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•ORIGINAL RESEARCH ARTICLE•

Association among Internet Usage, Body Image and Eating Behaviors of Secondary School Students

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Background: Presently, the internet plays a big role in daily life, especially for adolescents. In this age group, they are more concerned about their face and body shape. Despite the numerous studies on the effect traditional media has on body image, very few have focused on the effect of newer forms of media (e.g. online media). And almost none have looked at the relationship between time spent online and body image.

Aim: To study the associations between time spent on the internet, body image satisfaction and eating behaviors of students grades 7 to 12 in the Thai educational system.

Methods: The sample group included 620 students, who were selected using simple random sampling from 6 secondary schools in Bangkok. Data were collected using the Media and Internet use behavior questionnaires, The Body-Esteem Scale for Adolescents and Adults: Thai version (BESAA), Drive for Muscularity Scale (DMS: males only), The Rosenberg Self-Esteem Scale: Thai version, Eating Attitude Test-26: Thai version (EAT-26) and the eating behaviors at risk of obesity questionnaire.

Results: Mean (sd) age of the sample was 15.7 (1.9) years, 246 participants (39.7%) were male and 374 (60.3%) were female. Using the internet and social networks for content related to body image and eating behaviors, was negatively associated with body image satisfaction but positively associated with inappropriate eating attitudes/behaviors, binging, purging, use of laxatives/diuretics and drive for muscularity with respect to behaviors and attitudes, and was associated with eating behaviors that carried a risk for obesity.

Conclusions: Time spent on internet, especially engaged in activities related to self-image, and eating attitudes and behaviors, were associated with a decrease in body image satisfaction and problematic eating behaviors.

Key words: internet, body image, eating disorder, eating behaviors, body dysmorphia, obesity

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1. Introduction

Presently, the internet plays a big role in daily life. According to a survey of behaviors of internet use in Thailand in 2014, the average amount of time using the internet per week for adolescents aged 15 to 19 increased from 4.6 hours a day in 2013 to 7.5 hours a day.[1]

Adolescence is an age of great physical changes, where teenagers are increasingly concerned about their face and body shape. They try to maintain their body shape using many methods, which may also include harmful methods to control weight and body shape. Dissatisfaction with body shape as well as valuing a slim body, and abnormal eating attitudes and behaviors can

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put adolesecents at risk for eating disorders such as anorexia nervosa and bulimia nervosa,[2] which may in turn lead to many health effects ranging from irritable mood, to fatigue, arrhythmia and even death. The mortality rates for anorexia nervosa and bulimia nervosa patients were 4 percent and 3.9 percent respectively.[3]

