Association between Body Image Focused Social Media Usage (BSMU), Resilience, Attachment and Eating-related Problems among High School Students in Bangkok

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ABSTRACT

Objective: This study aimed to find the association among body image focused social media usage (BSMU), resilience, attachment, and eating-related problems among Thai adolescents.

Materials and Methods: Cross-sectional descriptive research was conducted with a sample of 495 high school students from three schools in Bangkok. The participants answered an online questionnaire comprised of age, sex, height/weight, BSMU, Body-esteem Scale for Adolescents and Adults, Eating Attitudes Test, Inventory of Parent and Peer Attachment for Children, and the Thai Resilience Quotient. Descriptive statistics were used to analyze demographic information, body satisfaction, resilience, attachment, and eating-related problems. T-tests, chi-square, and multivariate logistic regression analysis were performed to explore the associations between these variables.

Results: Mean (SD) age was 17.06 (0.805), with 307 female participants (62%). Time spent on social media was found to be associated with increased risk of binging (AOR (CI) = 1.71 (1.14-2.56)). BSMU was associated with increased risk of inappropriate eating attitudes, binging, purging and using laxative (AOR (CI) = 1.14 (1.03-1.27), 1.14 (1.06-1.22), 1.20 (1.04-1.40), and 1.21 (1.09-1.34) respectively). Higher resilience was found to associated with lower risk in binging (AOR (CI) = 0.45 (0.21-0.97)). However, attachment is not associated with any of eating-related problems.

Conclusion: BSMU usage was associated with inappropriate eating attitudes and behavior. Findings also suggest that higher resilience and stronger attachment were associated with lower risk of eating-related problems. The effectiveness of resilience and attachment improvement programs should be explored to help protect against eating problems.

Keywords: Social media; body image; inappropriate eating behaviors; resilience; adolescent-parent relationship
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INTRODUCTION

Social media (SM) has revolutionized communication and relationships, but it has also been linked to negative consequences for mental health, including eating problems in adolescents.[1,2] The issue of eating problems in adolescents is of significant importance and interest to the scientific community. Eating disorders are prevalent in adolescence and can have severe consequences for mental and physical health.[3,4] Previous studies have shown that significant SM use predicts increased body dissatisfaction and can

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lead to inappropriate eating behaviors such as binging and purging.[1,5-7] However, most studies only found an association between general SM use and eating-related problems, such as number of SM platforms[2,8], time spent on SM[1], frequency of SM usage[6,8], visiting or commenting on others' profile[9], general smartphone activities which might not related to body-image (e.g., browsing websites, sending and receiving text messages/e-mailing, watching TV shows).[5] Additionally, not all aspects of SM are associated with eating-related problems, and internalization and appearance comparison may be responsible for the maladaptive effects of SM use.[1,10,11]

Previous studies have examined the association between body image-related SM usage and eating-related problems, but have only focused on some body image-related SM activities such as photo-related activities (e.g., posting selfies, photo manipulation before posting, comments or likes on others' selfies)[12,13], and finding information related to body image on SM.[14] However, people engage in various body image-focused social media usage (BSMU) activities (e.g., number of selfie posts, how important of like or comments on their pictures, how often they photoshop their pictures before posting, how their profile picture looks) which might affect eating-related problems.[15-17]

SM usage has been found to have negative effects on eating-related problems, and identifying protective factors against these effects is important. Resilience is an important protective factor against many mental health problems[18,19], and studies have shown that individuals with greater resilience have fewer body image issues.[20-22] Emotional regulation, which is a components of resilience, has been found to plays a mediating role in the relationship between body image disturbance and disordered eating behavior.[23] Healthy adolescent-parent attachment has also been identified as an important protective factors against problematic eating behaviors.[24] However, spending more time on electronic media has been associated with lower quality attachment between adolescents and parent[25-27], and growing up in a dysfunctional family type has been linked to a higher risk of developing eating disorders in. female adolescents.[28] Berge et al., suggest that high quality family relationships and a sense of connection with parents may protect against problematic eating behaviors.[29] However, few studies have examined protective effect of these factors against negative effect of SM use, particularly on eating-related problems.[30,31]

There are many studies that found an association between SM activities and eating problems. However, most of them usually found an association between a few specific SM activities and eating-related problem as previously mentioned. Moreover, there are also limited studies on the protective effect of resilience and attachment against these problems. In this study, the researcher decided to explore 1) the association between BSMU and eating-related problems, 2) the association among resilience, attachment, and eating-related problems among high school students.

MATERIALS AND METHODS

Cross-sectional descriptive research was conducted to investigate the social media use behaviors, attachment, and resilience of students in grades 10 – 12 in the Thai educational system in Bangkok, and the effect on eating-related problems. The data were collected after the study received full approval from the institutional ethical review board of the Faculty of Medicine Ramathibodi Hospital, Mahidol University under the code MURA 2020/366.

Participants and procedure

Purposive sampling was used to choose three schools, two government schools and one international school following an international curriculum within Thai educational system in Bangkok, to be included in this study. Participants were in grades 10-12 in the 2nd semester of educational year 2020 and were selected in accordance with the teachers' convenience. Sample size was calculated using the G*Power[32,33] where effect size = 0.03, α error probability = 0.05, Power = 0.95 and number of predictions = 10. The total sample size required from the result of this calculation was 436. Students who could not read Thai, would not give assent to participating in the research, and those who did not complete the questionnaire were excluded. The data was collected from 15 to 31 October 2020 through an online questionnaire. After researchers provided details of the study and inform and consents were obtained, a QR code link to the online questionnaire was provided to participants. There were 529 questionnaires returned with 34 incomplete responses (6.43% of returned responses) resulting in a total of 495 participants (93.57%) (Fig 1).

Measurement

The survey consisted of six parts. The first part is demographic data which comprise questions regarding age, sex, weight/height, and grade in school.

