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Preventing Online Addictive Behaviors Promoting Active Online Use: Preliminary Findings in Italian Early Adolescents

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Abstract

Introduction: *Information and Communication Technologies (i.e., ICT) are fundamental in everyone's daily lives, especially for youths who integrate them into their routines as instruments for academic, relational, and entertainment purposes (Oka et al., 2021). Thus, it becomes crucial to differentiate positive or proactive online behaviors, which motivate people to interact directly with others and are positively associated with well-being, from negative or addictive online behaviors, which increase emotional, behavioral, or work-related and academic problems (Alimoradi et al., 2019; Gjoneska et al., 2022; Oka et al., 2021). Social and clinical policies are mostly focused on negative and addictive online behaviors in youths, due to their huge effects on mental health, which also significantly impact social and health costs to deal with these problems (Cañas & Estévez, 2021; Lopez-Fernandez & Kuss, 2020). To our knowledge, promotive policies and interventions in this field are still lacking, because they mostly focus only on the reduction of problematic behaviors rather than promoting individual or contextual protective factors (Cañas & Estévez, 2021; Li et al., 2020). Contrary to this trend, considering the potentiality of ICTs for youths, research is now highlighting the importance of considering both preventive and promotive components in online behaviors. According to the Positive Youth Development perspective (Lerner et al., 2018), which emphasized the importance of focusing on individuals' resources and protective factors, a preventive-promotive intervention was developed and implemented in an Italian Junior High School, that aimed to contrast negative online behaviors, while promoting positive ones (La Rose et al., 2010).*

Aims of this Study: *Thus, the present study preliminary investigated the effectiveness of this intervention, by analyzing longitudinal mean differences of two negative (i.e., problematic use of social network and smartphones) and two positive (i.e., searching for social support online, offering social support online) internet-related behaviors in youths.*

Method and Results: *358 youths (35% females; Mage=15.35, S.D.=.63) completed the Bergen Social Media Addiction Scale (Monacis et al., 2017), the Smartphone Addiction Scale (Kwon et al., 2013), and the Active and Passive Use of Social Networking Sites Scale (Remondi et al., 2023) in the pre-and-post intervention assessments. Repeated Analysis of Variances showed that smartphone and SNS addictions significantly decreased from pre-to-post assessments. In addition, offering and searching for social support on SN significantly increased across the two time points.*

Discussion: *Our findings showed that addictive smartphone and SNS use significantly decreased in a short time period, while relational activities engaged with SNS significantly increased across the intervention. These results could suggest the short-term efficacy of the project and could be considered in the implementation of other school-based interventions, and in the implementation of more effective socioeconomic strategies to contrast internet-related addictive behaviors (Andreassen et al., 2017).*

Keywords: online addictions; adolescents; positive online use; school-based interventions; smartphone and social media use.

Introduction
Internet and Media Use: Risks and Potentialities

Nowadays Internet and Information and Communication Technologies (i.e., ICTs) have become core instruments of everyone's daily lives, for carrying out academic, work, relational, or entertainment activities (Oka et al., 2021). Research attested that older children and adolescents are the ones mostly involved in massive and pervasive ICTs use (Cheng et al., 2021; Mahaparta, 2019) They are digital natives and have higher digital literacy and technological competencies that they integrate into their daily lives more innately and normatively than adults, also because smartphones and social networks are essential instruments of their lives that help them share most of their emotions, feelings, and social interactions (Andreassen et al., 2017; Cheng et al., 2021; Mahapatra, 2019). Indeed, young people use ICTs mainly for communicative reasons (i.e., chatting), or for entertainment (i.e., watching videos, gaming, and internet searches; De Freitas et al., 2021; Fischer-Grote et al., 2019; Vintilă et al., 2021). In particular, girls seem to have a higher tendency to communicate and have social interactions via chat and social networks, and both girls and boys seem to cope with their negative emotions by using ICTs to have comforting interactions (Bànyai et al., 2017; Vintilă et al., 2021).

The crucial role of smartphones and social network sites for younger people was attested by several studies, which underlined an increasingly higher trend in Asian countries, followed by slightly increasingly higher trends also in American and European countries, such as Italy (Longobardi et al., 2020; Quaglieri et al., 2021). The COVID pandemic that spread worldwide from 2020 to 2022 further increased these massive and, in some cases excessive, ICTs increasing trends (Gjoneska et al., 2022; Oka et al., 2021). During the pandemic, youths suffered the negative psychological consequences of this situation, and smartphones and social networks helped them to continue a variety of daily activities, such as following online lessons, maintaining social relationships, and perceiving social support from their friends (Alheneidi et al., 2021; Boursier et al., 2021; Zarco-Alpuente et al., 2021).

Therefore, disentangling positive smartphone and social network use from their problematic patterns represents a significant challenge (Santangelo et al., 2022; Yang et al., 2022). Overall, positive use motivates people to interact directly with others and is positively associated with well-being, while problematic and excessive use increases individuals' maladjustment (i.e., emotional, behavioral, and work/academic problems; Alimoradi et al., 2019; Gjoneska et al., 2022; Oka et al., 2021).