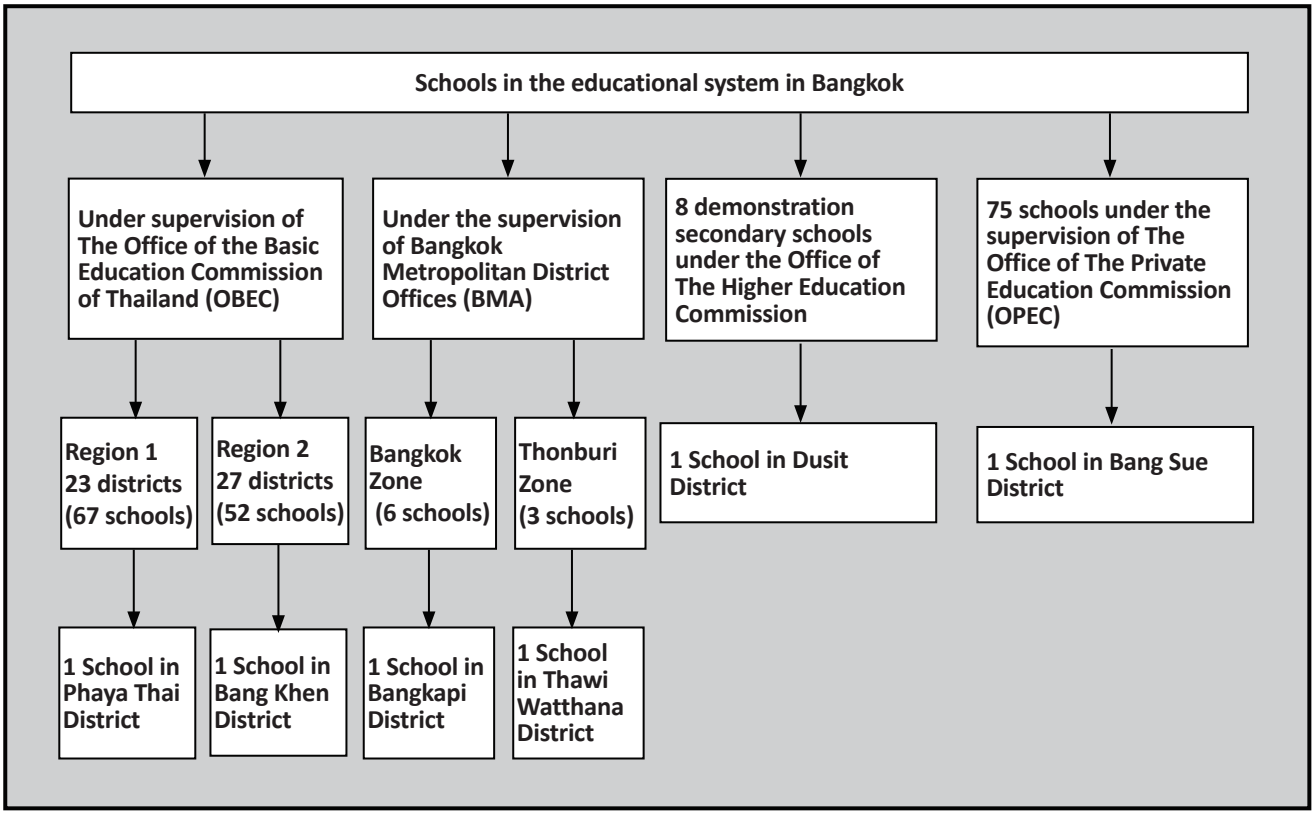
As time goes on popularity of media types has transitioned from more traditional forms (e.g. printed materials, television) to newer forms (e.g. computer games, internet). Most previous research only looked at traditional media forms impact on the body image, and eating attitudes and behaviors of individuals.[4-8] However internet based content is similar to that presented in more traditional forms of media and also contains some features not present in traditional forms such as user interaction and the ability for users to create their own content.[5] Even when examining these forms there are still relatively few studies of internet usage and its impact on eating attitudes and behaviors. Moreover, most of the previous research only studied exposure to contents related to body image, there was no assessment of the amount of time spent on them.[9-11] Therefore this study aims to study the association between time spent on the internet, body image satisfaction and eating behaviors. We hypothesized that time spent on the internet, especially when looking at body image related content, was positively correlated with more abnormal eating attitudes and behaviors and negatively correlated with body image satisfaction. In this study, we use the term ”eating problems” to represent both abnormal eating attitudes and behaviors.

2. Methods

2.1 Participants and procedure

7th through 12th grade students in the Thai educational system in Bangkok were included in this study with the exclusion of those who were unable to read and understand Thai. The sample size was calculated accepting a sampling error at 5%. The result was equivalent to at least 400 participants being included in this study. 100 participants (25% of the calculated sample size) were added to prevent missing data. Stratified random sampling was conducted to sample the schools (see figure 1). Simple random sampling was conducted for sampling of the grades and classrooms in each school. All students in a chosen class were considered as a sample group. The data was collected from 17th to 27th February 2015. Parental consent and student assent was obtained, and the study received full approval from the institutional ethical review board of the Faculty of Medicine Ramathibodi Hospital, Mahidol University.