The BSMU questionnaire was developed by the researcher to investigate BSMU. This self-reported questionnaire consisted of 10 questions and was based on a review of studies on body image-related SM usage.[1,5,7,8,9,34,35] The draft questionnaire was evaluated for face validity by three experts in psychiatry with experience in adolescent media use, and was revised based on their feedback. The

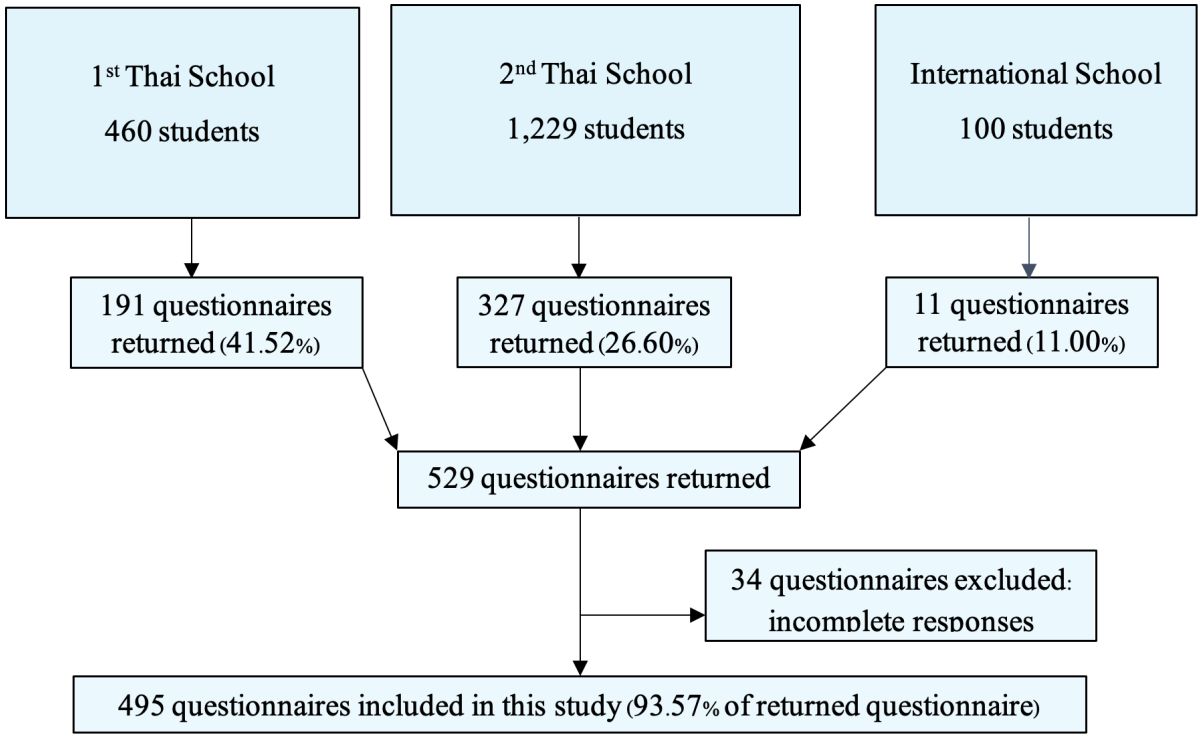

Fig 1. Participant selection for the study

questionnaire was then pilot-tested with ten students in Bangkok, and the questionnaire was revised based on feedback from the pilot test such as added a fill-in-the-blank option for the question about which social media platforms participants use most often, and the instructions for how to respond to the questions was modified to minimize confusion. The first question asked, "Which of the following SM platforms do you use most often?" The 11 most popular platforms from the website Digital 2020: Thailand[36] and a fill in the blank choice for "others" were possible replies and more than one reply was permitted. Question 2 asked how much time the respondent spent on SM following superstars/models and topics such as weight gain/loss and beauty. This response was fill in the blank. The next question (question 3) asked what the participant's profile picture was (e.g., waist-up, full body, someone/thing besides the participant). The next six questions (question 4-9) asked, within the last month how often participants conducted body image focused activities such as, posting selfies, photoshopping, and tagging/un-tagging themselves in pictures. Response options ranged from never (0) to every time (3). The final question (question 10) asked how important likes received on selfies or pictures were to the respondent. The results from last seven questions, which have responses option ranged from not at all (0) to very important (3), were summed together and resulted in a possible total score of 0 – 21 points, with higher scores indicating greater engagement in body image-focused social media usage. The reliability for this scale was questionable (Cronbach's alpha = 0.64). (the full version of BSMU questionnaire can be seen in supplementary material 1)

Eating-related problems were measured with three instruments as following:

1) The weight group was assessed using the "Nutrition Computation Program" (INMU-NutriStat), which was developed by Chittchana U and the Nutrition Institute of Mahidol University. This program computerized the nutrition of populations aged 1 day up to 19 years, and gave the results of nutrition status based on weight for age (w/a), height for age (h/a), and weight for height (w/h) for both genders. This program was widely used in a study about the weight status of children and adolescents in Thailand.[37] In this study we used only w/h because they are relevant to our outcomes. The results for each nutritional status based on w/h were divided into 3 categories which are underweight (under -1.5 SD), average weight (-1.5 to +1.5 SD), and overweight (more than +1.5 SD) compared with norms for Thai children.[37,38]

2) Body-esteem was collected using the 23-question Body-esteem Scale for Adolescents and Adults (BESAA) developed by Mendalson et al.[39], and translated into Thai by Gunta A. (Cronbach's Alpha = 0.9).[40] Response options ranged from never agree (0) to always agree (4). Scores for each question were summed and divided into three ranges, low (0.0 – 30.6), medium (30.7 – 61.3), and high

satisfaction (61.4 – 92.0) based on class interval analysis. Participants who had medium or high body satisfaction were grouped together to compare with those who had low body satisfaction. The reliability for this scale was excellent (Cronbach's alpha = 0.9) and validity was assessed with two experts on woman health.[40]

3) To evaluate eating attitudes and behaviors the EAT-26 (Eating Attitudes Test – 26 Questions) developed by Garner et al., and translated by Kaewpornsawan, (Cronbach's Alpha = 0.7) [41,42] was used. Eating attitudes was evaluated with first twenty-six items of the questionnaires (e.g., I Am terrified about being overweight, I Avoid eating when I am hungry) with response options ranged from never (0) to always (3). Inappropriate eating behaviors was assessed using five additional questions which asked how often participants binge, purge, use laxatives/drugs for weight control, exercise longer than 60 minutes, and have participants lost/gained more than 9 kilograms in the past 6 months. Choices were, never, once/month or less, 2-3 times/month, once/week, 2-6 times/week, and once/day or more often. For binging, anything more than once/month, and answers other than never for purging and laxative/drug use were considered at risk. Exercising more than 60 minutes/ day was only considered at-risk if the reply was once/day or more. Weight fluctuation was a simple yes or no reply and participants would be considered at risk if they reply with "yes". The first 26 questions were summed with scores over 12 indicating that the respondent was at risk for developing an eating disorder. The reliability of the scale was excellent (Cronbach's alpha=0.86).