More specifically, positive ICTs use can facilitate direct exchanges with others and is referred to all those activities that people carried out actively using ICTs, such as engaging and communicating with others, commenting, or liking posts and stories, posting updates or new content, making interactive research on specific sites, producing actively contents, updating/posting stories, or pictures, and so on (Ryding &

Kuss, 2020; Wang et al., 2018). A core characteristic of positive use is that in this type of use the process of sharing information is still active, both targeted to a one-to-one exchange as well as non-targeted exchange (Verduyn et al., 2017). In contrast, negative use is defined as the directed or random consumption of online contents without direct exchanges with others, and without a real interaction with others or with other contents, such as scrolling the homepage, going through different profiles without commenting or liking, viewing passively other idealized SNS profiles or updates (Ryding & Kuss, 2020; Wang et al., 2018). A core characteristic of passive use is that during this type of use, there is passive consumption of information and contents without the presence of communication (Verduyn et al., 2017). Within this distinction, the communicative component is crucial, because, in the case of a positive use, people generally are motivated to comment and to interact directly with other users, while in the case of a negative use, people generally did not interact with others, neither with liking nor private messages (Burke et al., 2010; Wang et al., 2018). Positive and negative use were found to be differently associated with adaptive and maladaptive negative consequences for youths (Ryding & Kuss, 2020; Verduyn et al., 2015; 2017; Wang et al., 2018). Previous studies found that positive use was associated with an increase in psychological well-being (Ryding & Kuss, 2020; Wang et al., 2014; Verduyn et al., 2017). Effects of positive use on perceived social support and social capital were firmly established because thanks to ICTs, people can have supportive interactions with others and peers, that in turn can lead to an increase in their perception of social support and social capital, as well as their perception of being loved and accepted from others (Verduyn et al., 2017; Utz & Breuer, 2017). Also, active requests for advice and support online have been found to play a crucial role, as well as self-disclosure (Verduyn et al., 2017). Positive use was associated with increased self-esteem, life satisfaction, perceived social connectedness, positive identity expression, and low perceived loneliness (Ryding & Kuss, 2020; Verduyn et al., 2017; Wang et al., 2018).

For what concerns negative ICTs use, previous studies supported the role of these kinds of online behaviors with a decrease in psychological well-being (Ryding & Kuss, 2020; Verduyn et al., 2017; Shin et al., 2017). In particular, negative ICTs use is strongly connected to unproductive social comparisons, which naturally arise as a result of ICTs passive use, and also because of the decrease in direct social interactions. This leads people, especially youths, to compare themselves with more favorable individuals, which in most cases are very distant in terms of socioeconomic conditions, producing frustration and irritability feelings (Ryding & Kuss, 2020; Wang et al., 2018; Vahedi & Zannella, 2021). In addition, these negative social comparisons can lead people to increase rumination and self-criticism, which make people more prone to experiencing anxiety and depressive symptoms, as well as to social media addictions and other addictions (Haferkamp & Krämer, 2011; Nolen-Hoeksema & Davis, 1999; Verduyn et al., 2017). Also, negative ICTs use was associated with a decrease in social capital (Ryding & Kuss, 2020; Wang et al., 2018), as well as an

increase in depression, anxiety, and loneliness (Lup et al., 2015; Orchard et al., 2014). Moreover, previous studies evidenced a decrease in self-esteem and life satisfaction (Verduyn et al., 2017; Wang et al., 2018). In conclusion is quite clear how passive ICTs use is by-directionally associated with subjective well-being because more passive online behaviors negatively affect well-being, and low well-being, which in turn, increases the frequency of passive online behaviors, due to a negative circle in which people compared their characteristics with others and perceived these comparisons as detrimental for their self-esteem and self-concepts (Shin et al., 2017; Wang et al., 2018).

Problematic Smartphone and Social Network Use

Despite the term "addiction" being widely used, nowadays there is still a debate among researchers on its meaning (Kelly, 2021; West et al., 2019). In general, it refers to an action or behavior that is strong and habitual, that reduces individuals' control over their thoughts and behaviors, and leads to increased harm and negative consequences (Sinnott-Armstrong & Pickard, 2013; Sussman & Sussman, 2011). Most research distinguished between substance and behavioral addictions (Zou et al., 2017). Behavioral and substance addiction share several common characteristics, such as the presence of psychopathological pre-existing conditions that exacerbate the vulnerability to addictions (e.g., depression, ineffective or abusive parenting experiences, social anxiety, withdrawal), the related psychophysiological consequences (i.e., craving, loss of control, tolerance, or salience), and the reinforcement mechanisms that promote the addiction (Alavi et al., 2012; Kardefelt-Winther et al., 2017). Substance addictions are the most studied and concern the repeated use of a chemical substance that directly provokes neurobiological modifications, which leads people to develop a recurring desire to continue its assumption despite negative consequences in several functioning areas (e.g., work, relations, physical, and mental health; West et al., 2019). Substance addictions are also associated with craving and loss of control when the substance is not available, and people direct every single action to the assumption (Zou et al., 2017; Alavi et al., 2012). Conversely, behavioral addictions are addictive tendencies, such as problematic and/or compulsive behaviors, in which any psychotropic or chemical substance is involved, related to negative emotions, which lead to negative consequences on diverse spheres of functioning (Alavi et al., 2012; West et al., 2019; Zou et al., 2017). There are other specific features of behavioral addictions, such as the absence of a chemical or psychotropic substance, or the absence of specific related physical signs of addiction (Alavi et al., 2012). Moreover, behavioral addictions are less easily noticeable, because are more similar to normative behaviors (i.e., someone who had to use massively the computer for working reasons; Kardefelt-Winther et al., 2017). The most studied behavioral addictions are largely heterogeneous, comprising work addiction (Andreassen et al., 2012), shopping addiction (Niedermoser et al., 2021), gambling (Clark, 2014), or Internet addiction (Kuss et al., 2014a; Yellowless & Marks, 2007).

