



## Adolescent problematic internet use and parental mediation: A Bangladeshi structured interview study



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### ABSTRACT

Internet-related problems such as excessive internet use, problematic internet use (PIU), and internet addiction, are becoming increasingly studied among Bangladeshi adult students, but there has been little research among adolescents. In Bangladesh, there has been no research examining the role of parental mediation in their children's internet use. Therefore, the present structured interview study investigated Bangladeshi adolescent PIU and its associated socio-demographics, internet use behaviors, and the parental mediation role among 350 high school students residing in Dhaka. The results showed that 84 of adolescents (24.0%) were classified as having PIU (cut-off score of  $\geq 50$  on the Internet Addiction Test) and nine adolescents (2.6%) were classified as having a severe dependency on the internet (cut-off score of  $> 80$  on the Internet Addiction Test). According to hierarchical regression analysis, significant PIU correlates included lower academic results, both parents' lower education, mother working outside the home, more than four days' weekly internet use, more than two hours daily internet use, and active mediation. Additionally, internet use behaviors (i.e., internet use locations, devices, purposes, and applications) and parental internet mediation dimensions other than active mediation (i.e., restrictive mediation, active mediation internet safety, monitoring, and technical mediation) were significantly related to PIU in *t*-tests and correlation analysis respectively. However, they were non-significant in the hierarchical regression analysis when included into equation altogether. The present study's findings will be helpful in developing country-level policymaking decisions and facilitating future research in the country.

### 1. Introduction

Internet use in adolescence has greatly increased over the past two decades (Spada, 2014; Uddin et al., 2016). Approximately 50% of adolescents in South America use the internet, whereas the rate is 80% for the adolescents in the UK, USA, and Asian countries (Cerniglia et al., 2017). With the increased use of the internet, problematic internet use (PIU) has become a public health concern, and has been associated with symptoms of addiction (Chang et al., 2015; Simcharoen et al., 2018; Spada, 2014), which include "excessive or poorly controlled preoccupations, urges, and/or behaviors regarding internet access that lead to physical as well as mental impairment or distress" (Mamun & Griffiths, 2019a, p. 46). "Internet Gaming Disorder" as a mental disorder was recognized in the American Psychiatric Association's most recent (fifth) edition of the

Diagnostic and Statistical Manual of Mental Disorders (DSM-5; 2013), although PIU was not (Kuss, Griffiths, & Binder, 2013). PIU prevalence rates can differ due to the use of different assessment tools and different cut-off scores – even when using the same screening instrument (Kuss, Griffiths, Karila, & Billieux, 2014; Mamun and Griffiths, 2019a). The global PIU prevalence rate was reported to be 6% based on a large-scale meta-analysis comprising 164 studies including 89,281 participants from 31 countries (the average age was  $18.42 \pm 5.02$  years and the age range was 12–41 years) (Cheng & Li, 2014). Another systematic review reported that the PIU prevalence rate among adolescents ranged from 0.8% (among Italian high school students) to 26.7% (among adolescent students in Hong Kong) globally (Kuss et al., 2014). The prevalence of PIU is higher among Asian adolescents compared to rates reported elsewhere (Kuss et al., 2014), and the only available study in

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Bangladesh reported a prevalence rate of 2.5% (Afrin, Islam, Rabbian, & Hossain, 2017).

Predictably, PIU appears to increase when there is an increase in the frequency of internet use (Vigna-Taglianti et al., 2017). For example, Mamun et al. (2019b) reported in a Bangladeshi study among university students that compared to weekly internet users, those who used the internet (i) a few times a week had a 1.78 times higher risk of PIU, (ii) once a day had a 2.65 times higher risk of PIU, and (iii) a few times a day had a 6.58 times higher risk of PIU. The same study also reported a twofold higher risk for PIU among participants using the internet for more than two hours a day compared to those using the internet for less than two hours a day (Mamun et al., 2019b). Similarly, using the internet for more than 35 h weekly has been indicated as an important correlate of PIU (Mamun et al., 2019b; Mamun & Griffiths, 2019b). Compared to those who used the internet for less than two hours a day, Vigna-Taglianti et al. (2017) reported a 4.44-times higher risk of PIU for 2–3 h daily use, 10.37-times higher risk of PIU for 4–5 h daily use, and 14.64-times higher risk of PIU for more than five hours daily use.