To analyze resilience, the Thai Resilience Quotient Questionnaire (RQ), developed by the Thai Ministry of Public of Mental Health[43], was utilized and demonstrated good reliability (Cronbach's alpha = 0.749). The RQ contains 20 questions with response options ranging from not true (1) to very true (4). There were 3 subscales, emotional stability (questions 1-10), willpower (11-15), and problem-solving (16-20). Each subscale was graded separately and then a total RQ score was summed. Emotional stability was scored as, lower-than- (< 27), normal (27-34), and higher-than-normal (> 34). Willpower was scored as, lower-than- (< 14), normal (14-19), and higher-than-normal (> 19), and problem-solving as, lower-than- (< 13 normal (13-18), and higher-than-normal (> 18). Total RQ score was scored as, lower-than- (< 55), normal (55-69), and higher-than-normal (> 69). The Cronbach's alpha value for this scale was 0.83 which indicate excellent reliability and face validity was evaluated with experts on mental health and psychology.[43]

Adolescent-parent relationship was evaluated using only the parent part (28 questions) of the Inventory of Parent and Peer Attachment – Revised (IPPA-R).[44] The questionnaire was translated into Thai by Lucktong, and demonstrated good reliability (Cronbach's alpha = 0.88) and face validity was evaluated by psychology experts.[45] Responses ranged from never (1) to always true (3). Questions were grouped into 3 subscales, communication (7), trust (8), alienation (8), and non-categorized (5 questions) which were negatively worded and reversed scored. Communication subscale included questions regarding seeking parent's viewpoints, telling parents about problems, and parental support. Trust subscale was made up of questions related to parents respecting their child's opinions, parental acceptance, trust, and understanding. Alienation questions concerned being ashamed around parents, getting easily upset and angry with parents, and lack of parental understanding. The higher the score on each subscale, the greater that attribute, and for total IPPA-R score, the higher the score the stronger the relationship.

Statistical analysis

Statistical analyses were performed using SPSS version 23.0 software (IBM, Armonk, NY USA). Descriptive statistics were used to detail demographics (sex, age, grade, weight group), and BSMU, BESAA, EAT-26, IPPA-R, and RQ. T-tests were used to analyze the number of SM accounts classified by sex, grade level, and weight group. Chi-square (X^2) was used to analyze the association among BSMU and weight group, body-esteem, and inappropriate eating behaviors, and to analyze the association between resilience and attachment, and body-esteem, and inappropriate eating behaviors.

Multivariate logistic regression analysis was performed at a 5% level of significance. The associations between demographic data (sex and age), BSMU, IPPA-R, and RQ and outcomes such as weight status, body esteem, eating problems were analyzed using a multivariate logistic regression model. Adjusted Odd Ratio (AOR) was presented for determining the impact of those factors and outcome, while body weight was analyzed by linear regression as a continuous outcome. The model was used to find the association between demographic characteristics, BSMU, resilience, attachment, and eating-related problems.

RESULTS

Demographics, eating-related problems, resilience, and attachment

Out of the 495 participants, 307 were female (62%), and the mean age of all respondents was 17.01 (SD = 0.92). Participants were grouped into under-, average,

and overweight, resulting in a total of 140 overweight (28.3%) and 49 underweight (9.9%). The BESAA found 66 participants (13.3%) had low body-esteem. There were 56 participants (11.3%) in the EAT-26 high-risk group. There was a greater percentage of females admitting to binging (47.6% and 41.0%), purging (6.2% and 5.9%), and laxatives/drug use, (16.9% and 5.3%) at p-value < 0.001. A greater percentage of males excessive exercised (12.2% and 2.6%; p-value < 0.001) and had 9-kilogram weight fluctuations (19.1% and 10.7%; p-value = 0.009). One hundred and eighty-two participants (36.8%) were in low total RQ group. Mean score on the IPPA-R was 58.45 (SD = 5.14). (Table 1)

Body image focused social media usage and association with eating-related problems

Female participants had a greater number of SM accounts (3.20 and 2.83), spent more time on SM (5.38 and 3.82 hours/day), and their overall BSMU score was higher than males (6.84 and 5.31 all at p-value < 0.001). The mean number of SM accounts and time spent on SM were 3.07 (SD = 1.20) and 4.79 hours/day (SD = 4.35) respectively (Table 1). BSMU mean scores of the overweight group (5.78; SD = 2.87) were significantly lower than average weight group (6.48; SD = 3.12) at p-value = 0.024, but not for the under- and the average weight group. Mean BSMU was higher for the EAT-26 high-risk group (7.09 and 61.5) at p-value = 0.029 and for those admitting to binging and laxative/drug use (6.87 and 5.76; 7.77 and 6.04; at p-value < 0.001) and purging (7.40 and 6.18) at p-value = 0.33. Those with binging behaviors spent more time on SM (mean = 5.36 hours) than those who did not (4.32 hours) at p-value = 0.008. Those admitting to laxative/drug use spent more time on SM (mean = 6.50 hours) than those who did not (4.54) at p-value = 0.008 (Table 2).

Association among resilience, attachment, and eating-related problems

Participants in lower RQ group (both total RQ and every subscale) tended to significantly have low body-esteem. Moreover, lower-than-normal willpower scores tended to be in the binging, purging, and laxative/drug use groups (p-value < 0.001, p-value = 0.046 and 0.015, respectively). Lower-than-normal RQ problem-solving subscale scores were mostly in the laxative/drug use group at p-value = 0.005, while those with lower-than-normal total RQ scores tended to be in the binging and laxative/drug use groups at p-value = 0.005 and p-value < 0.001 (Table 3). As for attachment, higher parental alienation and IPPA-R total scores tended to be in the low body-esteem group at p-value = 0.044 and 0.024 respectively (Table 2). Moreover, higher IPPA-R total scores tended to be in the purging group at p-value = 0.026 (Table 3).