For what concerns Internet addiction, the earliest studies analyzed this construct as a general dimension, defined as an overall multidimensional psychological dependence on the Internet that leads to over-use (Kuss et al., 2014b). However, recent studies underlined the necessity to divide the general construct into more specific sub-types of online addictive behaviors, due to the heterogeneity of internet activities (e.g., shopping, work, study, entertainment, gaming; Spilkova et al., 2017; Vintilă et al., 2021). Indeed, the cognitive-behavioral model (Davis, 2001; Su et al., 2020), allows the distinction between different types of online addictions, such as online gaming addiction, smartphone addiction, or social network addiction (Andreassen et al., 2017; Fischer-Grote et al., 2019; Su et al., 2020).

Smartphone addiction, or problematic use, conceives the use of the smartphone itself, and can be defined as "compulsive use", which negatively affects daily functioning, family and social relations, work and academic performances, and mental health (Vintilă et al 2021). Smartphone-addicted people use the device the entire day, also while doing other activities, and prefer to do online activities that usually can be done offline (Mahapatra, 2019; Vintilă et al., 2021). They manifest worries and irritability when the smartphone is not available, developing sleep alterations, social problems, and internalizing symptoms (De Freitas et al., 2021; Demirci et al., 2014). Tolerance for the number of hours spent using the device leads them to increase the amount of time to obtain the same positive effects experienced in the past, which is also negatively affected by their low behavioral self-control (De Freitas et al., 2021; Mahapatra, 2019). On the other hand, Social Network Addiction (i.e., SNS Addiction) conceives concerns about social media, driven by an uncontrollable motivation to log on and use them, investing so much time and effort on social media, with impairments in other important functioning areas (Andreassen & Pallesen, 2014; Andreassen et al., 2017). SN-addicted tend to spend most of their daily time thinking and interacting with SNs, their frequency of use tends to constantly increase, and they experience worries and preoccupations when SNs are not available, spending more time using SNs than was initially programmed (Cheng et al., 2021; Yang et al., 2022). SN-addicted showed negative outcomes in work/academic contexts (i.e., losing job/ bad academic performances), social and relations (i.e., conflicts with friends/parents, preferring online social interactions rather than in-person), producing psychopathological and physical consequences (i.e., depressive feelings, anxiety, withdrawal, sleep problems, psychosomatic symptoms; Cheng et al., 2021; Turel & Serenko, 2012).

The latest findings underlined significant differences across countries in the prevalence of problematic ICTs use, demonstrating how prevalence rates of problematic social networks use tend to be lower in North American, European, or African countries, and highest in Asian or Middle Eastern countries, and how Europe showed mixed percentages of smartphone addiction (from 6% of Italy to 40% of Poland), while Asian countries showed percentages that as high as

70% (Carbonell et al., 2016; Cheng et al., 2021; de Freitas et al., 2021). In the Italian context, the newest findings showed a Social Network Addiction prevalence of 8.90%, and a Smartphone Addiction prevalence of 6.30% in the general young population (Caldiroli et al., 2018; Statistica, 2022).

Youths show high vulnerability to behavioral addictions and are the highest at risk for internet-related problems (Cheng et al., 2021; Yang et al., 2022). This highest vulnerability to online addiction could be explained in different ways. First of all, youths are involved in online devices and behaviors from the beginning of their lives, so they have higher digital literacy than older people, their continuative online use is a normative part of daily routines because they use the internet, smartphones, and social media to relate with their peers, for academic reasons, and as a type of entertainment (Cheng et al., 2021; Yang et al., 2022). Moreover, during adolescence, several core individual characteristics are more exposed to changes and modifications, such as self-regulatory abilities, both behavioral and emotional, emotional disclosure, and the construction of self-identity, which are fundamental for protecting youths from online problematic behaviors (Alimoradi et al., 2019; Cheng et al., 2021). Indeed, previous studies demonstrated how emotional responsiveness, impulsivity, self-regulation impairments, activity levels, and individuals' proneness to external changes predicted higher vulnerability for problematic smartphone and/or social network use (Andreassen, 2015; Cheng et al., 2021; de Freitas et al., 2021; Fischer-Grote et al., 2019).

In terms of outcomes of problematic online behaviors, these behaviors can negatively influence youths' functioning in terms of relationship quality, and the development of emotional, behavioral, and academic problems (Monacis et al., 2017; Mascia et al., 2020; Han et al., 2017). As highlighted by previous studies, the huge increase in smartphone and social network psychopathologic use in the last fifteen years is associated with an increase in emotional problems, such as anxiety or depressive symptoms, loneliness feelings, withdrawal (e.g., their more severe forms such as the "hikikomori" phenomenon), but also behavioral problems, such as the increase in aggressive and antisocial behaviors, cyberbullying and "hate speech" behaviors, sleep problems, as well as academic problems, such as educational difficulties, declining in academic performance and school dropout (Alimoradi et al., 2019; Andreassen et al., 2017; Gerosa et al., 2021; Monacis et al., 2017; Mascia et al., 2020).

Internet-related problematic behaviors: A psychological perspective
The socio-cognitive perspective posits how individuals are proactive actors and influence their own daily lives and behaviors (Bandura, 2001). Within this interactionist approach (Bandura, 2001; Magnusson, 2003), individuals are not isolated units of functioning, but their behaviors, emotions, thoughts, and cognitions continuously influence and are influenced by environment and social contexts. In this perspective, individual functioning, and relations between personality and adjustment,

are bi-directionally related, in a continuous process that can affect development and personality, especially in earlier stages (Bandura et al., 2003; Caprara et al., 2008; Mischel & Shoda, 2008). Following this reasoning, individual and motivational aspects, together with contextual characteristics, can be associated with problematic or positive ICTs use (Andreassen, 2015; de Freitas et al., 2021; Fischer-Grote et al., 2019; Mahapatra, 2019).

