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Associations between social media use and positive mental health among adolescents: Findings from the Canadian Health Behaviour in School-aged Children Study

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ABSTRACT

Social media use (SMU) has rapidly increased among children and adolescents in the past decade, and has been linked with poorer mental health. However, moderate SMU can facilitate connectedness among peers, which may have positive impacts for well-being – these associations are underexplored. This study examined the associations between SMU and several indicators of PMH in a nationally representative sample of 13,113 adolescents in grades 6 to 10 from the 2017/2018 cycle of the Canadian Health Behavior in School-aged Children (HBSC) study. SMU was measured using a four-level composite of intensity (non-active, active, intense) and problematic SMU (addictive-like symptoms, regardless of intensity). Four dichotomous indicators of PMH were examined: self-efficacy, self-confidence, life satisfaction, and psychological well-being. Covariates included grade, gender, cultural/racial background, and socioeconomic status. Unadjusted and adjusted mixed effects logistic regression models accounting for school-level clustering were run, with separate models for each PMH indicator and active SMU set as the referent. When compared to active SMU, problematic SMU was associated with lower levels of all PMH indicators, and intense SMU was associated with lower life satisfaction. In gender-stratified models, intense SMU was associated with lower life satisfaction among girls. In grade-stratified models, non-active SMU was associated with lower self-confidence for adolescents in grades 9 and 10. In all, problematic SMU is generally associated with lower odds of reporting high PMH. Longitudinal research is required to ascertain directionality of these findings, and to examine how these associations may have changed as a result of the COVID-19 pandemic.

1. Introduction

Today's adolescents have grown up with consistent access to the Internet and portable digital technologies (e.g., smartphones). Research on over 74,000 U.S. adolescents reported that daily social media use (SMU) rose from 61 to 89% among girls and from 45 to 75% among boys between 2009 and 2017 (Kreski et al., 2021). Extended daily use of social networking sites is also on the rise, with 20% of Ontario adolescents in grades 7 to 12 reporting 5+ hours per day of SMU, a doubling of prevalence between 2013 and 2017, with more girls (25.8%) than boys (14.9%) reporting SMU of 5+ hours per day (Boak et al., 2018). Emerging research further suggests that increases in SMU have continued through the COVID-19 pandemic (Luo et al., 2021; Rouleau et al., 2023). Paralleling these increases in SMU, research suggests that poor mental health is rising among adolescents (Rouleau et al., 2023). From 2011 to 2018, the prevalence of poor/fair mental health increased for all Canadian adolescents, with larger increases among girls (Wiens et al., 2020); these increases have also occurred for American

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adolescents (Ivey-Stephenson et al., 2020). In turn, it has been hypothesized that the rise of SMU may be associated with poorer mental health (Twenge, 2020); evidence collected during COVID-19 has also suggested links between increases in some forms of SMU with lower well-being (Marciano et al., 2022).

Positive mental health (PMH) represents a separate but correlated construct with poor mental health, and is viewed from hedonic and eudaimonic perspectives. The hedonic perspective highlights the importance of pleasure and positive mood in the promotion of well-being, whereas the eudaimonic perspective prioritizes meaning and self-actualization through traits such as autonomy and self-efficacy (Delle Fave et al., 2011). Higher levels of hedonic and eudaimonic indicators of PMH are associated with lower risk of mental disorder (Koivumaa-Honkanen et al., 2004; Ruini and Cesetti, 2019), and lower levels are associated with higher risk of poorer physical health outcomes including diabetes, cancer, and stroke (Boehm et al., 2015; Feller et al., 2013). Globally, PMH is being recognized as an important factor in optimizing human health – for example, the definition of health put forth by the World Health Organization (WHO) includes aspects of PMH (World Health Organization, 2022). Given the relationship between PMH and health, identifying potential modifiable factors associated with PMH, such as SMU, is imperative. Among the limited evidence examining these relationships, addictive/problematic use of social media has been negatively linked with outcomes including life satisfaction (Hawi and Samaha, 2017).