Regression analysis for BSMU, resilience, attachment, and eating-related problems

The results found that increased time spent on SM is associated with being in the over-weight group (AOR = 1.07 (1.02-1.12)). However, the BSMU and total IPPA-R scores were associated more with a decreased risk for being in over-weight group (AOR = 0.93 (0.86-0.99) and 0.62 (039-099), respectively). The number of SM accounts is not associated with weight group and low BESAA. Additionally, Resilience (RQ) and IPPA-R are not associated with BESAA. (Table 4)

The higher number of SM accounts is associated with lower risk of purging (AOR 0.62, CI 0.42-0.93), while both time on SM and BMSU scores are associated with higher risk of binging (AOR 1.71, CI 1.14-2.56 and AOR 1.14, CI 1.06-1.22, respectively). In addition to binging, BMSU scores are also associated with being in the EAT-26 high-risk group (AOR 1.14, CI 1.03-1.27), risk of purging (AOR 1.20, CI 1.04-1.40), and risk of drug/laxative use (AOR 1.21, CI 1.09-1.34). While participants who are in high willpower RQ subscale and normal total RQ groups tended to have lower risk of binging (AOR = 0.18 (0.03-0.98) and 0.45 (0.21-0.97), respectively). Participants who are in high emotion RQ subscale tended to have higher risk for excessive exercise (AOR = 16.6 (1.63-169.1)). However, IPPA-R is not associated with any of those factors when analyzed by regression analysis. (Table 5)

DISCUSSION

The result of this study found that having multiple social media accounts, spending more time on SM and having higher BSMU was associated with an increased risk of inappropriate eating attitudes and inappropriate eating behaviors such as binging, purging, using laxative drugs. These findings supported our aims to find that not just overall social media usage, but specifically body-image focused social media usage which have effects on eating-related problems. Moreover, the study found that having higher resilience had a lower risk of binging. However, higher emotional stability (which is a subscale of resilience) associated with an increased risk of overexercise.

In this study, we found that 9.9% of participants were underweight and 28.3% were overweight. While the prevalence of overweight students was similar to a previous study in Thailand, which reported 29.3%

TABLE 1. Descriptive analysis of demographics, eating-related problems, resilience, and attachment.

			Total n = 495 n (%)/mean (SD)	Male n = 188 (38) n (%)/mean (SD)	Female n = 307 (62) n (%)/mean (SD)	*X2/t*	*P*
Number SM Accounts[a]			3.07 (1.20)	2.83 (1.24)	3.20 (1.15)	-3.392	<0.001***
Time on SM[a] (hours)			4.79 (4.35)	3.82 (4.29)	5.38 (4.28)	-3.923	<0.001***
BSMU Total[a]			6.26 (3.02)	5.31 (2.86)	6.84 (2.98)	-5.641	<0.001***
Weight groups	*Average Weight*		306 (61.8)	99 (52.7)	207 (67.4)		
	Underweight		49 (9.9)	25 (13.3)	24 (7.8)	11.206	0.004**
	Overweight		140 (28.3)	64 (34.0)	76 (24.8)		
BESAA	*Low*		66 (13.3)	14 (7.4)	52 (16.9)	9.09	0.003**
	Med-High		429 (86.7)	174 (92.6)	255 (83.1)		
EAT-26	*Low-Risk of attitude*		439 (88.7)	163 (86.7)	276 (89.9)	1.19	0.275
	High-Risk of attitude		56 (11.3)	25 (13.3)	31 (10.1)		
Inappropriate Eating	*Binging*	*Y*	223 (45.1)	77 (41.0)	146 (47.6)	2.051	0.152
		N	272 (54.9)	111 (59.0)	161 (52.4)		
	Purging	*Y*	30 (6.1)	11 (5.9)	19 (6.2)	0.023	0.878
		N	465 (93.9)	177 (94.1)	288 (93.8)		
	Laxatives, etc.	*Y*	62 (12.5)	10 (5.3)	52 (16.9)	14.367	<0.001***
		N	433 (87.5)	178 (94.7)	255 (83.1)		
	Excessive	*Y*	31 (6.3)	23 (12.2)	8 (2.6)	18.412	<0.001***
	exercise	*N*	464 (93.7)	165 (87.8)	299 (97.4)		
	lost/gained	*Y*	69 (13.9)	36 (19.1)	33 (10.7)	6.858	0.009**
	> 9 kg	*N*	426 (86.1)	152 (80.9)	274 (89.3)		
RQ	*Emotional*	*Low*	183 (37.0)	60 (32.8)	123 (67.2)		
	Stability	*Norm*	272 (54.9)	106 39.0)	166 (61.0)	7.128	0.028*
		High	40 (8.1)	22 (55.0)	18 (45.0)		
	Willpower	*Low*	153 (30.9)	56 (36.6)	97 (63.4)		
		Norm	322 (65.1)	119 (37.0)	203 (63.0)	6.466	0.039*
		High	20 (4.0)	13 (65.0)	7 (35.0)		
	Problem	*Low*	115 (23.2)	39 (33.9)	76 (66.1)	8.339	0.015*
	Solving	*Norm*	339 (68.5)	125 (36.9)	214 (63.1)		
		High	41 (8.3)	24 (58.5)	17 (41.5)		
	Total	*Low*	182 (36.8)	59 (32.4)	123 (67.6)		
		Norm	271 (54.7)	102 (37.6)	169 (62.4)	14.743	<0.001***
		High	42 (8.5)	27 (64.3)	15 (35.7)		
IPPA-R[a]	*Communication*		15.33 (3.17)	14.93 (3.07)	15.57 (3.21)	-2.185	0.029*
	Trust		19.17 (3.33)	18.87 (3.53)	19.34 (3.19)	-1.527	0.127
	Alienation		14.42 (2.79)	14.52 (2.80)	14.35 (2.78)	0.655	0.512
	Total Score		58.45 (5.14)	57.79 (4.95)	58.85 (5.22)	-2.223	0.027*

Abbreviations: SM = social media, BSMU = body image focused social media usage, *BESAA* = Body Esteem Scale for Adolescents and Adults, *EAT-26* = Eating Attitudes Test-26 item, kg = kilograms, *RQ* = Resilience Quotient, *IPPA-R* = Inventory of Parent and Peer Attachment – Revised, a = mean (SD), * = *p-value* < 0.05, ** = *p-value* < 0.01, *** = *p-value* < 0.001

TABLE 2. Analysis of body image focused social media usage, resilience, parental attachment and association with weight group, and body-esteem