Therefore, it is crucial to consider the school context, which represents a significant environment for youths who experience it daily, and in which youths can test several self-regulative skills and abilities (Eisenberg et al., 2010). The classroom represents an important testbed for youths' social skills, and social adjustment represents one of the most important protective factors against maladjustment in adolescence (Bradford Brown & Larson, 2009). Peers and schoolmates give youths important possibilities for experiencing new relationships that could empower and validate their identity and could represent important models for trying and learning new behaviors, both offline and online (Bandura et al., 2003; LaRose et al., 2010). Indeed, previous findings underlined that excessive peer smartphone use, peer pressure in conforming with their use standards, and low school performance predict negative ICT use (Andreassen, 2015; Fischer-Grote et al., 2019). Also, teachers can actively contribute to youths' development by empowering their self-regulation skills, which in turn could protect them from addictive behaviors and promote positive activities (Bandura et al., 2003; Mahapatra, 2019). In line with this approach, the Positive Youth Development (i.e., PYD) perspective (Lerner et al., 2018) evidenced how the environment (social and physical) is crucial for youths' positive development, and for their perception of modulating their goal-oriented behaviors and strengths. Thus, in considering positive and negative online behaviors, it becomes crucial to emphasize youths' resources for dealing with ICT use, which can lead to engaging in positive smartphone and social network behaviors, while protecting from engaging in excessive and problematic ICT use (Van der Aa et al., 2009; de Freitas et al., 2021; Vannucci et al., 2020).

Considering all the above-mentioned theoretical premises, we developed and implemented a two-fold pilot intervention to contrast negative online behaviors while fostering positive smartphone and social network use in a sample of Italian high school students. More information about the design of the project and the intervention is provided below.

The Intervention: See together beyond the screen!
The project was developed in the bosom of the actions promoted by the municipality of Rome, which encouraged and supported a variety of projects and actions to promote adaptive development for youths living in its districts. The general aims of the intervention were two: a) first, to prevent and reduce internet addictive behaviors, considering two specific media/devices, such as addictive smartphone use and addictive social networks use (Romero Saletti et al., 2021; Vintilă et al 2021; Yang et al., 2022) second, to increase the awareness on these

topics in youths, and promoting concurrently a positive use of ICT, fostering the adoption of positive online behaviors (Cañas & Estévez, 2021; Lopez-Fernandez & Kuss, 2020).

The design of the intervention considered two school years (i.e., (First academic year = 2021/2022; second academic year = 2022/2023) and was entirely carried out during school hours. In particular, to ensure the sustainability overtime of the project, during the first year (i.e., 2021/2022) the intervention was implemented with 15 classes who were recruited as part of the intervention group, while during the second year (i.e., 2022/2023) 12 classes were recruited as the control group (for more information about the design of the recruitment and assessment procedure, please see Favini et al., 2023). Regarding the intervention group, together with the school staff, selected all those classes that were enrolled in their second year of junior high school (i.e., 11 classes, 75% of the total sample), and a few classes that enrolled in their third year of junior high school (i.e., 4 classes, 25% of the total sample). Overall, four meetings with each class were planned and implemented during school hours; for each class, every meeting replaced a different academic subject, to ensure that any specific academic class would not influence the effectiveness of the intervention (i.e. if all the four meetings replaced the same subject – e.g. biology – this invariant variable should be taken into account in the analyses to exclude any possible effect). Each meeting comprised a disseminating/educational part followed by one or more practical experiences and games. To assess the effectiveness of the intervention, a pre-post-follow-up design was planned. The pre-intervention assessment was implemented at the beginning of the very first meeting with each class, to ensure the spontaneity of the subjects' responses. The post-intervention assessment was implemented immediately after the last meeting, to collect immediate changes and opinions about the project. The first intervention meeting comprised a brief presentation of the entire intervention, followed by an introduction to smartphone and social network addictions and problematic behaviors in terms of theory, definitions, and antecedents. At the end of this first meeting, as a practical experience, an active discussion with the class was supported, which focused on personal negative experiences with the internet, ICT use, and social networks. The first part of the second meeting started with a deeper examination of behavioral addictions, and differences among excessive use, abuse, and clinical addictive behaviors, followed by a discussion on individual and contextual determinants, and psychological precursors, of internet-related addictive behaviors. As a practical experience, in the second part of the meeting, an online game was proposed, to share further information on addictive online behaviors. The game used their own smartphone as a joypad, and each student played individually, asking them to give the correct answer among four different alternatives. To the first three in the class ranking, small gadgets were provided as an extrinsic reward. The third and fourth meetings focused on the positive side of online use. In particular, the third meeting started with a discussion on individual and collective functioning areas affected by behavioral adjustment or maladjustment, an examination

of emotional and behavioral regulation operationalized as effective coping strategies, the empowerment of behavioral modification, and positive and proactive use of internet, ICTs, and social networks. The practical experience proposed in the third meeting conceived an in-class decision-making game, that was carried out by the researchers, as a collective experience of how to set specific goals, and their evaluation in terms of costs-benefits, as well as the importance of each cost/benefit for the individual. At the end of the third meeting, one self-monitoring homework was proposed to the students, who were asked to try the implementation of a positive online behavior for 10 days. The fourth and last meeting started with a discussion on the positive activities that they carried out during the 10-day interval (i.e., from the third to the last meeting). The discussion focused on the opportunities and the strengths that the students found during these days to carry out their planned behavior, as well as on difficulties and limitations that could have negatively influenced their plans. Lastly, a debriefing with students on several non-sensitive data that were collected in the pre-intervention assessment on their positive online behaviors was provided to each classroom, and data were treated as an aggregation of the classroom functioning. At the end of the last meeting, the post-intervention survey was proposed to all participants, who individually and anonymously replied to the survey.

