



Problematic social media use: associations with health complaints among adolescents

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Abstract

Objective. Problematic Social Media Use (PSMU) has an addictive potential for young users. The aim of this study was to show the prevalence of PSMU across Italian regions and its association with health complaints.

Materials and methods. Data are gathered from the Italian 2018 Health Behaviour in School-aged Children survey using a representative sample of Italian adolescents aged 11, 13 and 15 years (50.6% males). Participants completed self-administered questionnaires assessing PSMU and health complaints.

Results. PSMU affects 8.9% adolescents in Italy and the prevalence is quite consistent across regions. 13-year-olds girls showed the highest percentage of PSMU (13%). Problematic users of social media are more likely to report multiple somatic (OR = 1.84 [95% CI 1.82-1.85]) and psychological (OR = 2.60 [95% CI 2.58-2.63]) symptoms.

Conclusions. PSMU represents a widespread problem in Italy. National prevention interventions are needed in order to promote a positive use of social media.

Key words

- social media
- problematic use
- adolescence
- psychosomatic symptoms

INTRODUCTION

Among the many activities available on Internet, the use of social media (e.g., Facebook, WhatsApp, Instagram, etc.) has been growing and now involves more than one third of the world population [1]. This impressive statistic has led to increasing interest in this phenomenon and its positive and negative impact on adolescents' health and well-being [2]. When conscious and moderate, the use of social media tends to be beneficial for adolescents' social relationships and adjustment, for example in terms of contact with peers, entertainment, and civic engagement [3, 4]. Nevertheless, many researchers have recently begun to focus on "Problematic Social Media Use" (PSMU) in youths' lives as it can be a potential behavioural addiction and it has been found to be associated with a number of negative outcomes, such as somatic symptoms [5], academic performance [6], and psychological distress [7]. It has recently been shown that the prevalence of PSMU in adolescence varied significantly across European countries with Italy

showing one of the highest percentages of adolescents with PSMU [8]. The aim of the current study is to show a clear picture of the prevalence of PSMU across Italian regions and its association with somatic and psychological complaints among adolescents involved in the latest HBSC survey (2018).

PSMU has been conceptualized as the presence of "addiction-like" symptoms due to social media use: (i) preoccupation (i.e. constantly thinking about social media), (ii) tolerance (i.e. desiring to spend more time on social media), (iii) withdrawal (i.e. feeling bad when offline), (iv) persistence (i.e. failing to reduce time spent on social media), (v) escape (i.e. using social media to escape from negative feelings), (vi) problems (i.e. having arguments with others because of social media); and other specific features borrowed from the latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria for Internet Gaming Disorder [9]: (vii) deception (i.e. lying to family and friends about the time spent on social media), (viii) displacement (i.e.

neglecting other activities because of social media use), and (ix) conflict (i.e. having serious conflicts with family due to social media use) [10]. Although the DSM-5 and the 11th Revision of the International Classification of Diseases (ICD-11) [11] have not recognized PSMU as a mental disorder yet, there is a growing body of evidence sustaining the addictive potential of social media and its association with physical/somatic and psychological problems [7, 12].

A positive association between Facebook addiction and somatic symptoms in adolescence was reported by Koc and colleagues [13] and Hanprathet and colleagues [14] who demonstrated a negative impact of problematic Facebook use on general health including somatic symptoms, anxiety, insomnia, depression, and social dysfunction. Cerutti and colleagues [15] showed that adolescent problematic Internet users (engaged in social media use and other online activities) have higher levels of somatic symptoms (e.g., stomach pain, headache, sore muscle, low energy) compared with non-problematic peers. Moreover, it has been suggested that problematic Internet use might put adolescents at greater risk of somatization both directly and indirectly via sleep disturbance [16]. It follows that PSMU might be related to poor sleep which, in turn, may negatively impact perceived physical health and school performance [6, 17].