			WT Group						BESAA				
			Average weight	Underweight			Overweight		Low	Med-High			
			n (%)/mean (SD)		*X2/t*	*p*[c]	n (%)/mean (SD)	*X2/t*	*p*[d]	n (%)/mean (SD)		*X2/t*	*p*
SM accounts[a]			3.06 (1.16)	2.29 (1.08)	-0.794	0.428	3.11 (1.31)	-0.449	0.654	2.92 (1.21)	3.08 (1.20)	-0.994	0.321
Time on SM[a]			4.62 (4.10)	4.29 (4.57)	-0.515	0.607	5.34 (4.76)	-1.618	0.106	5.70 (4.42)	4.65 (4.33)	1.835	0.067
BSMU[a]			6.48 (3.12)	6.24 (2.70)	-0.499	0.618	5.78 (2.87)	2.259	0.024*	6.59 (3.27)	6.21 (2.98)	0.959	0.338
RQ[b]	*Emotional*	*low*	112 (36.6)	23 (46.9)	2.979	0.561	48 (34.3)	0.521	0.771	38 (57.6)	145 (33.8)	13.918	< 0.001***
	stability	*normal*	171 (55.9)	22 (44.9)			79 (56.4)			24 (36.4)	248 (57.8)		
		high	23 (7.5)	4 (8.2)			13 (9.3)			4 (6.1)	36 (8.4)		
	Willpower	*low*	90 (29.4)	19 (38.8)	1.834	0.4	44 (31.4)	2.774	0.25	34 (51.5)	119 (27.7)	15.727	< 0.001***
		normal	206 (67.3)	29 (59.2)			87 (62.1)			29 (43.9)	293 (68.3)		
		high	10 (3.3)	1 (2.0)			9 (6.4)			3 (4.5)	17 (4.0)		
	Problem	*low*	70 (22.9)	14 (28.6)	2.146	0.342	31 (22.1)	4.588	0.101	24 (36.4)	91 (21.2)	8.879	0.012*
	solving	*normal*	217 (70.9)	30 (61.2)			92 (65.7)			40 (60.6)	299 (69.7)		
		high	19 (6.2)	5 (10.2)			17 (12.1)			2 (3.0)	39 (9.1)		
	RQ score	*low*	111 (36.3)	23 (46.9)	4.871	0.887	48 (34.3)	1.931	0.381	39 (59.1)	143 (33.3)	16.415	< 0.001***
		normal	174 (56.9)	20 (40.8)			77 (55.0)			24 (36.4)	247 (57.6)		
		high	21 (6.9)	6 (12.2)			15 (10.7)			3 (4.5)	39 (9.1)		
IPPA-R[a]	*Communication*		15.52 (3.03)	14.94 (3.72)	-1.199	0.231	15.05 (3.26)	1.473	0.141	15.59 (3.17)	15.29 (3.17)	0.725	0.469
	Trust		19.33 (3.10)	18.88 (3.91)	-0.913	0.362	18.90 (3.58)	1.294	0.196	19.18 (3.42)	19.16 (3.32)	0.048	0.962
	Alienation		14.33 (2.70)	14.53 (3.19)	0.47	0.638	14.56 (2.85)	-0.835	0.404	15.06 (2.62)	14.31 (2.81)	2.022	0.044*
	Total		58.60 (5.22)	57.82 (6.07)	0.959	0.338	58.32 (4.61)	0.551	0.582	59.77 (4.38)	58.24 (5.22)	2.261	0.024*

Abbreviations: BESAA = Body Esteem Scale for Adolescents and Adults, SM = social media, BSMU = body image focused social media usage, RQ = resilience quotient, *IPPA-R* = Inventory of Parent and Peer Attachment, a = mean (SD) and independent t-test was used to analyze, b = n (%) and chi-square test was used to analyze, c = statistically significant between frequencies or means of participants in underweight group and average weight group, d = statistically significant between frequencies or means of participants in overweigh, * = *p-value* < 0.05, ** = *p-value* < 0.01, *** = *p-value* < 0.001

TABLE 3. Analysis of body image focused social media usage, resilience, attachment and association with inappropriate eating attitudes and behaviors (EAT-26)