The correlates of PIU have been relatively well-studied and include socio-demographics (e.g., male gender, and living in rural areas), internet use behaviors (e.g., increased time spent on the internet, using the internet for specific purposes, such as gaming and sex), psychosocial factors (e.g., low self-concept, and negative emotion avoidance), and psychological disorders (e.g., depression, insomnia, anxiety, and stress) (Alimoradi et al., 2019; Balcerowska, Bereznowski, Biernatowska, Atroszko, Pallesen, & Andreassen, 2020; Balhara et al., 2019; Cerniglia et al., 2017; Kuss et al., 2014; Vally, Laconi, & Kaliszewska-Czeremska, 2020). Additionally, factors such as low social support, low satisfaction with academic performance, insecure attachment style, child maltreatment experiences, poor parent–adolescent relationships, lack of family love, and homesickness have also been reported to be correlated with adolescent PIU (Chen & Peng, 2008; Kuss et al., 2014). A decline in studying, missing classes, significant drop in grades, increased risk of being placed on academic probation, and poor integration in extra-curricular activities have been associated with PIU among students in Pakistan (Akhter, 2013). However, the cross-sectional nature of this study makes it impossible to indicate the direction of these relationships. A largescale study comprising 49,609 students in Taiwan suggested similar findings (i.e., worse relationships with administrative staff, lower academic grades, and learning dissatisfaction among problematic internet users; Chen & Peng, 2008). Consequently, PIU has become a potential concern for parents and a threat for the wellbeing of a minority of adolescents (Chang et al., 2015).

The world has become more technologically developed over the past few decades. As well as many increased benefits, several health-related consequences related to excessive internet use have come to the attention of researchers, parents, teachers, and treatment providers. Adolescents appear to be the most susceptible to technological addiction risks (Bleakley, Ellithorpe, & Romer, 2016; Chang et al., 2015). Consequently, excessive and uncontrolled internet use, preoccupation with the internet, and negative effects in terms of academic performance and interpersonal relationships have become parental concerns (Chen & Peng, 2008; Lee, 2013; Livingstone et al., 2017). Therefore, parental internet mediation has been suggested by many researchers to reduce the risk of PIU. This includes (i) parents talking to their children about media content (“*active mediation of internet use*”), (ii) parents setting rules and limits to restrict internet use (“*restrictive mediation*”), (iii) parents telling children about safe and responsible internet use (“*active mediation of internet safety*”), and (iv) parents using tools and software such as blocking and filtering tools as a way of monitoring and/or restricting children’s internet use (“*monitoring/technical mediation*”) (Chang et al., 2019, p.26; Dürager & Sonck, 2014; Lee, 2013).

Many studies have found positive results of parental mediation in reducing the risk of PIU (e.g., Bleakley et al., 2016; Chang et al., 2019; Dürager & Sonck, 2014; Livingstone et al., 2017; Kalmus, Blinka, & Olafsson, 2015). For instance, Kalmus et al. (2015) reported that active

and restrictive parental mediation was protective against excessive internet use and harmful online experiences by children. Similarly, other studies suggest adolescents have increased online self-regulation as well as decreased PIU due to parental mediation (Bleakley et al., 2016; Chang et al., 2015; Terras & Ramsay, 2016). Parental involvement or mediation in their children’s internet use is increasingly being utilized to protect young people from addictive use (Griffiths, Benrazavi, & Teimouri, 2016).