An additional gap in the evidence base is that many studies do not distinguish intensity/frequency of SMU from problematic SMU, which are distinct concepts (van den Eijnden et al., 2016). While intense users spend a lot of time on social media, problematic users demonstrate potential dependence on social media (Griffiths et al., 2014). Among Canadian adolescents in 2018, 38% of girls and 30% of boys reported intense SMU (almost all the time throughout the day), whereas 7.7% of girls and 5.2% of boys reported problematic use (Public Health Agency of Canada, 2022). Cross-national research suggests that among countries reporting a high prevalence of SMU, intense SMU is positively associated with well-being, whereas problematic SMU is negatively associated with well-being (Boer et al., 2020). The *digital Goldilocks hypothesis* stipulates that technology use at moderate levels is not intrinsically harmful, and may be advantageous for maintaining social connections in the "digital age" (Przybylski and Weinstein, 2017). Indeed, non-problematic SMU can promote connectedness among peers, assist in identity formation, and provide entertainment (Wong et al., 2022). However, despite the potentially positive impacts of intense or active SMU on well-being, few studies have explored the detailed associations between intensity/type of SMU with PMH. This is a notable limitation, given that the type of SMU can have either positive or negative impacts on mental health, and that the promotion of PMH can have protective effects on adolescents who are at-risk of poor mental health (Keyes et al., 2010).

The objective of this study was to examine the associations between SMU and a range of PMH indicators in a nationally representative sample of Canadian adolescents. We hypothesized that when compared to active SMU, problematic SMU, but not non-active or intense SMU, would be negatively associated with each indicator of PMH among adolescents.

2. Materials and methods

2.1. Data source

Data for this study came from the 2017/2018 cycle of the Canadian Health Behavior in School-aged Children (HBSC) study. The HBSC study is conducted every four years in several North American and European regions, including Canada, to examine the health, well-being, and social contexts of adolescents. In Canada, the HBSC is funded by the Public Health Agency of Canada (PHAC) and conducted by Queen's University. Data for the 2017/2018 cycle were collected from 21,745 Canadian adolescents in grades 6 to 10. Participants were administered electronic or paper-based surveys in classrooms, and self-reported data were collected anonymously. Consent was obtained from school administrators, parents or guardians, and students, and participation in the study was voluntary. The HBSC sampling frame does not include adolescents who are home-schooled, attending private schools, attending schools on First Nation or Inuit reserves, who are not in school, or who are incarcerated, representing less than 7% of Canadian adolescents. Adolescents from all 10 provinces and two territories (Yukon, Northwest Territories) participated. Ethics clearance for the Canadian component of the HBSC was granted by the research ethics boards at Queen's University and PHAC. Further details on sampling are available through the Canadian HBSC report (Craig et al., 2020). The eligible sample for this study comprised 13,113 adolescents with complete data on all study variables.

2.2. Measures

Social media use. SMU intensity was assessed by asking participants to identify frequency of online contact with four categories of people: "close friend(s)", "friends from a larger friend group", "friends that you got to know through the internet but didn't know before", and "other people than friends (e.g., parents, brothers/sisters, classmates, and teachers)". This measure was adapted from the EU Kids Online Survey (Mascheroni and Olafsson, 2014). Response options for each category ranged from 'never or almost never' to 'almost all the time throughout the day'. The highest frequency reported across categories was used to classify respondents into three levels of intensity of SMU: a) never or at most weekly (non-active SMU); b) almost daily to several times each day (active SMU); and c) almost all the time (intense SMU).

Problematic SMU was assessed using the Social Media Disorder Scale (van den Eijnden et al., 2016). This scale consists of nine items examining SMU-related addiction-like symptoms; response options were 'yes' or 'no'. In line with prior research (Boer et al., 2020), respondents who answered "yes" to six or more items were classified as having problematic SMU. The Social Media Disorder Scale has demonstrated strong psychometric properties, including high structural validity and good internal consistency, when assessed cross-nationally (across 44 countries) (Boer et al., 2022).

Consistent with other research using HBSC data (Boer et al., 2020; Boniel-Nissim et al., 2022), the intensity and problematic SMU measures were combined to classify participants into one of four categories: 1) non-active SMU (non-active SMU + non-problematic SMU); 2) active SMU (active SMU + non-problematic SMU); 3) intense SMU (intense SMU + non-problematic SMU); and 4) problematic SMU (problematic SMU regardless of intensity of use). All analyses used the active SMU as the reference category as this is the modal group (and is consistent with previous research) (Morningstar et al., 2023).

Positive mental health. Four indicators of PMH were examined: self-efficacy, self-confidence, life satisfaction, and psychological well-being.