			Inappropriate eating attitudes				Inappropriate Eating Behaviors																	
			Low Risk	High Risk			Binging				Purging				Laxative/Other Drug Use				Excessive Exercise				lost/gained weight > 9 kg/6 months			
							"No"	"Yes"			"No"	"Yes"			"No"	"Yes"			"No"	"Yes"			"No"	"Yes"		
			N (%)/mean (SD)		X^2/t	*p*	mean (SD)		X^2/t	p	mean (SD)		X^2/t	p	mean (SD)		X^2/t	p	mean (SD)		X^2/t	p	mean (SD)		X^2/t	p
SM Accounts[a]			3.04 (1.22)	3.25 (1.03)	-1.26	0.209	3.03 (1.20)	3.10 (1.19)	-0.64	0.523	3.08 (2.73)	2.73 (0.98)	1.547	0.123	3.03 (1.20)	3.31 (1.14)	-1.73	0.084	3.07 (1.20)	2.87 (1.15)	0.911	0.363	3.09 (1.20)	2.86 (1.14)	1.539	0.12
Time on SM[a] (hours)			4.85 (4.37)	4.30 (4.16)	0.879	0.380	4.32 (4.43)	5.36 (4.53)	-2.665	0.008*	4.81 (4.39)	4.40 (3.77)	0.571	0.617	4.54 (4.12)	6.50 (5.44)	-2.73	0.008*	4.69 (4.22)	6.23 (5.87)	-1.432	0.162	4.78 (4.29)	4.80 (4.71)	-0.025	0.98
BSMU[a]			6.15 (2.96)	7.09 (3.36)	-2.19	0.029*	5.76 (2.85)	6.87 (3.13)	-4.109	<0.001***	6.18 (3.06)	7.40 (2.20)	-2.14	0.033*	6.04 (3.05)	7.77 (2.34)	-4.3	<0.001***	6.30 (3.01)	5.58 (2.90)	1.291	0.197	6.31 (3.06)	5.94 (2.78)	0.938	0.35
RQ[b]	*Emotional*	*low*	161 (36.7)	22 (39.3)	2.139	0.343	94 (34.6)	89 (39.9)	2.677	0.262	167 (35.9)	16 (53.3)	3.988	0.136	145 (33.5)	38 (61.3)	18.3	<0.001***	174 (37.5)	9 (29.0)	3.215	0.200	152 (35.7)	31 (44.9)	4.518	0.1
	stability	*norm*	245 (55.8)	27 (48.2)			152 (55.9)	120 (53.8)			259 (55.7)	13 (43.3)			250 (57.7)	22 (35.5)			255 (55.0)	17 (54.8)			242 (56.8)	30 (43.5)		
		high	33 (7.5)	7 (12.5)			26 (9.6)	14 (6.3)			39 (8.4)	1 (3.3)			38 (8.8)	2 (3.2)			35 (7.5)	5 (16.1)			32 (7.5)	8 (11.6)		
	Willpower	*low*	135 (30.8)	18 (32.1)	1.178	0.424	71 (26.1)	82 (36.8)	14.9	<0.001***	138 (29.7)	15 (50.0)	6.168	0.046*	124 (28.6)	29 (46.8)	8.356	0.015*	146 (31.5)	7 (22.6)	1.221	0.543	134 (31.5)	19 (27.5)	0.805	0.67
		norm	288 (65.6)	34 (60.7)			183 (67.3)	139 (62.3)			307 (66.0)	15 (50.0)			291 (67.2)	31 (50.0)			299 (64.4)	23 (74.2)			274 (64.3)	48 (69.6)		
		high	16 (3.6)	4 (7.1)			18 (6.6)	2 (0.9)			20 (4.3)	0 (0.0)			18 (4.2)	2 (3.2)			19 (4.1)	1 (3.2)			18 (4.2)	2 (2.9)		
	Problem	*low*	13 (23.5)	12 (21.4)	0.133	0.936	56 (20.6)	59 (26.5)	8.906	0.120	105 (22.6)	10 (33.3)	4.063	0.131	91 (21.0)	24 (38.7)	10.62	0.005*	107 (23.1)	8 (25.8)	0.248	0.883	100 (23.5)	15 (21.7)	0.256	0.88
	solving	*norm*	300 (68.3)	39 (69.6)			185 (68.0)	154 (69.1)			319 (68.6)	20 (66.7)			303 (70.0)	36 (58.1)			319 (68.8)	20 (64.5)			290 (68.1)	49 (71.0)		
		high	36 (8.2)	5 (8.9)			31 (11.4)	10 (4.5)			41 (8.8)	0 (0.0)			39 (9.0)	2 (3.2)			3 (8.2)	3 (9.7)			36 (8.5)	5 (7.2)		
	Total	*low*	160 (36.4)	22 (39.3)	3.411	0.182	85 (31.3)	97 (43.5)	10.58	0.005*	165 (35.5)	17 (56.7)	5.707	0.058	143 (33.0)	39 (62.9)	21.12	<0.001***	173 (37.3)	9 (29.0)	0.852	0.653	156 (36.6)	26 (37.7)	0.376	0.83
		norm	245 (55.8)	26 (46.4)			157 (57.7)	114 (51.1)			259 (55.7)	12 (40.0)			250 (57.7)	21 (33.9)			252 (54.3)	19(61.3)			235 (55.2)	36 (52.2)		
		high	34 (7.7)	8 (14.3)			30 (11.0)	12 (5.4)			41 (8.8)	1 (3.3)			40 (9.2)	2 (3.2)			39 (8.4)	3 (9.7)			35 (8.2)	7(10.1)		
IPPA-R[b]	*Communication*		15.33 (3.12)	15.27 (3.58)	0.149	0.882	15.33 (3.42)	15.33 (2.84)	-0.001	1.000	15.30 (3.21)	15.70 (2.55)	-0.66	0.507	15.33 (3.23)	15.34 (2.74)	-0.03	0.976	15.32 (3.14)	15.48 (3.62)	-0.284	0.777	15.40 (3.14)	14.88 (3.36)	1.253	0.21
	Trust		19.21 (3.31)	18.91 (3.49)	0.604	0.546	19.23 (3.45)	19.09 (3.17)	0.475	0.635	19.12 (3.37)	19.77 (2.61)	-1.03	0.306	19.16 (3.34)	19.21 (3.26)	-0.12	0.907	19.14 (3.33)	19.48 (3.36)	-0.553	0.580	19.19 (3.29)	19.01 (3.59)	0.49	0.69
	Alienation		14.26 (2.75)	5.64 (2.86)	-3.53	<0.001***	14.26 (2.92)	14.61 (2.61)	-1.367	0.172	14.37 (2.80)	15.20 (2.50)	-1.59	0.112	14.37 (2.81)	14.71 (2.62)	-0.89	0.376	14.43 (2.81)	14.23 (2.47)	0.392	0.695	14.39 (2.76)	14.61 (2.96)	0.613	0.54
	Total		58.33 (5.09)	59.36 (5.47)	-1.41	0.159	58.29 (5.31)	58.64 (4.93)	-0.763	0.446	58.32 (5.14)	60.47 (4.84)	-2.23	0.026*	58.35 (5.16)	59.10 (4.96)	-1.07	0.287	58.45 (5.16)	58.45 (4.97)	-0.006	0.995	58.52 (5.05)	58.00 (5.68)	0.213	0.44

Abbreviations: SM = social media, BSMU = body image focused social media usage, *RQ* = Resilience Quotient, a = mean (SD) and independent t-test was used to analyze, b = n (%) and chi-square test was used to analyze, * = *p-value* < 0.05, ** = *p-value* < 0.01, *** = *p-value* < 0.001

TABLE 4. Multivariate logistic regression testing association between BSMU, resilience, attachment and weight group, and body esteem (BESAA)

			WT Group Under WT		Over WT		Low *BESAA*	
			AOR (CI)	*P*	*AOR (CI)*	*P*	*AOR (CI)*	*P*
SM Accounts			0.99 (0.76-1.31)	0.964	1.15 (0.96-1.37)	0.119	0.79 (0.60-1.03)	0.078
Time on SM			1.01 (0.93-1.08)	0.900	1.07 (1.02-1.12)	0.007**	1.03 (0.96-1.11)	0.422
BSMU			1.00 (0.89-1.12)	0.989	0.93 (0.86-0.99)	0.035*	1.05 (0.94-1.17)	0.387
RQ	*Emotional stability*	*low*	Ref		Ref		Ref	
		normal	0.50 (0.07-3.48)	0.485	1.13 (0.32-3.97)	0.846	0.52 (0.19-1.43)	0.206
		high	0.83 (0.30-2.28)	0.715	0.98 (0.49-1.98)	0.976	2.02 (0.27-14.7)	0.489
	Willpower	*low*	Ref		Ref		Ref	
		normal	0.23 (0.02-2.55)	0.230	0.78 (0.21-2.83)	0.703	0.48 (0.22-1.07)	0.074
		high	0.74 (0.31-1.75)	0.491	0.69 (0.38-1.28)	0.242	5.68 (0.59-54.1)	0.131
	Problem solving	*low*	Ref		Ref		Ref	
		normal	1.36 (0.28-6.57)	0.700	1.74 (0.59-5.13)	0.314	0.91 (0.42-1.94)	0.799
		high	0.91 (0.39-2.09)	0.818	0.99 (0.54-1.82)	0.982	0.11 (0.01-1.11)	0.061
	RQ Score	*low*	Ref		Ref		Ref	
		normal	2.51 (0.29-21.4)	0.399	1.25 (0.28-5.66)	0.769	0.71 (0.22-2.31)	0.569
		high	0.81 (0.24-2.79)	0.741	1.37 (0.58-3.25)	0.471	0.29 (0.02-4.03)	0.362
IPPA-R	*Communication*		1.37 (0.66-2.84)	0.392	1.69 (0.98-2.67)	0.058	0.99 (0.49-2.03)	0.990
	Trust		1.49 (0.69-3.22)	0.303	1.69 (1.01-2.84)	0.051	0.99 (0.48-2.08)	0.987
	Alienation		1.46 (0.71-3.03)	0.305	1.57 (0.96-2.57)	0.071	0.82 (0.41-1.63)	0.570
	Total		0.70 (0.35-1.39)	0.309	0.62 (0.39-0.99)	0.046*	1.08 (0.56-2.08)	0.828