Figure 1. Stratified random sampling of the schools in the educational system in Bangkok



2.2 Measurement

We developed a questionnaire about media and internet use behaviors. For time spent using media in general, we asked them "In the past week, from Monday to Friday, how many hours a day have you spent time on the following activities?" and "In the past week, from Saturday to Sunday, how many hours a day have you spent time on the following activities?" (see online supplement 1). For activities related to body image, eating attitudes and behaviors we asked them "In the past week, how long did you use the internet for the following activities?" and "In the past week, how much time did you spend using social media, e.g. Facebook, Line, Instagram, or Twitter for the following activities?" (see online supplement 1). Response options for time spent on each activity on the internet were: Never, <30 min, 1 hour, 1.5 hours, 2 hours, 2.5 hours, 3 hours, 3.5 hours, 4 hours, and >4 hours with instructions to specify the amount of time they spent. We calculated the average time spent on media, the internet, and social networks in general and in relation to social media for each day. We asked them "Over the past month, did you buy any of the following products via the internet?" to assess online purchasing of any product related to body image (online supplement 1). Response options for this question was "Yes" or "No". The reliability for internet and social network usage both in general and in relation to body-image, eating attitudes/behaviors were excellent (Cronbach's alpha = 0.74, 0.83, 0.85 and 0.90, respectively)

To determine participant nutritional status, we used the "Nutrition Computation Program" (INMU-NutriStat), which was developed by 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). This program was widely used in a study about the weight status of children and adolescents in Thailand.[12] In this study we used only w/a and w/h because they are relevant to our outcomes. The results for each nutritional status based on w/a and w/h were divided into 3 categories which are below standard (under -1.5 SD), standard (-1.5 to +1.5 SD), and over standard (more than +1.5 SD) compared with norms for Thai children.[12,13]

The Body-Esteem Scale for Adolescents and Adults: (Thai Version) was used to assess body image satisfaction. The scale consists of 23 questions about ones physical body (online supplement 2). Response options for each item were never agree=0, hardly agree=1, sometimes agree=2, often agree=3, and always agree=4. The sum scores were divided into 3 categories: low satisfaction (sum scores=0.0-30.6), moderate satisfaction (sum scores=30.7-61.3), and high satisfaction (sum scores=61.4-92.0). The reliability for this scale was excellent (Cronbach's alpha=0.9).[14]

To measure the drive for muscularity in male participants, we translated the Drive for Muscularity Scale into Thai (online supplement 2).[15] This questionnaire consisted of 15 items about behaviors (item numbers 2, 3, 4, 5, 6, 8, 10, 12) and attitudes (item numbers 1, 7, 9, 11, 13, 14, 15) related to drive for muscularity. Response options for each item were "always"=1, "every so often"=2, "often"=3, "sometimes"=4, "hardly"=5, "never"=6, "not known"=7. We used the same process to calculate the drive for muscularity score as that used with the original questionnaire. A higher score indicates less drive for muscularity. Lower sum scores represent higher satisfaction in ones muscularity. We tested the translated version of the scale and adapted it according to feedback from participants, then further discussed the scale with child and adolescent psychiatrists who had experience in this area. The reliability for the whole scale, as well as behaviors and attitudes sections were excellent (Cronbach's alpha=0.85, 0.96 and 0.84, respectively).

To assess self-esteem, the Thai version of the Rosenberg self-esteem scale was used.[16] The questionnaire consisted of 10 questions (online supplement 2). Response options for items 1, 3, 4, 7, 8, 10 were "absolutely agree"=4, "agree"=3, "disagree"=2, and "absolutely disagree"=1. The remaining items were scored in reverse direction. Lower sum scores represented lower self-esteem. The reliability of the scale was excellent (Cronbach's alpha=0.86).

To measure eating attitudes and behaviors, the Thai version of the Eating Attitudes and Behaviors questionnaire (EAT-26) was used.[17] This questionnaire consists of 2 parts. First, the eating attitudes section which is made up of 26 questions (online supplement 2). Response options for questions 1 through 25 were "rarely or never"=0, "often"=1, "usually"=2, and "always"=3. The answer to the 26th question was scored in the reverse direction. A score of higher than 12 indicated that the respondent may be at risk for an eating disorder. The sensitivity cut off point was 88.6% with specificity at 85.7%. The second section was made up of 5 questions asking about abnormal eating behaviors (e.g. binging, purging, laxative use, use of diuretic drugs, excessive exercise and significant weight loss) in the past 6 months. Response options for questions 1 through 4 were "never"=0, "once a month or less"=1, "2 to 3 times a month"=2, "once a week"=3, "2 to 6 times a week"=4, and "once a day or more"=5. We developed 7 questions to assess eating behavior indicating risk of obesity (online supplement 2). Response options for each question were "never"=1, "rarely"=2, "sometimes"=3, "often"=4, "usually"=5 and "always"=6. A lower total score represents a lower incidence of eating behavior that carries a risk of obesity. The questions were tested and adjusted based on feedback and then were discussed with 3 child and adolescent psychiatrists who have experience in this area. The reliability of the scale was excellent (Cronbach's alpha=0.86).