The Present Study

Taking in mind all the aforementioned theoretical and empirical premises, the focus of the present study was to examine the preliminary effectiveness of the proposed pilot intervention, by analyzing, in particular, positive and negative online behavior trends in the short time period in which the intervention was carried out (Alimoradi et al., 2019; Santangelo et al., 2022; Throuvala et al., 2019). More specifically, we analyzed the mean differences in positive and negative online behaviors from the beginning to the end of the project, comprising a timeframe of two months. As regards the negative online behaviors, we examined behaviors that were the target of the intervention, which were smartphone and social network excessive use (Favini et al., 2023). As regards positive online behaviors, considering that body of research that underlined the relational component who is stronger in positive online behaviors rather in negative ones, we examined two relational behaviors that youths can adopt while they are online: Offering social support toward others while they detect some at-risk situations or others' needs, and searching for social support when they need to be helped, comforted or instrumental supported by others (Ryding & Kuss, 2020; Verduyn et al., 2017). In addition, we considered also a general dimension of active Social Network use which encompass the general tendency to interact with other users, and a dimension who take into account the level of personal interest in searching and monitoring the perception of other users about him/her selves (Carpenter, 2012; Remondi et al., 2023; Stern et al., 2021).

According to previous research (Favini et al., 2023; Spilkova et al., 2017; Yang & Kim, 2018) we expected to find decreasing trends across the two months of the interventions for the two

negative online behaviors considered and, following the same reasonings, increasing trends for the positive online behaviors considered.

Materials and Methods
Participants and Procedures
Students involved in the project were selected using a convenience sampling procedure, considering all the students from 14 to 16 years old, including those who enrolled in their second (75% of the sample) or third year (25% of the sample) of the junior high school.

At the pre-test condition, a total of 346 students participated in the assessment, with a mean age of 15 years old (M_{age} = 15.35, St. Dev. = .35; 35% females), while at the post-test condition, we had 288 students with a mean age of 15 years old (36% females). For the purposes of the present study, we considered all students that completed both the evaluations and who participated in the entire intervention, resulting in a total sample of 275 students (36% females; 71% second year of junior high school). Informed consent from parents for the participating students was handled directly by the school staff and informed absents for students were asked at the beginning of each assessment. The surveys were shared in each classroom via QR codes, and students filled out the questionnaires anonymously directly using their devices (i.e., smartphones, notebooks, etc.). Two trained researchers provided support for any question regarding the procedure.

Measures
Addictive Behaviors: Ten items of the Smartphone Addiction Scale (Kwon et al., 2013) were used to assess problematic smartphone use in students, which measures their level of smartphone addiction considering several key aspects (i.e., negative outcomes in daily life, positive anticipation, withdrawal, poor offline relations, use frequency, and tolerance). The full list of the items is provided in the Appendix, which was rated on a 6-point Likert scale from 1 (Totally disagree) to 6 (Totally agree). To assess social network addiction, we used the six items of the Bergen Social Media Addiction Scale (Monacis et al., 2017), which measures the six core addiction elements (i.e., salience of SN use, mood modification when SN use changes, tolerance to the frequency of SN use, withdrawal, conflict with family/peers for the continuous SN use, relapse

of problematic SN use). Items were rated on a 5-point Likert scale, ranging from 1 (Very rarely) to 5 (Very often). The psychometric properties of both scales for our study are reported in Table A1.

Positive and Negative Online Behaviors: to assess common positive and negative behaviors that youths engage in while using social networks, we used the Active and Passive Use of Social Networking Sites Scale (Remondi et al., 2023), which comprises two dimensions of passive behaviors when using social network and two positive behaviors. In particular, we considered four items for the domain of "searching for comments about the self", which reflects the tendency to figure out what other people are saying regarding the individual on SN. For the positive behaviors, we considered five items for the domain of "seeking social support", which reflects individuals' tendency to ask for support in stressful situations and to cope with their negative feelings on SN, four items of the domain "offering social support", which reflects the tendency to help others on SN in coping with negative feelings and events, reducing personal distress, and increasing a positive sense of the self, and four items of the domain "active social use", which reflects the tendency to actively interact with others on SN and promote a positive vision of the self on SN. The psychometric properties of the scale for our study are reported in Table A1.

Analytic Approach
We tested our research questions using SPSS 27. In particular, we examined mean differences in youths' levels of smartphone and social network excessive use, as well as in their levels of positive online behaviors, from the pre- to the post-test condition, by referring to the repeated measures Analysis of Variance framework (Armstrong et al., 2000; Mak et al., 2018). As evidenced by previous research, this statistical technique can be useful in examining short-time longitudinal mean differences with a limited sample size (Vekety et al., 2022). Due to the fact that we only had the availability to analyze data provided by those who participated in the project (i.e., the intervention group, while data from the control group were not available), we did not consider the condition (i.e., intervention vs. control) as a between-subject factor, but we only examined longitudinal trends in the means for each dimension analyzed as a within-subject factor (Park et al., 2009; Vekety et al., 2022).