Meta-analytic studies and systematic reviews [5, 7, 18-20] have been highlighting the association between PSMU, well-being, and psychological problems. Problematic social media users tend to report low levels of well-being (including self-worth, social adjustment, quality of life, and happiness) and low levels of satisfaction with life and with social relationships [8, 21, 22]. Moreover, problematic users also report frequent psychological complaints sustaining the idea that PSMU might contribute to increasing anxiety, depression, loneliness and mood swings, especially in children and young people [20, 23, 24].

It has been pointed out that (early) adolescence might be the crucial and vulnerable developmental stage in which young users might not be able to avoid the negative consequences of social media use [19]. Indeed, in the last decades, the prevalence of adolescent psychological distress has been growing in European countries [19] and younger users appear to be at greater risk to develop PSMU and mental health problems because of the addictive potential of social media [25]. To our knowledge, no studies have investigated the prevalence of PSMU and its association with adolescents' psychosomatic health in a representative sample of adolescents in Italy.

The aim of this study is twofold: (i) to estimate the prevalence of problematic social media use across Italian regions by age groups (11, 13 and 15 years) and gender; and (ii) to evaluate whether PSMU is associated with health complaints (psychological and somatic symptoms) in a representative sample of adolescents in Italy, in line with previous international studies [19].

MATERIALS AND METHODS

Setting and sampling

Data were gathered from the 2018 Italian Health

Behaviour in School-aged Children (HBSC) survey. HBSC is a cross-national survey undertaken every four years in 50 countries in Europe and Canada with the collaboration of World Health Organization Regional Office for Europe (for details see [26]). This study involved a representative sample of youths aged 11, 13 and 15 years corresponding to the 6th, 8th and 10th grade (1st and 3rd grade of Italian middle school, and 2nd grade of Italian secondary school). For further methodological details see Appendix 1 in the paper by Nardone *et al.*, published in this same issue of *Annali dell'Istituto Superiore di Sanità*.

Measures

Problematic Social Media Use. PSMU was assessed through the Social Media Disorder Scale [10] that was translated into Italian following the indications of the international protocol [8]. The scale includes 9 items covering the criteria for PSMU described by van den Eijnden and colleagues [10]: preoccupation (“.. have you regularly found that you can't think of anything else but the moment that you will be able to use social media again?”), tolerance (“...regularly felt dissatisfied because you wanted to spend more time on social media?”), withdrawal (“...often felt bad when you could not use social media?”), persistence (“... tried to spend less time on social media, but failed?”), displacement (“... regularly neglected other activities (e.g. hobbies, sport) because you wanted to use social media?”), problem (“... regularly had arguments with others because of your social media use?”), deception (“... regularly lied to your parents or friends about the amount of time you spend on social media?”), escape (“... often used social media to escape from negative feelings?”), conflict (“... had serious conflict with your parents, brother(s) or sister(s) because of your social media use?”). Participants were asked to think about the last year and answer “yes” or “no” to each item. In order to be classified as “problematic users” (1), participants had to answer “yes” to six or more items; participants answering positively up to five items were classified as “non-problematic users” (0).

Health complaints. The HBSC Symptom Checklist [27] was used to assess health complaints. The scale comprises two subscales: (i) somatic symptoms (4 items: headache, stomachache, backache, feeling dizzy); and (ii) psychological symptoms (4 items: feeling low, irritable or in a bad mood, nervous and having difficulties falling asleep). Participants were asked to rate the frequency of symptoms over the last 6 months on a 5-point scale (from 1= “about every day” to 5= “rarely or never”). The two subscales were dichotomized: participants reporting 2 or more somatic/psychological symptoms more than once a week were considered to experience “multiple somatic symptoms” and “multiple psychological symptoms” [28].

Control variables

Age, gender and family affluence were used as control variables. The Family Affluence Scale (FAS) [29] was used as a proxy of socio-economic status and is described in Appendix 1.

Statistical analysis

Cronbach's alphas were calculated for the Social Media Disorder Scale and the two dimensions of the HBSC Symptom Checklist in order to assess the reliability of the scales in this study.

In order to show the prevalence of problematic social media users in Italy, percentages across regions, age groups and gender were calculated.