In Bangladesh, the prevalence rate of internet use has markedly increased due to the government policy of developing a ‘Digital Bangladesh’ by improving internet access to its citizens at minimal costs (Mamun et al., 2019; Uddin et al., 2016). Therefore, internet-related problems such as PIU have increasingly been studied particularly among emerging adults at universities (Islam & Hossain, 2016; Jahan et al., 2019; Karim & Nigar, 2014; Mamun & Griffiths, 2019a,b,c; Mamun, Rafi, Al Mamun, Hasan, Akter, Hsan, & Griffiths, 2019a,b, 2020; Uddin et al., 2016). To date, there has been only one Bangladeshi study that has investigated PIU and its potential correlates among 279 adolescents, which reported that the prevalence of severe internet addiction was 2.5%, whereas 64.9% were ‘moderately addicted’ (i.e., Afrin, Islam, Rabbian, & Hossain, 2017). Therefore, the knowledge relating to this cohort is limited. To prevent PIU among adolescents, parental mediation and similar approaches (e.g., parent–child cohesion, and parent–child involvement) have been suggested as these approaches can result in lower exposure to harmful online behaviors, such as violent and sexual content, gambling sites, and sexual grooming (Bleakley et al., 2016). These studies were conducted outside of Bangladesh. Therefore, it is necessary to assess whether parental supervision or involvement is related to PIU in a Bangladeshi population, which can support adolescent wellbeing and provide insight for the country’s policymakers. Therefore, the present interview study was carried out to examine the role of socio-demographics and parental mediation factors in PIU among Bangladeshi adolescents.

## 2. Methods

### 2.1. Participants and procedure

The present interview study was conducted among 365 adolescents who were attending two secondary schools residing in the capital of Bangladesh, Dhaka city. The schools and the students were selected on the basis of convenience. Parents provided their consent for their children to participate. The inclusion criteria for participants were: (i) studying at grades 8–10 (ages 13 to 17 years; mean age = 14.69 and  $SD = 1.01$ ), (ii) living with parent(s), and (iii) being an internet user. An offline face-to-face interview was conducted during school time from January to December 2018. Data collected from 15 interviews were incomplete, therefore data from 350 participants (184 females; 52.6%) were used in the final analysis.

#### 2.1.1. Ethical considerations

To conduct the study, formal ethical approval was obtained from the Institutional Review Board (IRB) of the National Institute of Preventive and Social Medicine (NIPSOM), Dhaka, Bangladesh (Approval ID: NIPSOM/IRB/2018/471). After explaining the aim and purpose of the study, consent was obtained from the school authority prior to data collection as well as informed written consent from every participant’s guardian prior to taking part in the present study. There was no risk of physical harm to the participants and no sensitive questions were asked in the structured interviews.

#### 2.2. Measures

A face-to-face structured interview was carried out to collect the data. The questions included in the study concerned socio-demographics, internet use behavior, the Parental Internet Mediation Scale,

and the Internet Addiction Test. The interview questions were reviewed by the respective authorities and permission to use the scale instruments was granted by the scale developers.

2.2.1. Socio-demographic measures

The present study included socio-demographics, namely age, gender, academic year (i.e., Grades 8–10), academic performance (i.e., grade point average; Grade A + denotes the highest GPA [of 5.0 out 5.0] in the Bangladeshi education system, Grade A denotes less than GPA 5.0 but more than GPA 3.5; Grade B denotes having a GPA equal or lower than 3.0), family type, number of siblings, and monthly family income. Information was also collected concerning the participants' guardianship, parental education, parental occupation, and who they lived with (e.g., both parents, or single parent).

2.2.2. Internet use behaviors

Questions related to internet use were also included in the present study based on previous literature (e.g., Mamun et al., 2019a, b; Simcharoen et al., 2018; Vigna-Taglianti et al., 2017). The frequency of daily and weekly internet use were assessed. Data were also collected on where the internet was used and accessed (e.g., home, school, and cybercafes), how the internet was accessed (e.g., personal computer, laptop, smartphone, and tablet), and most frequently used internet apps and activities (i.e., communication/chatting, and educational purposes).