Abbreviations: SM Accts = social media accounts, Tm on SM = time on social media, BSMU = body image focused social media usage, *RQ* = Resilience Quotient, Emo Stab = emotional stability, Prob Sol = problem solving, Comms = communication, Alien = alienation; Data were adjusted for sex and age; * = *p-value* < 0.05, ** = *p-value* < 0.01, *** = *p-value* < 0.001

overweight participants, the prevalence of underweight students was unexpectedly high. Our study found a rate two times greater than previous studies, which reported only 5.2% of participants as underweight.[46] Further investigation is necessary to understand the reasons behind this discrepancy. One possible explanation could be the demographic differences between our sample and previous studies, as our sample had a higher mean age. Our study found that participants had a mean of 3.07 SM accounts, which is lower than previous studies.[36,47] This could be due to the difference in ages of the respondents as studies have shown that the number of SM accounts increases with age (up to age 34).[48] However, the mean number of hours spent on SM was higher, at 4.79 hours/day, consistent with other studies reporting adolescents spending 3–5 hours/day on SM.[1,49,50] Our study also found that females had higher body image-related SM activities than males. which aligns with previous research on self-objectification.[51,52] However, the COVID-19 pandemic and resulting regulations have led to an increased reliance on technology for social interactions and entertainment, which could have influenced the results of this study. Previous studies have shown an increase in social media use during the pandemic, particularly among adolescents.[53,54] In addition, the pandemic might effect on various mental health problems among adolescents which might affect the results of eating-related problems in our study.

The current study found a lower prevalence of low body-esteem (13.3%) compared to previous study in Western countries, which have reported up to 27% of

TABLE 5. Multivariate logistic regression testing association between BSMU, resilience, attachment and inappropriate eating attitudes/behaviors (EAT-26)

			High risk *eating attitudes*		Binging		Purging		Drug/Laxative use E		xcessive Exercise		Weight Fluctuation	
			AOR (CI)	*p*	*AOR (CI)*	*p*	*AOR (CI)*	*p*	*AOR (CI)*	*p*	*AOR (CI)*	*p*	*AOR (CI)*	*p*
SM Accts			1.10 (0.85-1.43)	0.477	0.98 (0.83-1.15)	0.783	0.62 (0.42-0.93)	0.020*	1.05 (0.82-1.34)	0.723	0.98 (0.68-1.40)	0.905	0.86 (0.68-1.10)	0.234
Time on SM			0.76 (0.40-1.45)	0.408	1.71 (1.14-2.56)	0.010*	0.59 (0.25-1.37)	0.217	1.01 (0.53-1.93)	0.997	2.08 (0.82-5.26)	0.120	1.17 (0.65-2.09)	0.599
BSMU			1.14 (1.03-1.27)	0.015*	1.14 (1.06-1.22)	<0.001***	1.20 (1.04-1.40)	0.015*	1.21 (1.09-1.34)	0.001**	1.01 (0.87-1.17)	0.881	0.99 (0.91-1.09)	0.907
RQ	*Emotional*	*low*	Ref		Ref		Ref		Ref		Ref		Ref	
	Stability	*normal*	0.88 (0.34-2.30)	0.800	1.67 (0.89-3.14)	0.110	0.93 (0.29-2.97)	0.906	0.66 (2.73-1.59)	0.352	1.60 (0.31-8.22)	0.572	0.47 (0.19-1.15)	0.099
		high	1.19 (0.21-6.82)	0.841	2.05 (0.63-6.65)	0.233	0.34 (0.01-13.6)	0.565	0.80 (0.10-6.22)	0.833	16.6 (1.63-169.1)	0.018*	1.01 (0.22-4.59)	0.991
	Willpower	*low*	Ref		Ref		Ref		Ref		Ref		Ref	
		normal	1.11 (0.47-2.61)	0.819	0.93 (0.54-1.57)	0.776	0.69 (0.24-1.97)	0.493	0.88 (0.41-1.90)	0.749	2.30 (0.72-7.39)	0.162	1.46 (0.67-3.17)	0.337
		high	1.88 (0.32-11.03)	0.485	0.18 (0.03-0.98)	0.047*	0.92 (0.54-1.57)	0.998	3.77 (0.28-51.5)	0.320	0.69 (0.05-9.95)	0.791	0.76 (0.12-4.82)	0.775
	Problem	*low*	Ref		Ref		Ref		Ref		Ref		Ref	
	Solving	*normal*	1.08 (0.46-2.54)	0.854	1.03 (0.60-1.74)	0.926	0.86 (0.33-2.27)	0.757	0.69 (0.33-1.40)	0.302	0.60 (0.19-1.84)	0.372	1.14 (0.53-2.46)	0.731
		high	0.75 (0.16-3.59)	0.715	0.64 (0.22-1.82)	0.397	0.41 (0.09-1.68)	0.997	0.27 (0.02-3.19)	0.297	0.67 (0.11-4.13)	0.668	0.77 (0.18-3.26)	0.718
	Total	*low*	Ref		Ref		Ref		Ref		Ref		Ref	
		normal	0.74 (0.23-2.45)	0.626	0.45 (0.21-0.97)	0.041*	0.61 (0.15-2.46)	0.484	0.47 (0.16-1.37)	0.166	0.57 (0.09-3.54)	0.548	1.11 (0.38-3.26)	0.845
		high	1.45(0.19-10.91)	0.710	0.41 (0.09-1.68)	0.214	2.56 (0.53-127.7)	0.631	0.32 (0.03-3.89)	0.369	0.107 (0.01-1.90)	0.128	1.20 (0.18-7.87)	0.849
IPPA-R	*Communication*		0.78 (0.39-1.52)	0.465	0.94 (0.60-1.47)	0.785	0.96 (0.38-2.41)	0.935	1.87 (0.92-3.77)	0.082	0.47 (0.17-1.29)	0.146	0.99 (0.53-1.87)	0.996
	Trust		0.83 (0.41-1.68)	0.599	0.90 (0.56-1.44)	0.670	1.06 (0.39-2.82)	0.909	2.06 (0.99-4.29)	0.054	0.46 (0.16-1.33)	0.155	1.08 (0.56-2.10)	0.815
	Alienation		0.64 (0.33-1.26)	0.195	0.89 (0.57-1.39)	0.608	0.78 (0.31-1.98)	0.604	1.79 (0.90-3.57)	0.096	0.49 (0.18-1.33)	0.161	1.05 (0.56-1.96)	0.874
	Total		1.26 (0.67-2.37)	0.474	1.09 (0.72-1.66)	0.689	1.09 (4.56-2.59)	0.846	0.55 (0.29-1.06)	0.076	2.06 (0.79-5.35)	0.134	0.95 (0.53-1.72)	0.867