Self-efficacy in daily life was assessed by asking respondents "How would you rate your ability to handle unexpected and difficult problems?" and "How would you rate your ability to handle day-to-day demands in your life?". Response included five options from: '1: poor' to '5: excellent'. Scores were summed, and in line with prior research (Veenstra et al., 2005), scores $\geq$6 were categorized as having "high self-efficacy" (average of "good" or higher for each item), and scores $\leq$5 were categorized as having "low self-efficacy". A cut-off of 8 (average score of "very good" or higher for each item) was used in sensitivity analyses.

Self-confidence was assessed by asking participants how much they agreed or disagreed with the statement "I have confidence in myself", with five response options ranging from 'strongly agree' to 'strongly disagree'. 'Strongly agree' and 'agree' responses were categorized as "high self-confidence", and remaining response options were categorized as "low self-confidence".

Life satisfaction was assessed using Cantril's Ladder (Cantril, 1966), where participants were provided with a picture of a ladder where the top rung (10) represented the "best possible life for you" and the bottom rung (1) being the "worse possible life for you". Participants were asked to indicate where on the ladder they felt they stood from 1 to 10. In line with prior HBSC studies, scores ≥6 were categorized as "high life satisfaction", and scores ≤5 were categorized as "low life satisfaction" (Currie et al., 2012). A higher cut-off of 9 was also used in a sensitivity analysis, based on prior research among adolescents (Mazur et al., 2018). Among 11–15 year olds, Cantril's Ladder has demonstrated good reliability, and good convergent validity with other measures of emotional well-being and health (Levin and Currie, 2014).

Psychological well-being was assessed using the WHO-5 mental well-being scale (Topp et al., 2015). This scale included five items that asked participants, over the last two weeks, how often they felt: 1) cheerful and in good spirits, 2) felt calm and relaxed, 3) felt active and energetic, 4) woken up feeling fresh and rested, and 5) had your daily life filled with things that interest you. Response options ranged from 'all of the time' to 'at no time'. Items were reverse-coded, scored from 0 to 5, summed, and then multiplied by 4, where higher scores represented higher psychological well-being (scale from 0 to 100). Scores ≥50 were categorized as "high psychological well-being", and scores ≤49 were categorized as "low psychological well-being". When used as a screening tool for depression, the WHO-5 is sensitive and specific, with high clinometric validity (Topp et al., 2015).

Covariates. Several sociodemographic variables related to SMU and/or PMH were included as covariates, including grade (6 through 10), gender (male, female), cultural/racial background (White; non-White, multiracial or Indigenous), and socioeconomic status (SES). SES was examined using the Family Affluence Scale (FAS) (Currie et al., 2008); which asks participants to report on the following: number of cars, number of bathrooms, number of computers, ownership of a dishwasher, having own bedroom, and number of family holidays outside of Canada during the past year. Responses were summed to generate a continuous measure of SES. The FAS has demonstrated good reliability and criterion validity (Boyce et al., 2006).

2.3. Statistical analyses

The analytic sample represented 60% of eligible participants with complete data on study variables – missingness on study variables ranged from 0.3% (self-confidence) to 30% (SMU). Analyses were conducted using SAS Enterprise Guide version 7.1 (SAS, Cary, NC). Descriptive statistics were generated for complete cases and stratified by gender. Categorical variables were described using frequencies, and continuous variables were described using means, with confidence intervals (CIs) reported for both. Included respondents (those with complete data) and excluded respondents (those with missing data) were compared on key study variables, with independent samples *t*-tests or Chi-square tests used to ascertain differences between groups. The associations between SMU and PMH were examined using unadjusted and adjusted mixed effects logistic regression models accounting for school-level clustering, with separate models run for each PMH indicator. To test for interactions between SMU and gender or grade, interaction terms were added to models; models were stratified if interaction terms were below $p < 0.10$. Grade level was collapsed into two groups – 6 to 8, and 9 to 10, to represent the educational level (i.e., 6 to 8 representing students in middle school or junior high school, 9 to 10 representing students in secondary school). Adjusted models included participant's cultural/racial background and SES; grade or gender were adjusted for when models were not stratified. Analyses incorporated sampling weights to ensure that results were nationally representative. Sensitivity analyses included examination of associations between SMU with psychological well-being and life satisfaction using higher cut-offs.