2.3 Statistical analysis

After excluding repeat surveys, statistical analysis was performed using SPSS version 22.0. Due to variation in completion rate for the questionnaires, we report the sample size and response rate for each question. Descriptive statistics were used to report information about media and internet use behaviors, nutritional status scores of body image satisfaction, abnormal eating attitudes and behaviors, drive for muscularity, and self-esteem. T-test was used to compare average time spent on internet as classified by gender and level of education. Pearson Correlation Coefficient (r), Spearman Rank Correlation Coefficient (ρ) and Chi-square ($\chi 2$) were used to find association between media use behaviors, internet/social network use and nutrition status, body image satisfaction scores, abnormal eating attitudes and behaviors, drive for muscularity and self-esteem scores. Multiple regression analysis were used to examine the associations between internet use, social network use, product purchase via internet, body image satisfaction, abnormal eating attitudes and behaviors, and drive for muscularity. Age and gender were adjusted in model 1, overall use of internet and social media were additionally adjusted in models 2 and 3, respectively. Finally, age, gender and overall use of internet and social media were adjusted in model 4.

3. Results

3.1 Demographic information of study participants

We invited 650 children to participate in the survey, however 30 did not return the survey. There were 620 participants in this study with a mean (sd) age of 15.7 (1.9) years. Despite there being more female participants (n=374; 60.3%) than male, there were no significant gender differences among junior high school level participants. Educational level was uniformly distributed for junior high school (n=302 [48.7%]) and senior high school (n=318 [51.3%]) students. Most participants received a monthly average of money that was lower than 2,000 Baht per month (n=191 [30.8%]) (online supplement 3).

3.2 Media usage

On average male participants spent significantly more time using media than female participants did (table 1). However on average female participants spent significantly more time using the internet and social media for content related to body image or eating attitudes/behaviors than males. In addition senior high school students spent siginificantly more time consuming body image and eating behavior/attitude related media than junior high school students. There were 380 participants (61.3%) who purchased products related to body image online. While there were significantly more female participants who purchased beauty products than males, there were more male participants who purchased sporting equipment and muscle strengthening/ weight gain products than females (online supplement 4).

3.3 Nutritional status, body image satisfaction, eating problems, drive for muscularity, self-esteem and behaviors carrying a risk of obesity

The "Nutrition Computation Program" that we used to assess nutritional status reports the nutritional status of participants based on their weight for age (w/a), and weight for height (w/h) as compared to the national standard for Thai children. We report here the number of participants who had w/a and w/h below and over national standard and also the effect of sex and age (as well as educational status) on them. There were 40 (7.5%) and 148 (27.8%) participants who had below or over the standard of w/a, respectively. Junior high-school male participants tended to significantly be over

Table 1. Average time spent on media and internet

Behaviors of Media and Internet Use	Male (n=246)	Female (n=374)	*t*	*Statistics p-value*	Junior high-school (n = 302)	Senior high-school (n=318)	*t*	*p-value*
media in general (hour: minute/day)	13:17	12:36	0.952	0.013*	12:29	13:14	-1.123	0.798
internet in general (hour: minute/day)	2:20	2:25	-0.486	0.588	2:10	2:35	-2.143	0.523
social network in general (hour: minute/day)	3:05	4:04	-2.955	0.866	3:20	3:59	-2.062	0.503
internet related to body image and eating attitudes/behaviors (hour: minute/week)	3:24	6:00	-6.158	<0.001**	3:48	6:06	-5.357	<0.001**
social network related to body image and eating attitudes/behaviors (hour: minute/week)	4:06	8:24	-6.499	<0.001**	5:24	7:48	-3.377	0.052

* **statistical analysis was significant at $p < 0.05$**

the standard of w/h when compared with junior high females ($\chi 2 = 9.35$, $p = 0.009$). However, junior and senior high-school female participants had significantly lower body image satisfaction than males (table 2). While there was no significant difference between genders in being at risk for an eating disorder, junior high school female participants had significantly more purging.