In order to test for the possible contribution of PSMU to somatic and psychological symptoms, six multivariable logistic regression analyses were run, controlling for the effect of children's age, FAS and, in some models, gender. Multiple somatic and psychological symptoms were the dependent variables and PSMU was the independent variable. Analyses were run on the total sample and for males and females separately. Odds ratios (OR) with 95% confidence intervals (95% CI) were calculated.

IBM SPSS Statistics 25 was used to perform the analyses.

RESULTS

Descriptive statistics

Overall, a total of 58,976 youths completed the questionnaire (mean age = 13.5 years, Standard Deviation (SD) = 1.6 years; 50.6% males), distributed across It-

aly's 21 regions (1281-5570 youth per region). For the purpose of this study, only youths with complete data in the variables of interest (i.e. answering the 100% of the items related to PSMU and health complaints) were included in the final analyses.

The Cronbach's alpha for the Social Media Disorder Scale was 0.72. The Cronbach's alpha was 0.69 for the somatic symptoms dimension and 0.77 for the psychological symptoms dimension of the HBSC Symptom Checklist.

Table 1 shows that PSMU affects 8.9% adolescents in Italy and that the prevalence of PSMU is quite consistent across regions, slightly varying from 6.6% (Valle d'Aosta and Friuli Venezia Giulia) to 10.8%-10.9% (Campania and Puglia). With regard to differences across age groups, 13-year-olds reported the highest percentages of PSMU (10.2%) followed by 11-year-olds (8.6%) and 15-year-olds (7.8%). Whereas boys and girls appear to be at similar risk of PSMU among 11-year-old adolescents (8.6% and 8.7% respectively), PSMU is higher among 13- and 15-year-old girls as compared to their male peers (13.0% vs 7.5%; 10.0% vs 5.5%, respectively). Specifically, at age 13 girls reported the highest percentages of PSMU in Italy (i.e. 17.0% in Puglia, 16.1% in Campania, and about 15.0% in Lombardia, Umbria and Abruzzo) whereas the lowest percentage

Table 1
Prevalence of problematic social media use by region, age group, and gender (n = 53292)

	Total %	11-year-olds (n = 17,160) %			13-year-olds (n = 19,292) %			15-year-olds (n = 16,840) %		
		Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Piemonte	8.1	8.3	8.9	8.6	5.6	13.0	9.2	4.3	8.4	6.2
Valle d'Aosta/Vallée d'Aoste	6.6	4.5	5.2	4.9	6.8	10.9	8.9	3.9	7.9	5.9
Lombardia	10.3	9.5	10.5	10.0	9.8	15.4	12.5	5.9	9.8	8.1
Bolzano/Bozen	9.1	9.3	7.4	8.4	6.9	12.5	9.9	8.9	8.7	8.8
Trento	8.2	10.7	8.3	9.4	9.0	8.8	8.9	5.5	7.3	6.5
Veneto	9.1	8.8	7.6	8.2	8.6	12.9	10.8	6.0	10.1	8.0
Friuli Venezia Giulia	6.6	8.1	5.6	6.8	4.0	9.7	6.9	4.5	7.5	6.1
Liguria	8.9	8.6	7.6	8.1	8.6	12.4	10.3	5.8	10.8	8.2
Emilia Romagna	8.3	5.7	7.5	6.6	8.5	10.2	9.4	5.2	11.2	8.7
Toscana	7.5	5.8	7.5	6.7	4.8	11.9	8.4	4.6	10.0	7.2
Umbria	8.5	7.1	5.8	6.4	9.5	15.1	12.2	6.7	6.6	6.7
Marche	8.6	9.6	11.9	10.7	4.7	12.4	8.4	4.6	8.6	6.8
Lazio	8.3	6.9	7.8	7.3	6.4	11.7	9.1	4.2	13.6	8.4
Abruzzo	9.3	9.7	9.1	9.4	6.6	15.5	10.7	4.3	10.7	7.8
Molise	9.5	10.4	10.2	10.3	7.0	13.9	10.1	6.6	9.0	7.9
Campania	10.8	11.1	13.6	12.2	8.9	16.1	12.5	4.6	11.0	7.8
Puglia	10.9	8.4	9.2	8.8	8.9	17.0	12.7	7.7	13.8	10.9
Basilicata	9.2	8.0	10.4	9.1	8.5	12.6	10.7	6.0	8.6	7.1
Calabria	10.0	9.1	10.3	9.6	7.5	14.5	11.1	6.9	11.4	9.3
Sicilia	10.0	9.4	10.4	9.9	10.4	14.7	12.6	4.6	11.2	7.7
Sardegna	9.2	9.3	9.6	9.5	6.5	12.9	9.5	5.1	10.5	8.0
Italy	8.9	8.6	8.7	8.6	7.5	13.0	10.2	5.5	10.0	7.8