3. Results

Descriptive statistics are reported in Table 1 for included and excluded respondents. Most of the eligible sample were White (72%), and female (54%). Most adolescents reported active (46%) or intense (32%) SMU; fewer reported non-active (16%) or problematic SMU (7%). Most adolescents reported high self-efficacy (81%), high self-confidence (60%), high life satisfaction (83%), and moderate-high psychological well-being (76%). Compared to included adolescents, those excluded due to missing data were more likely to be male, under 14 years of age, report lower SES, report non-White/multiracial/Indigenous status, report more problematic SMU, and report lower self-efficacy, life satisfaction, and psychological well-being (p's < 0.05).

Unadjusted and adjusted logistic regressions are presented in Table 2. Prior to and after adjustment, problematic SMU, when compared to active SMU, was associated with lower odds of reporting higher self-efficacy (adjusted OR (aOR) = 0.38, 95% CI = 0.30, 0.49), self-confidence (aOR = 0.48, 95% CI = 0.39, 0.59), life satisfaction (aOR = 0.40, 95% CI = 0.32, 0.50), and psychological well-being (aOR = 0.45, 95% CI = 0.37, 0.56). Intense SMU, compared to active SMU, was associated with lower odds of reporting high life satisfaction both prior to and after covariate adjustment (aOR = 0.83, 95% CI = 0.71, 0.96). Remaining associations between non-active and intense SMU with PMH were not statistically significant.

The addition of interaction terms between SMU and gender to models were statistically significant for life satisfaction ($p = 0.001$) and psychological well-being ($p = 0.01$), but not self-efficacy ($p = 0.25$) and self-confidence ($p = 0.21$). Thus, gender-stratified analyses are presented for models including life satisfaction and psychological well-being in Table 3. Among males and females, problematic SMU, when compared to active SMU, was associated with lower odds of life satisfaction and psychological well-being prior to and after adjustment for grade, cultural/racial background, and SES. Among females, intense SMU, compared to active SMU, was associated with lower life satisfaction (aOR = 0.74, 95% CI = 0.63, 0.87).

The addition of interaction terms between SMU and grade level (6–8, 9–10) to models was statistically significant (at a $p < 0.10$ threshold) for life satisfaction ($p = 0.07$), self-confidence ($p = 0.02$), and psychological well-being ($p = 0.04$), but not for self-efficacy ($p = 0.30$). Thus, grade-stratified analyses for life satisfaction, self-confidence, and psychological well-being are presented in Table 4. Among adolescents in grades 6–8 and 9–10, problematic SMU, compared to active SMU, remained associated with lower odds of reporting higher life satisfaction, self-confidence, and psychological well-being. For adolescents in grades 9–10, non-active SMU, compared to active SMU, was associated with lower odds of high self-confidence (aOR = 0.79; 95% CI: 0.62, 0.998).

Sensitivity analyses introducing higher cut-offs for self-efficacy and life satisfaction were conducted for the overall sample and stratified by gender and grade. Across overall and stratified results, problematic SMU remained associated with lower self-efficacy (results not shown). Intense SMU was associated with higher self-efficacy (aOR = 1.13, 95% CI: 1.02, 1.26) overall, and for adolescents in grades 6–8 (aOR = 1.17, 95% CI: 1.01, 1.36) when compared with active SMU. Problematic SMU, compared to active SMU, remained associated with lower odds of reporting higher life satisfaction overall (results not shown), and for all groups except males (aOR = 0.65, 95% CI: 0.43, 1.00). Among all adolescents, non-active SMU was associated with higher life satisfaction prior to and after adjustment (aOR = 1.30, 95% CI = 1.14, 1.49). Similar results were found among males (aOR = 1.30, 95% CI: 1.07, 1.57), females (aOR = 1.38, 95% CI: 1.12, 1.71), and adolescents in grades 6–8 (aOR = 1.45, 95% CI: 1.22, 1.73). Among males, intense SMU was associated with higher life satisfaction (aOR = 1.30, 1.07, 1.58).

4. Discussion

This large, nationally representative study of over 13,000 Canadian

Table 1
Descriptive characteristics and comparison of included and excluded respondents.