Though when looked at together there was no significant difference between genders in risk of eating disorder, however junior high female participants had significantly more purging, use of laxatives, diuretics and weight loss pills, and excessive exercise than males (table 2). However junior high school male participants had significantly higher scores for behaviors carrying a risk of obesity than females (mean=23.30 and 21.78, p=0.019) (see table 3).

3.4 Association between media usage and problems related to body image

The use of media in general was positively associated with weight for age and weight over height. However, it was negatively associated with purging behaviors. While the use of social networks in general was negatively associated with body image satisfaction, it was positively associated with drive for muscularity in both behaviors and attitude.

The use of internet and social networks in relation to body image and eating behaviors was negatively associated with body image satisfaction (table 4). However, use of internet and social networks was positively correlated with risk of eating disorder, binging, purging, use of laxatives, diuretics and weight loss drugs. It was also associated with drive for muscularity with respect to behaviors and attitudes, as well as behaviors carrying a risk of obesity.

Use of internet and social media for material related to body image was significantly related to eating and body image problems, however after adjusting for age, gender, and general use of the internet and social media, they were no longer significantly related (see table 5). Online purchasing of products related to body image (e.g. weight loss supplements) was significantly correlated with rapid weight loss, even after adjustment for age and gender. However, after adjustment for age

Table 2. Association among nutrition, body image satisfaction, abnormal eating attitudes and behaviors as classified by level of education and gender

	Total	Junior High-school			Senior High-school		
	n (%)	M (n)	F (n)	χ^2 (p)	M (n)	F (n)	χ^2 (p)
w/a							
below standard	40 (7.5)	11	5		7	17	
standard	344 (64.7)	71	105	9.35 (0.009) **	45	123	3.79 (0.150)
over standard	148 (27.8)	44	33		28	43	
w/h							
below standard	79 (13.1)	28	25		10	16	
standard	389 (64.4)	71	102	7.42 (0.024) *	52	158	9.13 (0.010) **
over standard	136 (22.5)	41	25		30	40	
Body image satisfaction							
low	68 (11.0)	4	19		4	41	
medium	484 (78.0)	121	122	12.45 (0.002) **	82	159	11.98 (0.003) **
high	68 (11.0)	23	13		12	20	
Eating problems	233 (37.6)	53	59	20 (0.653)	36	85	0.10 (0.747)
Abnormal eating behaviors							
binge eating	277 (44.7)	61	78	2.70 (0.100)	35	103	3.40 (0.065)
purging	150 (24.2)	51	37	3.98 (0.045) *	23	39	1.42 (0.233)
using medication	150 (24.2)	44	23	9.57 (0.002) **	24	59	0.19 (0.662)
excessive exercise	35 (5.6)	17	4	9.22 (0.002) **	7	7	2.53 (0.112)
quick weight loss	99 (16.0)	36	25	3.07 (0.080)	13	25	0.23 (0.629)

Abbreviation: M = male, F = female, [a] Drive for muscularity, calculated for male subjects only, * Correlation is significant at the $p < 0.05$, ** Correlation is significant at the $p < 0.01$

Table 3. Association among drive for muscularity, self-esteem and behaviors risky to obesity as classified by level of education and gender

	Total Mean	Level of Education						Min-Max
		Junior High-school			Senior High-school			
		M Mean	F Mean	*p-value*	M Mean	F Mean	*p-value*	
Drive for muscularity [a]								
behaviors	20.57	20.09	-	-	21.06	-	-	8 - 48
attitude	23.93	22.84	-	-	25.02	-	-	7 - 42
Self-esteem	28.78	28.74	28.78	0.922	28.57	29.02	0.306	14 - 40
Behaviors risky to obesity	22.70	23.30	21.78	0.021	23.90	21.83	0.002 **	3 - 36