Table A1: Descriptive statistics and correlations among the study variables for the total sample.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
SAS T1 (1)	-											
SAS T2 (2)	.69***	-										
BSMAS T1 (3)	.76***	.62***	-									
BSMAS T2 (4)	.64***	.74***	.65***	-								
Comments about the self T1 (5)	.37***	.21**	.39***	.18**	-							
Comments about the self T2 (6)	.32***	.37***	.30***	.37***	.46***	-						
Active SN Use T1 (7)	.39***	.36***	.46***	.37***	.38***	.26***	-					
Active SN Use T2 (8)	.25***	.25***	.38***	.33***	.20**	.36***	.60***	-				
Offer social support T1 (9)	.22***	.13	.31***	.17**	.35***	.22***	.33***	.23***	-			
Offer social support T2 (10)	.18**	.19**	.27***	.15*	.17*	.30***	.26***	.30***	.60***	-		
Seek social support T1 (11)	.27**	.29***	.32***	.23***	.20***	.19**	.41***	.28***	.26***	.17**	-	
Seek social support T2 (12)	.17*	.24***	.24***	.16*	.14*	.29***	.33***	.38***	.23**	.30***	.46***	-
Mean	2.42	2.32	2.25	2.19	2.31	2.38	1.78	1.73	3.15	3.38	1.39	1.57
SD	.93	.92	.80	.78	1.3	1.3	.87	.86	1.7	1.7	.79	1.0
Reliability (Cronbach's α)	.86	.87	.75	.77	.74	.78	.71	.75	.86	.85	.83	.90
Reliability (McDonald's ω)	.86	.87	.76	.78	.78	.81	.72	.76	.87	.86	.84	.91

Notes: SAS = Smartphone Addiction Scale; BSMAS == Bergen's Social Media Addiction Scale; Comments about the self = Searching for comments about the Self on Social Network; Active SN Use = Active Social Network use; Offer social support = Offering social support when people are on Social Network; Seek social support = Seeking for social support when people are on Social Network.
* $p < .05$; ** $p < .01$; *** $p < .001$

Results

To answer our research questions, we analyzed longitudinal mean differences in online negative behaviors (i.e., smartphone and social network excessive use), as well as in Social Network positive and negative activities (i.e., active use, searching for comments about the self, seeking social support, and offering social support) using repeated measures analyses of variance (Mak et al., 2018). Overall, we found that most of the trends showed a significant change from the pre- to the post-test assessment.

Online Negative Behaviors

Regarding Internet-related addictions (see Figure 1), our models showed that smartphone addiction (F [1,229] = 7.95; $p < .005$; $\eta^2 = .03$) significantly decreased from the beginning to the end of the intervention, within an interval of two months (respectively, $M_{w1} = 2.44$, $SD_{w1} = .94$; $M_{w2} = 2.30$, $SD_{w2} = .91$).

Similarly, from the beginning of the intervention to the end of the intervention, two-month mean trends of social networks addiction (F [1,230] = 5.56, $p < .01$; $\eta^2 = .02$) showed a significant decrease (respectively, $M_{w1} = 2.29$, $SD_{w1} = .81$; $M_{w2} = 2.18$, $SD_{w2} = .77$).
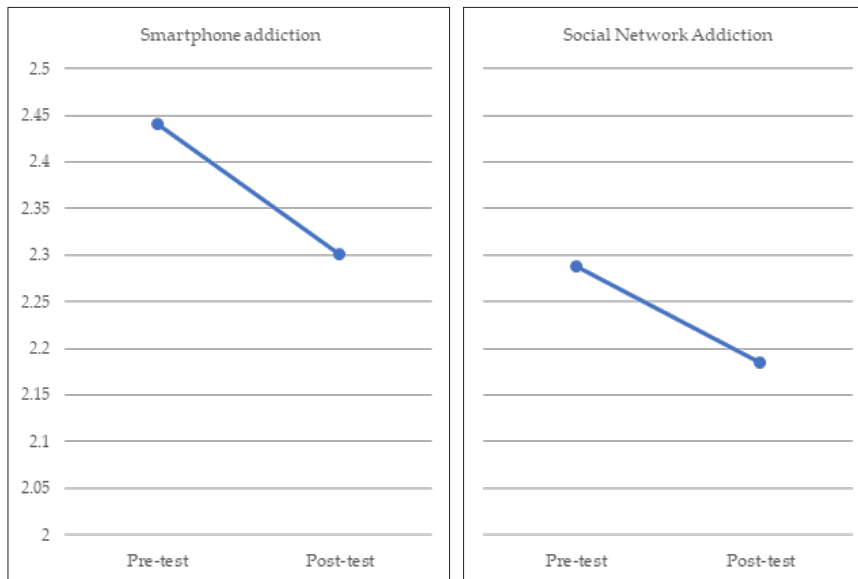

Figure 1: Mean Differences in Smartphone and Social Network Addiction from pre- to post-test assessment.

Online Positive Behaviors

Regarding positive behaviors that youths can handle while they use social networks (see Figure 2), our models showed that, from the beginning of the intervention, after two months mean trends of active social network activities (F [1,237] = .89; p = n.s.; $\eta^2 = .00$), and the activity of checking for comments about the self (F [1,236] = .37; p = n.s.; $\eta^2 = .00$) did not significantly change.