Variables	Included (complete cases) (n = 13,113)	Excluded (n = 8632)	*p*-value
Sociodemographic characteristics	Mean or % (95% CI)[a]	Mean or % (95% CI)[a]	
Gender			<0.0001
Male	45.7 (43.7, 47.6)	52.4 (50.5, 54.4)	
Female	54.4 (52.4, 56.3)	47.6 (45.6, 49.5)	
Grade			<0.0001
6	15.3 (11.4, 19.3)	27.1 (20.3, 34.0)	
7	20.3 (17.0, 23.6)	23.3 (19.3, 27.3)	
8	22.2 (18.3, 26.2)	17.5 (13.6, 21.4)	
9	23.7 (19.9, 27.4)	19.4 (15.8, 23.0)	
10	18.5 (15.3, 21.8)	12.7 (10.0, 15.4)	
Age			<0.0001
8.0–13.9	48.7 (43.2, 54.1)	58.4 (52.7, 64.1)	
14.0–15.9	42.9 (38.3, 47.5)	32.2 (27.3, 37.0)	
16.0 +	8.5 (6.8, 10.1)	9.4 (7.7, 11.2)	
Cultural/racial background			0.0126
White	71.6 (66.7, 76.5)	65.3 (58.4, 72.2)	
Racialized or Indigenous	28.4 (23.5, 33.3)	34.7 (27.8, 41.6)	
Socioeconomic status (Family Affluence Scale)	9.1 (8.9, 9.2)	8.9 (8.7, 9.1)	0.0056
Social media use			0.008
Non-active	16.2 (14.9, 17.5)	17.2 (14.8, 19.5)	
Active	45.5 (43.9, 47.2)	40.3 (36.7, 43.9)	
Intense	31.7 (29.6, 33.8)	33.6 (29.9, 37.3)	
Problematic	6.6 (5.8, 7.3)	9.0 (7.3, 10.7)	
Positive mental health variables			
Self-efficacy			<0.0001
High	80.6 (79.3, 82.0)	76.5 (74.7, 78.2)	
Low	19.4 (18.0, 20.7)	23.5 (21.8, 25.3)	
Self-confidence			0.7949
High	59.6 (57.9, 61.3)	59.4 (57.2, 61.5)	
Low	40.4 (38.7, 42.1)	40.7 (38.5, 42.8)	
Life satisfaction			0.0036
High	83.2 (82.0, 84.3)	80.7 (78.8, 82.6)	
Low	16.8 (15.7, 18.0)	19.3 (17.5, 21.2)	
Psychological well-being			0.0307
Moderate-high	75.5 (73.9, 77.2)	73.0 (70.2, 75.7)	
Low	24.5 (22.8, 26.1)	27.0 (24.3, 29.8)	
Variables	**Included (complete cases) (n = 13,113)**	**Excluded (n = 8632)**	***p*-value**
Sociodemographic characteristics	**Mean or % (95% CI)[a]**	**Mean or % (95% CI)[a]**	
Gender			<0.0001
Male	45.7 (43.7, 47.6)	52.4 (50.5, 54.4)	
Female	54.4 (52.4, 56.3)	47.6 (45.6, 49.5)	
Grade			<0.0001
6	15.3 (11.4, 19.3)	27.1 (20.3, 34.0)	
7	20.3 (17.0, 23.6)	23.3 (19.3, 27.3)	
8	22.2 (18.3, 26.2)	17.5 (13.6, 21.4)	
9	23.7 (19.9, 27.4)	19.4 (15.8, 23.0)	
10	18.5 (15.3, 21.8)	12.7 (10.0, 15.4)	
Age			<0.0001
8.0–13.9	48.7 (43.2, 54.1)	58.4 (52.7, 64.1)	
14.0–15.9	42.9 (38.3, 47.5)	32.2 (27.3, 37.0)	
16.0 +	8.5 (6.8, 10.1)	9.4 (7.7, 11.2)	
Cultural/racial background			0.0126
White	71.6 (66.7, 76.5)	65.3 (58.4, 72.2)	
Non-White, multiracial, or Indigenous	28.4 (23.5, 33.3)	34.7 (27.8, 41.6)	
Socioeconomic status (Family Affluence Scale)	9.1 (8.9, 9.2)	8.9 (8.7, 9.1)	0.0056
Social media use			0.008
Non-active	16.2 (14.9, 17.5)	17.2 (14.8, 19.5)	
Active	45.5 (43.9, 47.2)	40.3 (36.7, 43.9)	
Intense	31.7 (29.6, 33.8)	33.6 (29.9, 37.3)	
Problematic	6.6 (5.8, 7.3)	9.0 (7.3, 10.7)	
Positive mental health variables			
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Self-confidence			0.7949
High	59.6 (57.9, 61.3)	59.4 (57.2, 61.5)	
Low	40.4 (38.7, 42.1)	40.7 (38.5, 42.8)	
Life satisfaction			0.0036
High	83.2 (82.0, 84.3)	80.7 (78.8, 82.6)	
Low	16.8 (15.7, 18.0)	19.3 (17.5, 21.2)	
Psychological well-being			0.0307
Moderate-high	75.5 (73.9, 77.2)	73.0 (70.2, 75.7)	
Low	24.5 (22.8, 26.1)	27.0 (24.3, 29.8)	