2.2.3. Parental internet mediation scale

To assess parental mediation, the EU Kids Online Survey Parental Internet Mediation Scale (PIMS) was used (Livingstone, Haddon, Görzig, & Ólafsson, 2011). The scale includes five types of mediations (i.e., five items concerning 'active use mediation' [e.g., "Do your parents talk to you about what you do on the Internet?"]; six items concerning 'restrictive mediation' [e.g., "Do your parents allow you to use forms of instant messaging such as Skype?"]; six items concerning 'active safety mediation' [e.g., "Do your parents suggest to you ways to use the Internet safely?"]; four items on 'monitoring mediation' [e.g., "Do your parents watch which websites you visit?"]; four items on 'technical mediation' [e.g., "Do your parents use filter programs or other means of blocking some types of websites?"]). The response options for active use, active safety, monitoring, and technical mediation were "no" (scoring 0) and "yes" (scoring 1), whereas "can do this" (scoring 0), "can only do this with permission or supervision" (scoring 1), and "can never do this" (scoring 2) were used to assess restrictive mediation. Higher scores indicate higher parental mediation (Livingstone et al., 2011). The Cronbach's  $\alpha$  of the active use, active safety, monitoring, technical, and restrictive mediation subscales were 0.87, 0.72, 0.74, 0.77, and 0.87, respectively.

2.2.4. Internet addiction test

The Internet Addiction Test was used to assess the severity of internet addiction (Young, 1998). The scale has 20 items concerning the characteristics and behaviors associated with compulsive use of the internet that include compulsivity, escapism, and dependency. The questions also assess problems related to personal, occupational, and social functioning stemming from internet use. The scale is rated on a six-point system ranging from 0 (not applicable) to 5 (always) with possible scores ranging from 0 to 100. A score between 0 and 30 reflects normal internet use, whereas 31 to 49 reflects mild problematic internet use, 50 to 79 a moderate level of problematic internet use, and scores of 80 to 100 indicate a severe dependency on the internet. In the present study, the moderate to severe score (i.e., using 50 as the cut-off) was categorized as denoting problematic internet use (Simcharoen et al., 2018; Vigna-Taglianti et al., 2017). In the present study, the IAT had excellent internal consistency (Cronbach's  $\alpha = 0.92$ ).

2.3. Statistical analysis

Data were entered, cleaned, edited, and analyzed using the Statistical Package for Social Science (SPSS) version 22.0. The study's findings were presented as frequencies, percentages, means, and standard deviations (SDs). The PIU and subscales of the PIMS were described using means and SDs. The PIU score differences in terms of demographic and internet use behavior variables were investigated using *t*-tests and analysis of variance (ANOVA). The correlations between PIU and parental internet mediation constructs were examined using Pearson's correlation analysis. Finally, demographic and internet use behavior variables that significantly differed in terms of PIU scores, and parental internet mediation variables were included into hierarchical regression analysis with PIU as the dependent variable. The normality of distribution (skewness and kurtosis values) and multicollinearity (VIF and tolerance values) were investigated.

3. Results

Given that skewness and kurtosis values were between the threshold of  $\pm 2$  (George & Mallery, 2010) normal distribution was assumed. A total of 84 participants (24.0%) were classified as having PIU, whereas only nine adolescents (2.6%) scored 80 and were classed as having a possibly severe problem. The demographic statistics, *t*-tests, and ANOVA comparing IAT scores ( $N = 350$ ) are presented in Table 1. Those who had a lower academic performance (grade B or less), pocket money, parents with lower education (up to higher secondary), and