(4.0%) was observed among boys in Friuli Venezia Giulia. At age 15, boys in Valle d'Aosta showed the lower percentage of PSMU (3.9%) and the biggest difference between girls (13.6%) and boys (4.2%) was observed in Lazio. Overall, the regions in which PSMU was spread the most were Campania among 11-year-olds (12.2%) and Puglia among 13- and 15-year-olds (12.7% and 10.9% respectively).

Findings of the logistic regression analyses

Results from the logistic regression (Table 2) shows that being problematic users of social media increased the likelihood of reporting multiple somatic symptoms [2 or more symptoms claimed more than once a week; OR = 1.84 (95% CI: 1.82-1.85)], controlling for age, gender, and FAS. The strongest associations (above OR = 2.24) between PSMU and somatic symptoms were observed in Sardegna, Calabria, Umbria and Valle d'Aosta, with boys from Umbria and Sardegna and girls from Valle d'Aosta and Calabria showing the highest impact of PSMU on multiple somatic symptoms. This effect was non-significant among girls in Abruzzo and among boys in eight regions (i.e. Piemonte, Valle d'Aosta, Trento, Bolzano, Toscana, Marche, Molise, Basilicata).

Table 3 shows that problematic users of social media are also more likely to report multiple psychological symptoms [2 or more symptoms reported more than once a week; OR = 2.60 (95% CI: 2.58-2.63)], adjusting for confounders. Across regions, the highest effects (above OR = 3.00) of PSMU on psychological symptoms were observed in Piemonte, Valle d'Aosta, Toscana, Lazio, Molise, and Sardegna. Among girls, the strongest associations were observed in Valle d'Aosta and Sardegna. However, male problematic users seem to experience more psychological symptoms in Umbria and Abruzzo. This effect was non-significant only among boys in Bolzano.

DISCUSSION

This study aimed to investigate the prevalence of PSMU and analysed its association with health complaints (psychological and somatic symptoms) in a representative sample of Italian adolescents. On average, almost one out of ten adolescent reported problematic social media use, which was associated with both somatic and psychological symptoms.

Our findings showed that PSMU is a widespread problem in Italy, with almost one out of ten adolescents (8.9%) reporting a problematic use of social media; the

Table 2

OR (95% CI) for multiple somatic symptoms (2 or more symptoms more than once a week); independent variable: Problematic Social Media Use (0 = no; 1 = yes)