On the contrary, the positive behaviors of offering (F [1,234] = 5.07; $p < .05$; $\eta^2 = .02$) and seeking (F [1,231] = 5.26; $p < .05$; $\eta^2 = .02$) social support while using social networks showed a significant increase in their mean-level trends (respectively, $M_{w1} = 3.17$, $SD_{w1} = 1.74$, and $M_{w2} = 3.40$, $SD_{w2} = 1.69$ for offering social support; $M_{w1} = 1.41$, $SD_{w1} = .83$, and $M_{w2} = 1.56$, $SD_{w2} = 1.04$ for seeking social support).
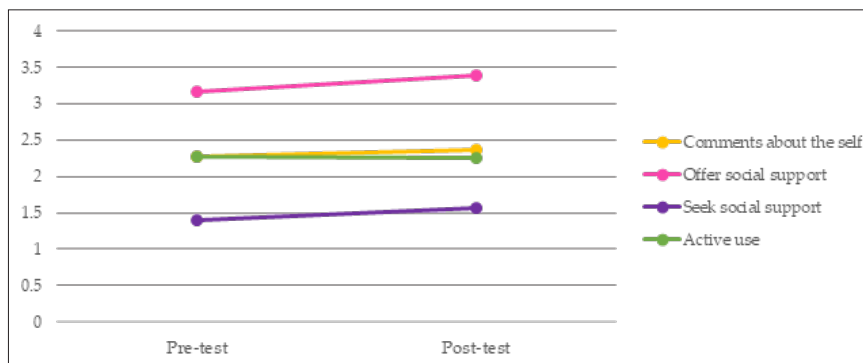

Figure 2: Mean Differences in Social Network positive and negative behaviors from pre- to post-test assessment.

Discussion

The present work represents a preliminary examination of the short-term positive effects of the proposed pilot school-based intervention that twofold aimed to contrast negative behaviors while adolescents are online while fostering positive activities on social networks, according to a Positive Youth Development approach (Bonell et al., 2016; Favini et al., 2023; Lerner et al., 2018). In particular, our findings provided support for a decline in negative addictive online behaviors, while positive online behaviors that are more connected with the socio-relational domain of functioning increased (Ryding & Kuss, 2020; Verduyn et al., 2017).

According to the PYD approach (Bonell et al., 2016), these preliminary results can be read in the light of the protective role that socio-emotional and relational competencies can have in adolescents' adjustment, that can protect them against risky behaviors, as well as addictive online and offline conducts (Bonell et al., 2016; Lerner et al., 2018; Schwartz et al., 2010). In addition, these findings provided further evidence of the more effectiveness of interventions when the promotive component is included, that can buffer, not merely compensate, the protective focus of the program in reducing maladaptive and addictive behaviors (Bonell et al., 2016; Cirimele et al., 2022; Schwartz et al., 2010).

Negative Online Behaviors

As regards the two negative and addictive online behaviors that we considered, according to our hypotheses and previous research (Spilkova et al., 2017; Yang & Kim, 2018), we registered a short-time reduction in mean levels of addictive smartphone and social network use. Thus, youth who participated in our program started with higher excessive smartphone and social network use, that across the intervention averagely and significantly decreased (Andreassen et al., 2017; Fischer-Grote et al., 2019). Therefore, we could relate this reduction to the effectiveness of the intervention, that within a two-month time period was able to empower self-awareness of their own online behaviors in youths, who activate their self-regulative abilities which leads them to diminishing the time spent online on social network and using smartphones (Andreassen et al., 2017; de Freitas et al., 2021; Spilkova et al., 2017). Negative feelings related to the excessive use of smartphones and/or social network may be reduced too in these adolescents, together with a related reduction in sleep problems, emotional impairments, and other behavioral problems, such as impulsivity, irritability, attentive problems, and academic impairments (Cheng et al., 2021; Vintilă et al 2021; Yang et al., 2022).

Positive Online Behaviors

Considering our results related to positive behaviors that youths can do while they use social networks, our results partially supported our hypotheses. In particular, we found that activities on social networks that are less related to a communicative and relational exchange with other users, such as the general tendency to adopt active behaviors on SNs (e.g., updating the personal status, uploading new content,

and so on), and the activity of searching online for comments that are related to the opinion of others on themselves and on personal actions, did not manifest a significant change from the beginning to the end of the proposed program, so these two types of online behaviors remained substantially stable across the two months. On the contrary, the two behaviors that are more related to socio-relational exchange with other users, such as searching or offering social support while youths are online, showed a significant increase in their mean level from the beginning to the end of the intervention, as reported by several previous studies (Ryding & Kuss, 2020; Verduyn et al., 2017). Thus, adolescents who participated in our program over the two-month period substantially adopted similar behaviors of updating their own personal pages, did not change their upload frequency, and they did not change the way in which they integrate their social network use into their daily lives, as well as they did not change their behaviors of searching online for comments that other users can make on themselves online. At the same time, youths who participated in our program over the two months become more involved in others' online lives, becoming more attentive and responsive to other's needs, and offering social support when other users appeared to be in trouble or they seemed to need some help (Ryding & Kuss, 2020; Wang et al., 2018). Similarly, over the two months, these youths increased their request for online social support, considering social networks as more and more important instruments to cope with their negative feelings or problems, perceiving others' support and help as a crucial way to solve their problems (Boursier et al., 2021; Zarco-Alpuente et al., 2021).