**Table 1**  
Demographic statistics, *t*-tests, and analyses of variance comparing IAT scores.

Variable		N	%	Mean	<i>t</i> (or F)	$\eta^2$
Gender	Men	166	47.4	38.59	0.27	0.00
	Women	184	52.6	38.13		
Studying grade	Grade VIII	116	33.1	39.34	1.59	0.01
	Grade IX	120	34.3	36.28		
	Grade X	114	32.6	39.52		
Academic performance <sup>a</sup>	Grade B or less	33	9.4	51.12	13.38***	0.07
	Grade A	131	37.4	38.01		
Type of family	Grade A +	186	53.2	36.32	1.02	0.00
	Nuclear	316	90.3	38.63		
Total siblings	Joint	34	9.7	35.73	0.01	0.00
	0 or 1	209	59.7	38.35		
Monthly income	$\geq 2$	141	40.3	38.34	-0.15	0.00
	Less than 15,000	44	12.6	38.02		
Pocket money	15,000 to 30,000	306	87.4	38.39	2.59**	0.02
	Yes	68	19.4	42.73		
Father's education	No	282	80.6	37.29	2.53**	0.02
	Up to higher secondary	209	59.7	40.08		
Mother's education	Graduation and above	141	40.3	35.78	3.25***	0.03
	Up to higher secondary	146	41.7	41.53		
Fathers' occupation	Graduation and above	204	58.3	36.07	1.50	0.01
	Service holder	195	55.7	37.04		
Mothers' occupation	Business	115	32.9	40.19	2.45*	0.02
	Teacher or doctor	28	0.08	37.32		
Guardianship	Working mother	64	18.3	42.67	-1.67	0.01
	Housewife	286	81.7	37.38		
Living with	Both parents	319	91.1	37.91	-1.85	0.01
	Single parent or relatives	31	8.9	42.84		
Living with	Both parents	321	91.7	37.88	-1.85	0.01
	Single parent or relatives	29	8.3	43.48		

Note. <sup>a</sup> = 'Grade B or less' group scored significantly higher on IAT than 'grade A' and 'grade A+' groups;  $\eta^2$  = eta squared; \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

**Table 2**  
Internet use behaviors' descriptive data and t-tests comparing IAT scores.

Variable		N	%	Mean	t	$\eta^2$
Weekly use frequency	< 4 days	227	64.8	43.18	8.60***	0.18
	≤ 4 days	123	35.2	29.43		
Daily use frequency	2 h and above	169	48.2	45.27	8.80***	0.18
	Less than 2 h	181	51.8	31.88		
<i>Place where internet is used</i>						
Home	Yes	344	98.3	38.53	1.63	0.01
	No	6	1.7	28.00		
School	Yes	8	2.3	54.00	2.88***	0.02
	No	342	97.7	37.98		
Relative/friend's homes	Yes	168	48	39.92	1.81	0.01
	No	182	52	36.90		
Cybercafe	Yes	16	4.6	51.31	3.43***	0.03
	No	334	95.4	37.73		
<i>Device on which internet is used</i>						
Mobile and tablet	Yes	337	96.3	38.61	1.60	0.01
	No	13	3.7	31.54		
Computer	Yes	123	35.1	41.78	3.05***	0.03
	No	227	64.9	36.49		
Laptop	Yes	111	31.7	41.72	2.76**	0.02
	No	239	68.3	36.78		
<i>Most frequently used apps</i>						
Facebook	Yes	240	68.6	41.45	6.61***	0.11
	No	110	31.4	31.58		
Twitter	Yes	27	7.7	45.78	2.58**	0.02
	No	323	92.3	37.73		
Instagram	Yes	104	29.7	45.95	5.65***	0.08
	No	246	70.3	35.13		
Skype	Yes	37	10.6	45.65	2.40*	0.02
	No	313	89.4	37.49		
E-mail	Yes	160	45.7	41.85	3.85***	0.04
	No	190	54.3	35.40		
YouTube	Yes	342	97.7	38.50	1.16	0.00
	No	8	2.3	32.00		
<i>Frequent internet activities</i>						
Entertainment or recreation	Yes	336	96	38.64	2.45*	0.02
	No	14	4	31.43		
Information and education	Yes	325	92.8	38.43	0.34	0.00
	No	25	7.2	37.32		
Chat and instant message	Yes	241	68.8	41.50	6.81***	0.12
	No	109	31.2	31.38		
News site visiting	Yes	175	50	38.66	0.37	0.00
	No	175	50	38.03		
Online gaming	Yes	215	61.4	40.85	4.00***	0.04
	No	135	38.6	34.36		
Online shopping	Yes	92	26.3	45.24	4.45***	0.05
	No	258	73.7	35.89		
Adult entertainment	Yes	42	12	48.69	4.68***	0.06
	No	308	88	36.94		

Note.  $\eta^2$  = eta squared; \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

having a mother who was employed scored significantly higher on the IAT when compared to those with a higher academic performance (grade A and A +), no pocket money, parents with higher education (graduation and above), and having a mother who was a housewife respectively. It should be noted that the eta squared values indicated small effect sizes for these differences.