Note. [a]CI = confidence interval.

adolescents evaluated the associations between SMU and several PMH indicators. In line with our hypotheses, problematic SMU, when compared to active SMU, was associated with lower PMH across indicators. Contrary to our hypotheses, intense SMU, when compared to active SMU, was associated with lower life satisfaction overall, and among girls. For adolescents in grades 9–10, non-active SMU was associated with lower self-confidence.

Modern children and adolescents have consistent access to the Internet and social media, offering the opportunity to build friendships, and reduce feelings of isolation. In line with prior research (Boer et al.,

Table 2
Unadjusted and adjusted associations between type of SMU and PMH, overall (n = 13,113).

	Self-efficacy		Self-confidence		Life satisfaction		Psychological well-being	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
Social media use								
Non-active	0.99 (0.82, 1.21)	0.95 (0.77, 1.16)	1.09 (0.95, 1.24)	0.96 (0.83, 1.11)	1.13 (0.90, 1.41)	1.05 (0.83, 1.33)	1.11 (0.96, 1.29)	0.94 (0.80, 1.10)
Active	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Intense	0.91 (0.79, 1.05)	0.93 (0.81, 1.07)	1.00 (0.88, 1.13)	1.06 (0.94, 1.20)	**0.80 (0.69, 0.93)**	**0.83 (0.71, 0.96)**	0.99 (0.85, 1.15)	1.07 (0.92, 1.24)
Problematic	**0.37 (0.29, 0.47)**	**0.38 (0.30, 0.49)**	**0.45 (0.37, 0.54)**	**0.48 (0.39, 0.59)**	**0.37 (0.30, 0.45)**	**0.40 (0.32, 0.50)**	**0.42 (0.35, 0.51)**	**0.45 (0.37, 0.56)**

Note. Reported values represent odds ratios with 95% confidence intervals. Bolded values indicate statistical significance ($p < 0.05$). Variables adjusted for include cultural/racial background, gender, grade, and socioeconomic status.

Table 3
Unadjusted and adjusted associations between type of SMU and PMH, stratified by gender (n = 13,113).

	Life satisfaction		Psychological well-being	
	Unadj.	Adj.	Unadj.	Adj.
Males				
Social media use				
Non-active	0.95 (0.69, 1.30)	0.95 (0.68, 1.33)	0.94 (0.73, 1.20)	0.86 (0.67, 1.10)
Active	Ref.	Ref.	Ref.	Ref.
Intense	1.03 (0.79, 1.36)	1.07 (0.80, 1.42)	1.26 (0.97, 1.64)	1.30 (1.00, 1.70)
Problematic	**0.57 (0.39, 0.85)**	**0.59 (0.40, 0.88)**	**0.52 (0.37, 0.73)**	**0.52 (0.37, 0.73)**
Females				
Social media use				
Non-active	1.17 (0.89, 1.54)	1.20 (0.91, 1.57)	1.15 (0.95, 1.38)	1.05 (0.87, 1.27)
Active	Ref.	Ref.	Ref.	Ref.
Intense	**0.75 (0.63, 0.88)**	**0.74 (0.63, 0.87)**	0.93 (0.78, 1.11)	0.97 (0.82, 1.15)
Problematic	**0.32 (0.25, 0.41)**	**0.34 (0.26, 0.45)**	**0.40 (0.30, 0.52)**	**0.42 (0.32, 0.56)**

Note. Reported values represent odds ratios with 95% confidence intervals. Bolded values indicate statistical significance ($p < 0.05$). Variables adjusted for include cultural/racial background, grade, and socioeconomic status.

Table 4
Unadjusted and adjusted associations between type of SMU and PMH, stratified by grade (n = 13,113).