Abbreviations: SM Accts = social media accounts, Tm on SM = time on social media, BSMU = body image focused social media usage, *RQ* = Resilience Quotient; Data were adjusted for sex and age; * = *p-value* < 0.05, ** =*p-value* < 0.01, *** = *p-value* < 0.001

adolescents having body image dissatisfaction.[55] Cross-regional differences in the ideal female figure and body dissatisfaction have been reported, with Americans exhibiting greater body dissatisfaction.[56] One study found that the ideal body weight is slimmer in Westernized countries as opposed to less socioeconomically developed or traditional societies.[57] These finding may explain why this study which did not find an association between SM usage, resilience, attachment to parent, and body-esteem. This study also found that 11.3% of the participants had inappropriate eating attitudes, with a comparable rate between male and female participants (13.3% and 10.1%, respectively). These results are consistent with previous studies reporting that eating disorders affect 9 - 10% of the world population[58,59], with no gender differences in frequency of disordered weight control and overall prevalence of eating disorders study in Singapore. Further studies are required to understand effect of culture and gender specific factors on increase prevalence of male eating-related problems in Asia.[60]

The study found that participant in the overweight group spent the most time on SM, which is consistent with previous studies linking greater time spent on SM with higher body weight.[61] However, overweight participants in this study conducted less body image focused social media activities, which is supported by an Italian study that found women dissatisfied with their body image posted fewer selfies.[61] These results may be attributed to overweight stigma and are consistent with previous study linking higher BMI with greater body dissatisfaction.[62] In addition, participants spending more time on SM in the current study tended to be at-risk for binging, and those with higher BSMU scores had inappropriate eating attitudes and were at risk for binging, purging, and laxative/drug use. This is consistent with previous research showing that elevated appearance exposure on Facebook was significantly correlated with weight dissatisfaction, drive for thinness, thin ideal internalization, and self-objectification. Body image dissatisfaction has been shown to lead to inappropriate eating behaviors[63], so it becomes a viscous cycle.

Higher resilience was associated with a lower risk for problematic eating behaviors in the current study, consistent with a previous research.[64] Greater resilience has been shown to help adolescent cope with online risks and is associated with lower incidence of eating problems.[65] Lower resilience is associated with a higher likelihood of demonstrating a variety of mental health problems, including eating disorders.[66] Higher resilience may have "emotion-regulatory benefits" that mitigate the development of disordered eating behaviors[67], and lead to improved body image and less body image dissatisfaction.[20]

Our study revealed that higher parental attachment was associated with lower risk of being in the overweight group. These findings are consistent with previous research that had shown weaker adolescent-parent communication wo be associated with unhealthy weight control behaviors, body dissatisfaction, and low self-esteem.[68,69] Moreover, positive relationships with parents have been found to be significant predictors of body image satisfaction.[62] Family cohesion has also been shown to be correlated with resilience, which is associated with emotional regulation and can mitigate the development of disordered eating behaviors.[70] A healthy family environment and positive communication have been found to be significant protective factors against eating problems.[29]

The study suggest that parents and caregivers should monitor their children's social media usage and educate them on how body-related content can affect their body-esteem. It also suggests that content creators should be made aware of the unintended effects of unrealistic body image content on adolescents. Schools should implement training programs to increase resilience in early years so that adolescents have established healthy eating habits and do not rely on social media for guidance. Programs to strengthen the adolescent-parent relationship can help build the child-parent bond, which can assist with both body image issues and potential eating problems.

Strengths and limitations

This is a few study which aimed to investigate the relationship between various social media activities centered on body image, resilience, parental attachment, and eating-related problems. However there are a number of limitations in this study. Firstly, this study was cross-sectional descriptive research, therefore a causal relationship could not be concluded. Secondly, due to the COVID-19 situation, many of randomized schools were unwilling to participate in this study, so purposive sampling was used to choose three schools to be included in this study. In addition, classrooms and students were selected based on teacher convenience, which may have introduced potential bias. Thirdly, this study relied on respondent self-report which can result in report bias. Fourthly, the low Cronbach's alpha score of BSMU questionnaire indicates that the reliability of the scale may be limited. However, the BSMU questionnaire was developed to measure a complex construct such as body image-related social media use, which may have multiple dimensions. In addition, due to normal behaviors of SM usage which one might do each SM activity with different frequency (such as one might be more likely to click

"like" on pictures or comments, but rarely posting or vice versa). Therefore, these could result in poor Cronbach's alpha values of the questionnaire. Further testing of the BSMU questionnaire in future studies with larger sample sizes to evaluate the psychometric properties of the questionnaire are recommended. Finally, this study was comprised of only students in the educational system in Bangkok, which could not be a good representation of the general population. Finally, the pandemic might have also affected various mental health problems among adolescents,[71] which in turn might have influenced the results of eating-related problems in our study.

CONCLUSION

This study investigates the association between body-image focused social media usage and eating-related problems, as well as the relationships between resilience, attachment, and these problems among high school students. The study highlights the negative impact of social media on body image and eating behaviors and suggests that resilience and adolescent-parent relationship may serve as protective factors against these negative effects.

Declarations

Ethical approval

This study received full approval from the institutional ethical review board of the Faculty of Medicine Ramathibodi Hospital, Mahidol University under the code MURA2020/366. The authors confirm that all the methods were carried out in accordance with relevant guidelines and regulations.

Informed consent

Written informed consent was obtained from all the subjects before answering the questionnaires.

Consent for publication

All participants and authors have approved the publication.

Availability of data and material

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of interest statement

The authors have no conflict of interest relevant to this article.

Authors' contribution

CN, KK, HS and PC conceived and designed the study and acquired the data. CN and KK analyzed and interpreted the data. CN and KK drafted the manuscript. The manuscript was critically revised by KK, HS and PC. CN, KK, HS and PC read and approved the final version of the manuscript.

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Abbreviations

SM = social media
SM Accts = social media accounts
Tm on SM = time on social media
BSMU = body image focused social media usage
RQ = Resilience Quotient
Emo Stab = emotional stability
Prob Sol = problem solving
Comms = communication
Alien = alienation

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