We reasoned on this difference in our results, and we hypothesized that we found a significant increase in mean levels of two online behaviors that are more "relational", because the socio-relational component of social network and smartphone use represents the stronger aspect that discriminates a positive online behavior from a negative one (Verduyn et al., 2017; Wang et al., 2018). Following this reasoning, activities such as updating their own profile or searching for comments that others may publish that concern personal activities or characteristics imply less activation of socio-emotional domain of functioning, who represent the core aspect of active and positive online behavior (Alheneidi et al., 2021; Boursier et al., 2021; Gjoneska et al., 2022). As demonstrated by a lot of recent studies and research (Anderson & Jiang, 2018; Gjoneska et al., 2022; Quaglieri et al., 2021), youths mostly use smartphones and social networks to maintain and improve their own relations, and represent important instruments of emotional and instrumental support and empowerment, especially when adolescents perceive negative emotions or are living in difficult relational or contextual situations (living in difficult neighborhoods, having family problems). These aspects contribute to increase the sense of social inclusion and individual well-being (Bandura, 2001; Bradford Brown & Larson, 2009; Ryan & Deci, 2000), so they are fundamental aspects for youths' adjustment and psychological development.

Conclusion

Overall, our findings showed that problematic smartphone and social network use significantly decreased across the intervention, while relational positive behaviors that youths can do on social networks that are more related to social support significantly increased (Andreassen et al., 2017; Spilkova et al., 2017; Verduyn et al., 2017). These significant differences in the mean levels of these positive and problematic online behaviors can be read as preliminary evidence of the effectiveness of the program that we proposed to the pilot school who participated in the project (e.g., Lopez-Fernandez & Kuss, 2020; Throuvala et al., 2019).

Despite these strengths, our work has many limitations. To one, this represents only a preliminary investigation, so we need further and stronger evidence to attest a real effectiveness of the program. We considered the mean differences in positive and negative online behavior levels, so we did not examine the real trend of these behaviors across time considering their initial levels and their change over time with more complex statistical methods, such as, a growth curve analysis. Moreover, we did not compare the mean differences of our intervention group with a control group due to the design of data collection. However, other studies (Favini et al., 2023) demonstrated a significant difference between a control group and this intervention group, so we could reason that these results could hold even within a mean differences comparison. Thus, we considered only youths' self-evaluations, so these results could be self-reported biased in some way (van Berkel et al., 2020).

Even though these limitations, these results suggested the short-term effectiveness of the program, and could be considered in the implementation of other school-based interventions, and in the implementation of more effective socioeconomic strategies to contrast online addictive and problematic behaviors (Throuvala et al., 2017; Vahedi & Zannella, 2021). In fact, considering the central role of the online world, especially for youngsters, and considering the difficulties in determining whether an online behavior could considered positive or negative, and analyzing their short and long term effects on youths' well-being, referring to a PYD perspective which emphasizes the importance to promote positive individual resources and abilities while preventing negative behaviors and outcomes represent a crucial suggestion for social and health entities who are interested in promoting a positive developmental pathway for youths also in the online context (Lerner et al., 2018; Lopez-Fernandez & Kuss, 2020; Zarco-Alpuente et al., 2021). Is, in other words, crucial to also consider the potentialities of the Internet and of the ITCs, rather than focusing only on the risks that youths can meet, as a way to promote a digital civilization and a more comprehensive sense of civic engagement (Chen, 2017).

Future directions that can originate from this preliminary work could focus on the implementation of a similar program in different socio-economic contexts, such as other Italian junior high schools located in different regions, or in other countries with a different socio-cultural context, such as Chile, USA, or Colombia. Moreover, considering different types of high schools could increase the heterogeneity of the intervention sample, and more accurate comparisons could be possible. Lastly, including more complex components within the design of the intervention could refine and improve the effectiveness of the program, such as the inclusion of a self-monitoring activity through daily diaries, which allows to examine daily fluctuations in youths' behaviors, emotions, and feelings related with their own use of social networks and smartphones.

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Bergen Social Media Addiction Scale (Monacis et al., 2017)

1. Spent a lot of time thinking about SN or planned to use them
2. Felt an urge to use SN more and more
3. Used SN to forget about personal problems
4. Tried to cut down on the SN use without success
5. Become restless or troubled when SN use was prohibited
6. Used SN so much that it has had a negative impact on life

Smartphone Addiction Scale (Kwon et al., 2013)

1. Missing planned works due to smartphone use
2. Hard concentrating in class/assignments/works due to smartphone use
3. Feeling back pain while using an smartphone
4. Won't be able to stand not having an smartphone
5. Feeling impatience and fretfulness when not holding the smartphone
6. Having the smartphone in mind when not using it
7. Never stop using smartphone even when family/peers are affected by my use
8. Constantly check smartphone to not miss conversations or important news
9. Using smartphone longer than what intended
10. People around me tell me that my smartphone use is too much

Active and Passive Use of Social Networking Sites Scale (Remondi et al., 2023)

Active SN Use

1. Posting status updates
2. Posting pictures of yourself
3. Changing the profile picture
4. Tagging pictures of yourself

Offering Social Support

1. Offering emotional support to people
2. Posting a comforting comment
3. Cheering up my friends
4. Making people feel better

Seeking for Social Support

1. Usually posting a status update when in bad mood
2. Usually posting a comment when in bad mood
3. Venting when something is bugging me
4. Posting update about something that is bothering
5. Letting people know that I am upset

Searching for Comments About the Self

1. Seeing what people are saying
2. Seeing if my friends have mentioned me somewhere
3. Seeing anything about me
4. Usually knowing what people are saying about me