	Self-confidence		Life satisfaction		Psychological well-being	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
Grades 6–8						
Social media use						
Non-active	1.10 (0.93, 1.29)	1.04 (0.87, 1.24)	1.16 (0.87, 1.55)	1.14 (0.84, 1.53)	1.03 (0.83, 1.27)	0.99 (0.80, 1.22)
Active	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Intense	1.01 (0.86, 1.18)	1.04 (0.89, 1.23)	0.79 (0.61, 1.02)	0.81 (0.62, 1.06)	0.92 (0.76, 1.12)	0.93 (0.76, 1.13)
Problematic	**0.38 (0.28, 0.51)**	**0.40 (0.28, 0.56)**	**0.29 (0.22, 0.39)**	**0.31 (0.23, 0.42)**	**0.37 (0.28, 0.50)**	**0.39 (0.29, 0.52)**
Grades 9–10						
Social media use						
Non-active	0.87 (0.69, 1.10)	**0.79 (0.62, 0.998)**	0.90 (0.60, 1.35)	0.88 (0.57, 1.36)	0.88 (0.71, 1.10)	0.83 (0.65, 1.05)
Active	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Intense	1.03 (0.85, 1.27)	1.09 (0.90, 1.32)	0.83 (0.69, 1.01)	0.85 (0.70, 1.03)	1.15 (0.93, 1.43)	1.20 (0.97, 1.49)
Problematic	**0.55 (0.42, 0.72)**	**0.59 (0.44, 0.78)**	**0.48 (0.34, 0.67)**	**0.53 (0.38, 0.74)**	**0.49 (0.37, 0.65)**	**0.53 (0.39, 0.71)**

Note. Reported values represent odds ratios with 95% confidence intervals. Bolded values indicate statistical significance ($p < 0.05$). Variables adjusted for include cultural/racial background, gender, and socioeconomic status.

2020; Wong et al., 2022), our findings generally suggest that non-problematic, active use of social media is not negatively associated with PMH. For some groups, non-active SMU was associated with lower life satisfaction, but higher self-confidence. The former result is supportive of the Goldilocks hypothesis, which suggests that technology use at moderate levels is not inherently harmful, and may even be advantageous in a growingly connected world where most communications are technology-dependent (Przybylski and Weinstein, 2017); by contrast, "overuse" can lead to displacement of other health-promoting activities, including sleep and physical activity (Pagano et al., 2023; Shimoga et al., 2019). However, our finding that non-active use is not linked to poorer PMH is not consistent with this hypothesis. Many of the most popular social media networks (Facebook, Instagram, TikTok) require users to be 13 years or older to register for the platform. Although age restrictions can be bypassed by adolescents, recent research among Dutch children suggested that only 18% of children aged 9–12 had a Facebook profile despite being underage (Bruggeman et al., 2019). It is possible that non-active SMU does not have substantially detrimental effects on PMH for younger adolescents, as they may not feel that they are "missing out" if their peers are not regularly using social media. Indeed, when our analyses were stratified by grade, we observed that non-active SMU was associated with lower self-confidence only among older adolescents (grades 9 and 10).

We observed that problematic SMU was negatively associated with PMH. In-line with our conceptualization of problematic SMU, the biopsychosocial model of behavioural addictions suggests that problematic SMU can be characterized by mood modification, tolerance, symptoms of withdrawal, displacement, interpersonal conflict, and relapse (Dailey et al., 2020; Griffiths, 2005). Conceivably, the negative feelings that arise from potential shifts in mood, interpersonal problems, and withdrawal can negatively impact PMH. Similar to our findings, research from 29 countries participating in the HBSC study (including Canada, and the same data used in this study), demonstrated associations between problematic SMU and lower well-being and life satisfaction (Boer et al., 2020). As an extension of this work, our findings demonstrate that problematic SMU is negatively associated with PMH indicators including self-efficacy and self-confidence among Canadian adolescents. Similar findings have been reported in international studies; for example, problematic SMU has been linked to lower self-esteem, life satisfaction, and happiness (Huang, 2022; Marttila et al., 2021). However, longitudinal research into these relationships and their potential mechanisms is needed to ascertain directionality. Some evidence suggests the associations between poor mental health and SMU may be bidirectional (Raudsepp and Kais, 2019); assessment of whether this applies to the associations between SMU and PMH would also be informative.