	Boys ^a (n = 25,917)	Girls ^a (n = 26,225)	Total ^b (n = 52,142)
Piemonte	1.49(0.82-2.72)	1.52(1.04-2.22)*	1.53(1.11-2.11)**
Valle d'Aosta / Vallée d'Aoste	1.45(0.59-3.58)	2.69(1.55-4.68)***	2.24(1.42-3.54)***
Lombardia	2.05(1.31-3.20)**	1.78(1.28-2.47)***	1.87(1.43-2.44)***
Bolzano/Bozen	1.21(0.53-2.77)	1.79(1.12-2.88)*	1.60(1.07-2.41)*
Trento	1.68(0.96-2.92)	2.21(1.48-3.30)***	2.02(1.47-2.79)***
Veneto	1.99(1.35-2.93)***	1.55(1.17-2.06)**	1.71(1.36-2.15)***
Friuli Venezia Giulia	2.16(1.19-3.93)*	1.87(1.25-2.79)**	1.99(1.42-2.78)***
Liguria	2.02(1.21-3.37)**	1.57(1.06-2.32)*	1.74(1.17-2.37)***
Emilia-Romagna	1.79(1.04-3.10)*	1.95(1.37-2.77)***	1.91(1.42-2.57)***
Toscana	1.18(0.59-2.36)	1.82(1.25-2.65)**	1.65(1.19-2.27)**
Umbria	3.68(1.83-7.41)***	1.82(1.02-3.24)*	2.33(1.49-3.64)***
Marche	1.63(0.92-2.88)	1.82(1.28-2.58)***	1.77(1.31-2.38)***
Lazio	2.36(1.41-3.95)***	1.71(1.19-2.45)**	1.93(1.43-2.60)***
Abruzzo	2.00(1.18-3.40)**	1.37(0.95-1.98)	1.56(1.16-2.12)**
Molise	1.42(0.78-2.60)	2.09(1.41-3.10)***	1.86(1.34-2.57)***
Campania	1.71(1.07-2.75)*	1.61(1.14-2.26)***	1.66(1.26-2.19)***
Puglia	1.64(1.02-2.65)*	1.84(1.33-2.54)***	1.79(1.37-2.34)***
Basilicata	1.71(0.90-3.25)	2.15(1.32-3.50)**	1.97(1.34-2.89)***
Calabria	1.89(1.17-3.07)**	2.70(1.94-3.77)***	2.43(1.86-3.18)***
Sicilia	2.71(1.74-4.22)***	1.52(1.07-2.17)*	1.94(1.46-2.57)***
Sardegna	3.12(1.61-6.07)***	2.17(1.30-3.45)**	2.44(1.64-3.63)***
Italy^c	2.05(2.01-2.08)***	1.71(1.69-1.73)***	1.84(1.82-1.85)***

*. p<0.05; **. p<0.01; ***. p<0.001; †: control variables: age and family affluence – effects not reported for clarity seeking; †: control variables: age, gender and family affluence; ‡: weighed for region.

Table 3

OR (95% CI) for multiple psychological symptoms (2 or more symptoms more than once a week); independent variable: Problematic Social Media Use (0 = no; 1 = yes)

	Boys ^a (n = 25,898)	Girls ^a (n = 26,209)	Total ^b (n = 52,107)
Piemonte	2.15(1.58-3.79)***	3.64(2.38-5.57)***	3.06(2.26-4.13)***
Valle d'Aosta / Vallée d'Aoste	3.33(1.70-6.55)***	5.38(2.72-10.67)***	4.29(2.68-6.86)***
Lombardia	2.35(1.63-3.40)***	2.80(1.99-3.94)***	2.60(2.03-3.33)***
Bolzano / Bozen	1.61(0.90-2.87)	2.57(1.68-3.92)***	2.17(1.55-3.03)***
Trento	2.25(1.48-3.40)***	3.55(2.30-5.48)***	2.86(2.13-3.84)***
Veneto	1.98(1.45-2.71)***	2.80(2.08-3.77)***	2.41(1.95-2.98)***
Friuli Venezia Giulia	2.76(1.71-4.47)***	2.87(1.85-4.43)***	2.91(2.11-4.02)***
Liguria	2.25(1.50-3.39)***	3.39(2.14-5.36)***	2.75(2.04-3.70)***
Emilia Romagna	2.22(1.43-3.46)***	3.37(2.26-5.03)***	2.83(2.11-3.78)***
Toscana	2.83(1.74-4.60)***	3.07(2.06-4.57)***	3.00(2.20-4.07)***
Umbria	3.87(2.03-7.38)***	2.16(1.17-3.97)*	2.92(1.86-4.59)***
Marche	1.85(1.19-2.86)**	3.25(2.22-4.75)***	2.58(1.95-3.41)***
Lazio	2.62(1.66-4.12)***	3.70(2.41-5.67)***	3.24(2.39-4.40)***
Abruzzo	3.01(1.95-4.66)***	2.44(1.68-3.55)***	2.73(2.05-3.64)***
Molise	2.97(1.93-4.57)***	3.28(2.14-5.03)***	3.09(2.29-4.18)***
Campania	1.94(1.29-2.81)**	2.55(1.77-3.68)***	2.29(1.75-3.00)***
Puglia	2.32(1.58-3.41)***	2.63(1.84-3.74)***	2.51(1.94-3.25)***
Basilicata	1.98(1.15-3.43)*	2.42(1.44-4.06)***	2.19(1.51-3.18)***
Calabria	1.52(1.01-2.29)*	2.79(1.94-4.01)***	2.16(1.66-2.82)***
Sicilia	1.79(1.19-2.68)**	2.65(1.79-3.91)***	2.27(1.72-2.99)***
Sardegna	2.03(1.11-3.72)*	4.57(2.45-8.54)***	3.13(2.06-4.76)***
Italy^c	2.23(2.20-2.27)***	2.89(2.85-2.93)***	2.60(2.58-2.63)***