Abbreviation: **M** = male, **F** = female, [a] **Drive for muscularity, calculated for male subjects only,** * **Correlation is significant at the** $p < 0.05$, ** **Correlation is significant at the** $p < 0.01$

Table 4. Association among nutrition, body image satisfaction, abnormal eating attitudes and behaviors, drive for muscularity, and self-esteem and behaviors of internet and social network use in relation to body image and eating behaviors

	Internet use in relation to body image and eating behaviors		Social network use in relation to body image and eating behaviors	
	r	*p-value*	*r*	*p-value*
Weight for age (w/a)	-0.026	0.547	-0.035	0.416
Weight for height (w/h)	-0.009	0.826	-0.023	0.569
Body image satisfaction	-0.096	0.017*	-0.097	0.016*
Eating problems	0.272	<0.001**	0.269	<0.001**
Abnormal eating behaviors				
- binge eating	0.178	<0.001**	0.177	<0.001**
- weight loss by purging	0.143	<0.001**	0.158	<0.001**
- weight loss by taking laxatives	0.211	<0.001**	0.202	<0.001**
- exercise/weight control	-0.006	0.887	-0.055	0.170
- quick weight loss	0.024	0.545	0.000	0.996

	Internet use in relation to body image and eating behaviors		Social network use in relation to body image and eating behaviors	
	r	*p-value*	*r*	*p-value*
Drive for muscularity [a]				
- behaviors	0.359	<0.001 **	0.286	<0.001 **
- attitude	0.276	<0.001 **	0.248	<0.001 **
Self-esteem	-0.052	0.199	-0.042	0.300
Eating behaviors risky to obesity	0.109	0.006 **	0.102	0.011 *

Abbreviations: **w/a** = weight for age, **w/h** = weight for height, [a] = **Drive for muscularity, for male subjects only,** * = **Correlation is significant at the** 0.05 **level,** ** = **Correlation is significant at the** 0.01 **level**

Table 5. Associations among body image satisfaction, abnormal eating attitudes and behaviors, drive for muscularity and behaviors of internet and social network use in relation to body image and eating behaviors when adjusting for sex, age, use of the internet and social media overall

	Internet use in relation to body image and eating behaviors								Social network use in relation to body image and eating behaviors							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	OR (95%CI)	*p*	OR (95%CI)	*p*	OR (95%CI)	*p*	OR (95%CI)	*p*	OR (95%CI)	*p*	OR (95%CI)	*p*	OR (95%CI)	*p*	OR (95%CI)	*p*
Low body image satisfaction	1.02 (0.95-1.09)	0.593	1.02 (0.95-1.09)	0.661	1.02 (0.95-1.09)	0.606	1.02 (0.95-1.09)	0.649	1.01 (0.96-1.06)	0.693	1.01 (0.96-1.05)	0.816	1.01 (0.96-1.06)	0.705	1.01 (0.96-1.06)	0.793
Eating problems	1.12 (1.08-1.16)	<0.001***	1.13 (1.08-1.17)	<0.001***	1.13 (1.08-1.17)	<0.001***	1.13 (1.08-1.17)	<0.001***	1.06 (1.04-1.09)	<0.001***	1.07 (1.04-1.09)	<0.001***	1.07 (1.04-1.09)	<0.001***	1.07 (1.04-1.09)	<0.001***
Binge eating	1.05 (1.01-1.08)	0.007**	1.05 (1.01-1.08)	0.008*	1.05 (1.01-1.08)	0.008**	1.05 (1.01-1.08)	0.008**	1.03 (1.01-1.05)	0.013*	1.03 (1.01-1.05)	0.015*	1.03 (1.01-1.05)	0.015*	1.03 (1.01-1.05)	0.015*
Weight loss by purging	1.10 (1.05-1.13)	<0.001***	1.10 (1.06-1.14)	<0.001***	1.10 (1.06-1.14)	<0.001***	1.10 (1.06-1.14)	<0.001***	1.05 (1.03-1.08)	<0.001***	1.06 (1.04-1.09)	<0.001***	1.06 (1.04-1.09)	<0.001***	1.06 (1.04-1.09)	<0.001***
Weight loss by taking laxatives	1.06 (1.04-1.09)	<0.001***	1.06 (1.04-1.09)	<0.001***	1.06 (1.04-1.09)	<0.001***	1.06 (1.04-1.09)	<0.001***	1.05 (1.03-1.07)	<0.001***	1.05 (1.03-1.08)	<0.001***	1.05 (1.03-1.08)	<0.001***	1.05 (1.03-1.08)	<0.001***
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*
Drive for muscularity [a]																
behaviors	0.369	<0.001***	0.372	<0.001***	0.377	<0.001***	0.376	<0.001***	0.286	<0.001***	0.290	<0.001***	0.307	<0.001***	0.305	<0.001***
attitude	0.264	<0.001***	0.263	<0.001***	0.263	<0.001***	0.264	<0.001***	0.240	<0.001***	0.238	0.001***	0.240	0.001***	0.245	<0.001***
Eating behaviors risky to obesity	0.175	<0.001***	0.178	<0.001***	0.172	<0.001***	0.174	<0.001***	0.172	<0.001***	0.177	<0.001***	0.169	<0.001***	0.173	<0.001***

