013) scale.

We hope that this experience will help media education scholars to focus more on educational strategies for tackling digital overuse. In our view, this should be done by pushing students to independently identify new solutions for these problems as far as possible. Eliciting the development of co-constructed techniques to combat overconsumption and to focus digital media use on personal and professional goals is an urgent complement to the development of digital skills. Only by building the ability to strategically channel the myriad of opportunities the internet offers will we be able to channel its full potential to have a positive impact both in education and on people's lives.


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ISSN 2038-3002 – Vol. 10, n. 1, anno 2019, pp. 59-68
doi: 10.14605/MED1011904

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ISSN 2038-3002 – Vol. 10, n. 1, anno 2019, pp. 59-68
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ISSN 2038-3002 – Vol. 10, n. 1, anno 2019, pp. 59-68
doi: 10.14605/MED1011904