*: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$; ^a: control variables: age and family affluence - effects not reported for clarity seeking; ^b: control variables: age, gender, and family affluence; ^c: weighed for region.

prevalence appears quite consistent across the country, although some variation was found in some regions. Even though it was not possible to identify a clear trend across geographic areas, it is worth noting that the two regions with the lowest prevalence of PSMU were in the North (Valle d'Aosta and Friuli Venezia Giulia), while two regions from the South (Campania and Puglia) showed the highest prevalence. These findings point out that PSMU characterizes a notable portion of adolescents everywhere in the country, with some regions reflecting the North-South inequalities observed for other health indicators, for example the prevalence of youth gambling [30].

A wider variation in the prevalence of PSMU was observed in relation to age groups. More specifically, 13-year-old adolescents showed the highest percentages of PSMU (10.2%), compared to 11- and 15-year-olds. It should be noted that, in Italy, 13 years old is the minimum age required to create personal accounts on social media. Therefore, it is possible that in this developmental stage, after a short period of familiarization with social media, adolescents have learned most of the social media tools but might not have the abilities to use them in a constructive way yet. Interestingly, 15-year-old adolescents appeared as the less problematic age

group (7.8%), suggesting a decrease of PSMU from 13- to 15-years. It could be that social media become less pronounced (and then problematic) as adolescents get used to them until social media use become a way of being rather than a problematic behaviour. However, more studies are needed in order to identify the developmental stages more exposed to the risk of developing PSMU and explore the factors responsible for the highest prevalence in specific age groups.

Variation in the prevalence of PSMU was also observed across gender: with the exception of 11-year-old boys and girls, having a similar risk of developing PSMU, 13- and 15-year-old girls reported to use social media in a problematic way almost twice as much as boys. This is consistent with the literature sustaining that girls are more vulnerable to the negative consequences of the online environment as they are more frequently engaged in social media use than boys and they tend to prefer social online interactions, thus incurring in more addiction-like symptoms [7].

PSMU: Italian HBSC results 2018 vs International HBSC results 2018

The recent HBSC international report showed that overall 7.0% of adolescents in Europe and Canada can

be classified as problematic social media users [31]. Overall, Italy gets the 4^o place among countries showing the highest percentages of adolescent problematic social media users as compared to other countries [8]. At age 11, Italian boys and girls appeared at major risk of PSMU as compared to the HBSC average prevalence across countries. Specifically, they are only less problematic than 11-year-old in Azerbaijan, Malta, and Romania [32]. Italy ranks at 8^o and 17^o for PSMU among 13- and 15-year-olds respectively. In line with international findings, PSMU in Italy increased from 11- to 13-year-olds and was more common among girls. However, overall in Europe and Canada, 15-year-old girls had the highest percentage of PSMU. In contrast, our findings highlighted that Italian 13-year-old girls were the most problematic group in Italy along with girls of 13 years from Malta, Wales, Romania, Ireland, and Greece. Interestingly, at age 15, Italian adolescents showed a modest decrease in PSMU (especially among boys) that, instead, remained overall stable in other countries.