Model 1 is adjusted for sex and age, model 2 is adjusted for sex, age and use of the internet overall, model 3 is adjusted for sex, age and use of social media overall, and model 4 is adjusted for sex, age, use of the internet and social media overall. Abbreviation: OR = adds ratio, [a] = Drive for muscularity, for male subjects only, * = statistical analysis was significant at $p < 0.05$, ** = statistical analysis was significant at $p < 0.01$, * = statistical analysis was significant at $p < 0.001$**

and gender, this online purchasing behavior was found to not be significantly related to excessive exercise or other efforts at weight control (see online supplement 5).

4. Discussion

4.1 Main findings

This study found that participants spent an enormous amount of time consuming online and social media based content related to body image. This result is consistent with many studies of media usage in adolescents.[5,18-20] We found that female senior high school students spent more time using the internet and social media for content related to body image than their male counterparts. However, we cannot assess the actual amount of time used on each activity because multitasking is a well known behavior among this group. Therefore additional research is needed to find ways to tease out the differences between reported time and actual time spent on this activity.[21] In addition to consuming online content, many of the participants also purchased products online. This result is also consistent with other studies which found that some of the most commonly purchased online products were related to beauty and body image.[1]

Overall there were more male than female participants who were over the standard for w/a and w/h. This result was in concordance with a report on the health of Thai children.[22] However, female adolescents had lower satisfaction in body image than males. This was consistent with Indian and American studies regarding body image perception.[23,24] The percentage of senior high-school students with low body image satisfaction was higher than junior high-school students. Most middle to late adolescents want to be accepted by others, especially their peers. So they may place more importance on their figure, as a means of being accepted by others, and compare their figure to that displayed in the media and elsewhere.[3] Furthermore, our study also found that one third of participants had abnormal eating and body image attitudes and almost half of all participants had abnormal eating behaviors. These results exceeded a report from the Youth Risk Behavior Survey in 2013, which found that 4.4% of secondary students vomited or used laxatives to lose weight.[25] The differences in these results may reflect a real difference in abnormal eating behaviors between cultures or the rising prevalence of abnormal eating behaviors.[26] The results from the drive for muscularity portion of the survey also exceeded results of other studies. This could also be due to a real difference between cultures drive for muscularity, however there has of now been no studies directly comparing the clinical features of body dysmorphic disorder across different cultures.