Studies evaluating the associations between SMU and mental health have generally focused on indicators of poor mental health. However, mental health comprises more than the presence or absence of mental distress or disorder – modern definitions highlight the importance of optimizing psychological well-being (World Health Organization, 2022). Our study utilizes indicators of PMH covering hedonic (e.g., life satisfaction) and eudaimonic (e.g., self-efficacy) perspectives. Hedonic well-being has been more frequently captured in existing SMU research, but there is a dearth of research examining the associations between SMU and eudaimonic well-being (Meier and Reinecke, 2024). Thus, our findings contribute to a growing area of literature examining the role of type of SMU on eudaimonic indicators of PMH. The analysis of hedonic and eudaimonic indicators of well-being is particularly valuable given that they are conceptually distinct, and optimizing both is beneficial for overall well-being (Delle Fave et al., 2011).

4.1. Strengths and limitations

This study has limitations to consider. First, we were unable to investigate specific associations between SMU and PMH among non-binary adolescents, as fewer than 2% of adolescents in the sample reported being non-binary. Social networks can represent valuable resources for sexual and gender minority adolescents through provision of emotional support and information (Craig and McInroy, 2014). Second, our use of a complete case analysis (and exclusions for missing data) can impact generalizability – excluded adolescents were more likely to report being male, Indigenous or visible minority status, lower SES, and/or more intense and problematic SMU. Third, the cross-sectional nature of this study limits ascertainment of directionality of observed associations. Fourth, all measures were self-reported, which can result in potential misclassification due to biases such as recall and/or social desirability bias. For example, study participants may have answered questions on SMU, PMH, and other variables more favourably (e.g., lower SMU and/or improved PMH), likely resulting in an underestimate of the strength of the associations under study. In addition, some terminology included in the SMU items (such as distinguishing between close friends and larger friend groups, or use several times per day versus almost all the time) may be interpreted differently by participants, although this is a limitation inherent to Likert-style items. Future work may look to capture SMU objectively by looking at user engagement data on apps or device monitoring time; however, these approaches cannot distinguish intense from problematic SMU. Fifth, our measure of SMU does not distinguish between active and passive users – passive users typically use social media to monitor the profiles or online lives of other social media users without engaging in direct communication (Verduyn et al., 2020). Passive SMU has been associated with higher depression and anxiety among adolescents relative to active SMU (Thorisdottir et al., 2019). Finally, study data was collected in 2018; as use of technology is rapidly changing, it is possible that adolescents may engage with social media differently in the present day. Furthermore, onset of the COVID-19 pandemic in 2020 has driven many adolescents towards SMU to maintain social connections, with associated implications for well-being (Bailey et al., 2022); shifts in SMU and mental health resulting from the pandemic may further impact the observed associations.

This study also has notable strengths. The use of a large, nationally representative sample afforded adequate power to conduct overall analyses, stratify analyses by gender and grade, and generalize findings to most Canadian adolescents between grades 6 and 10. Furthermore, examination of several PMH indicators encapsulating hedonic and eudaimonic dimensions, as well as use of an SMU scale separating intensity from problematic use, addresses the dearth of research that examines the associations between type of SMU and PMH.

5. Conclusions

SMU is highly prevalent among Canadian adolescents. Findings from the current study suggest that problematic SMU is associated with lower PMH. For most analyses, non-active use was not negatively associated with PMH. This research can inform further study of these associations in Canada and abroad. Importantly, longitudinal research is needed to ascertain directionality of findings, and to examine how associations may change during, or due to, periods of adversity or social change (e.g., COVID-19 pandemic). Lastly, future research better identifying mechanisms linking type of SMU with PMH may further inform treatment and prevention strategies to optimize adolescent mental health.

CRediT authorship contribution statement

Zahra M. Clayborne: Writing – original draft, Investigation, Formal analysis, Data curation. **Suzy L. Wong:** Writing – review & editing, Methodology, Conceptualization. **Karen C. Roberts:** Writing – review & editing, Methodology, Conceptualization. **Stephanie A. Prince:** Writing – review & editing, Methodology. **Geneviève Gariépy:** Writing – review & editing, Methodology, Conceptualization. **Gary S. Goldfield:** Writing – review & editing, Methodology. **Ian Janssen:** Writing – review & editing, Methodology. **Justin J. Lang:** Writing – review & editing, Methodology, Formal analysis, Data curation.

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Declaration of competing interest

The authors have no financial or personal interest or belief that could affect the objectives of the paper. The authors do not have any competing interests to declare. The content and views expressed in this article are those of the authors and do not necessarily reflect those of the Government of Canada.

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