PSMU and health complaints

Moreover, as expected, PSMU was associated with health complaints, with greater effects on psychological symptoms as compared to somatic ones. Regarding the association between PSMU and somatic symptoms, results of the present study appear in line with the literature, highlighting the negative effect of problematic use of new technologies on somatic and physical symptoms [5, 33]. As social media have become an integral part of adolescent lives and adolescents predominantly use social media on their smartphones [25], it could be argued that the negative impact of PSMU on somatic symptoms, such as headache and feeling dizzy, might be at least partially explained by the effect of smartphone use (or the exposure to other device screen) on physical health [34, 35]. At the same time, given the correlational nature of the data, it is also possible that adolescents experiencing somatic symptoms such as backache or stomachache are more likely to prefer sedentary online activities, thus having a higher risk of developing a problematic use of these technologies.

It has been suggested that the mechanism linking PSMU and psychological problems is not straightforward, in that problematic use and psychological symptoms might co-occur and influence each other [7]. On the one hand, being characterized by mood modification, cognitive preoccupation, and compulsive online behaviours, PSMU might result in negative consequences in terms of emotional, social, and school impairments [19, 36]. On the other hand, psychologically vulnerable users (for example, experiencing any distress due to poor social support or with low levels of psychological well-being) might use social media as a coping strategy to regulate their emotional and social difficulties putting themselves at major risk to develop a maladaptive use of social media [22, 37, 38]. Although establishing the final direction of the association between PSMU and psychological distress was not the aim of this study, PSMU did appear to worsen the levels of adolescents' psycho-somatic health in Italy.

The associations between PSMU and adolescent health were stronger for psychological than physical symptoms. This might be due to the fact that the somatic effects of problematic social media may mostly derive from the physical consequences of spending time in front screen devices, and to a lesser extent to the social media specific uses. The opposite might be true for psychological consequences of social media use, mostly arising not from the time spent online per se, but rather from the problematic aspects of PSMU, such as loss of control and relational problems with family and friends.

STRENGTHS AND LIMITATIONS

Using a representative sample of adolescents in Italy represents the main strength of this study in that it allowed to reliably estimate the association between PSMU and health complaints. Nevertheless, the present study comes with several limitations that have to be acknowledged. The cross-sectional design of the study precludes any causality statement. A comprehensive description of the strengths and limitations of HBSC methodology is provided in Appendix 1.

Moreover, the scale used to assess PSMU is relatively short and does not capture the preference for online social interactions over face-to-face communication, which is commonly considered a key factor of the problematic use of Internet and social media among youths [39]. Lastly, data were collected via self-report measures in line with the vast majority of the studies in the field. However, there is a need to combine self-reported information with objective data related to the "real" use of social media in order to understand how and what type of social media activity put adolescents at greater risk to develop PSMU.

CONCLUSIONS

This is the first study showing the prevalence of PSMU in adolescents across Italian regions. By showing a consistent association between the problematic use of social media and adolescent psychosomatic health, our findings underline the urgency of implementing prevention intervention in order to promote a positive use of social media and minimize the drawbacks [40]. Moreover, the prevalence of PSMU across the country (also as compared to the international prevalence) shows that in no regions the problem can be considered negligible, thus underlying the need of a national strategy to implement intervention educating adolescents to a healthy use of social media.

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Ethical approval

The Italian HBSC study protocol and questionnaire were formally approved by the Ethics Committee of the Italian National Institute of Health (PROT-PRE876/17, 20 November 2017).

Authors' contribution

CM, ML, NC, and AV conceptualized and designed the study. CM and AV analyzed the data. CM wrote up the first draft. ML and NC wrote sections of the article and contribute to the interpretation of data. DP and PD supervised the statistical analysis. All Authors critically reviewed the manuscript and approved the final version.

Conflict of interest statement

None of the Authors declares competing financial interests.

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