Use of social media was negatively associated with body image satisfaction, a finding that is consistent with the results of a previous study out of Canada.[27] A meta-analysis on this topic showed a correlational link across 77 studies between media exposure and body dissatisfaction in women.[28] Time spent online or using social media that was related to body image also showed an association with abnormal eating attitudes and behaviors, binging, purging, use of laxative/weight loss or diuretics, and eating behaviors carrying a risk of obesity. These results indicate the impact social media can have on an adolescent's body image. Moreover, using the internet and social media for content related to body image was also associated with a higher score in drive for muscularity. This was consistent with results from a previous study that found media usage affected the perception of ideal body size in males[29] and carried a higher risk for depression and lower self-esteem. The association between time spent viewing body image related content on the internet and social media with abnormal eating behaviors/attitudes and drive for muscularity remained significant after adjusting for confounding variables. This result underscores the importance of how they used the internet and social media, and how it affected their body image and eating behaviors. In addition it answers the limitations of previous studies that did not adjust for these confounding factors.[6, 8-10, 28, 29] However, there were no significant associations with low body satisfaction after adjustment for confounding factors, which might reflect the significant effect of age and gender to body image satisfaction in adolescents.[3] Furthermore, the associations were found between online purchasing products related to body image and abnormal eating attitudes and behaviors as well. So further study about this area of concern should include this online activity because these products were easy to find online. [30]

4.2 Limitations

This study has the following limitations: (a) Due to the cross-sectional nature of this study we cannot determine the direction of effect. (b) We did not test the validity of our developed questionnaires. However, we tested the reliability of them and found that all of them have high reliability and these questionnaires were tried out with the relevant groups and adjusted to fit with them. (c) Our sample was made up of students in the educational system in Bangkok and most of them had family with middle to high income, so the results may not be generalizable. (d) Finally, we did not measure other factors (e.g. depression, anxiety, poor coping mechanisms) which might be related with inappropriate eating attitudes/behaviours and body-image satisfaction. Further study should include these factors in the analysis.

4.3 Implications

In sum, our findings, along with those of other studies, highlight that both exposure to and time spent on media content are correlated with body image and eating attitudes and behaviors. Further studies need to address how we can protect adolescents from the harmful effects of media and even how to use media to

improve body image satisfaction in teens. A longitudinal study to examine cause and effect between correlated factors we found in our study is required.

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Conflict of interest statement
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Ethical approval
This study received full approval from the institutional ethical review board of Faculty of Medicine Ramathibodi Hospital, Mahidol University on January 12, 2015.

Informed consent
Parental consent and student assent was obtained before answering the questionnaires.

Authors' contribution
All authors conceived and designed the study and acquired the data. KN analyzed and interpreted the data. KN and KK drafted the manuscript. The manuscript was critically revised by KK and HS. All authors read and approved the final version of the manuscript.

青少年在网上时间、体象满意度和饮食习惯的关联研究

Kaewpradub N, Kiatrungrit K, Hongsanguansri S, Pavasuthipaisit C

背景：现时互联网在日常生活中扮演着重要角色，尤其是对青少年，他们更关心自己的脸型和体型。尽管有传统媒体对体象满意度影响的大量研究，但很少关注到新媒体（网络）的影响，而且几乎没有青少年在网上时间和体象满意度之间关系的研究。

目标：旨在研究 7-12 年级泰国学生在网上时间、体象满意度和饮食习惯的关系。

方法：对来自泰国曼谷 6 所中学的 620 名学生进行随机抽样调查。采用自制的媒体和互联网使用行为问卷，青少年和成人的体像自信量表 (BESAA) 泰国版，肌肉强壮量表 (DMS 只用于男性)，Rosenberg 自尊量表泰国版，26 项饮食态度测试泰国版 (EAT-26) 和饮食习惯带来肥胖风险问卷进行测量。

结果：受试平均年龄为 15.7 (1.9) 岁，其中男性 246 名 (39.7%)，女性 374 名 (60.3%)。从互联网和社交网络获得体象和饮食行为相关内容的上网时间，与身体意象满意度负相关 (r = -0.096, p = 0.17 & r = -0.097, p = 0.016)，与不恰当的饮食态度 / 行为、贪食、自我诱导式呕吐、使用泻药 / 利尿剂，对强壮肌肉获取关注的行为 / 态度的控制正相关。同时也与饮食习惯带来的肥胖风险相关 (r = 0.109, p = 0.006 & r =0.102, p = 0.011)。

结论：上网时间，尤其是花在改善自我形象上的活动、饮食态度及行为，都与体象满意度下降和不良饮食习惯相关。

关键词：互联网，身体意象，进食障碍，饮食行为，身体变形，肥胖

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