Table 2 presents the internet use behaviors' descriptive statistics and t-tests comparing IAT scores. Those adolescents who used the internet more than four days a week and two hours a day, used the internet in school and cybercafés, and used the internet via a computer and laptop had higher PIU scores compared to those who used the internet less than four days a week and two hours daily, did not use the internet in school and cybercafés, did not use the internet via a computer and laptop, respectively. Furthermore, those that indicated that Facebook, Twitter, Instagram, Skype, and e-mail were among the most frequently used apps scored higher on the IAT than those who indicated these apps were not among their most frequently used apps. Finally, participants who used the internet for entertainment or recreation, chat and instant messaging, online gaming, online shopping, and adult entertainment

**Table 3**  
Mean scores, standard deviations, and correlation coefficients of the study variables.

	1	2	3	4	5	6
1. Problematic internet use	–					
2. Active mediation	–0.38*	–				
3. Restrictive mediation	–0.47*	0.37*	–			
4. Active mediation internet safety	–0.52*	0.51*	0.89*	–		
5. Monitoring	–0.31*	0.48*	0.32*	0.45*	–	
6. Technical mediation	–0.30*	0.43*	0.30*	0.46*	0.47*	–
Mean	38.35	2.94	3.55	7.01	1.72	1.13
S.D.	15.70	1.34	2.95	3.76	1.45	1.32

Note. \* $p < .001$ .

had higher PIU scores when compared to those who did not use internet for these aforementioned activities, respectively.

Mean scores, standard deviations, and correlation coefficients of the study variables are given in Table 3. PIU was negatively moderately correlated with active mediation, restrictive mediation, active mediation internet safety, monitoring, and technical mediation. Next, hierarchical regression analysis was applied via including PIU as the outcome variable. Given that VIF and tolerance values were lower than 10 and higher than 0.10 respectively (Kline, 2011) multicollinearity was not detected. Demographic and internet use behavior variables that significantly differed in terms of PIU scores in t-tests and ANOVA comprised the Block 1 as control variables (explained 36% of the variance in PIU). In Block 2, parental internet mediation constructs (i.e. active mediation, restrictive mediation, active mediation internet safety, monitoring, technical mediation) were included into the equation, explaining an additional 7% of the variance in PIU. Academic performance, parents' education level, having a working mother, and active mediation were negatively associated with PIU, whereas using the internet more than four days a week and two hours a day were positively related to PIU. The final model explained 43% of the variance in PIU (Table 4).

#### 4. Discussion

Problematic internet use (PIU) has become a global public health concern for a minority of adolescents, and is reflected by most social media platforms not allowing children to be users because they have age-related restrictions (Balcerowska et al., 2020; Chang et al., 2015). In the present study, 24.0% of adolescents from Dhaka were reported to be problematic internet users and only 2.6% had severe PIU. However, the present study and a previous Bangladeshi study (Afrin et al., 2017) are not directly comparable due to the instruments used (Orman Internet Stress Survey vs. IAT) as well as the city where the studies took place (i.e., in Chittagong, there are fewer internet facilities available compared to Dhaka). However, the prevalence rates at the severe end of internet use were very similar (2.5% vs. 2.6%). The PIU rate in the present study appears to be lower than in studies conducted elsewhere (see Kuss et al., 2014 for a review), but because different studies use different instruments and different cutoff scores, caution is advised when making such comparisons. Based on the findings of the present study, it is recommended that there should be protective initiatives and programs for adolescent wellbeing and screen use for adolescents residing in Dhaka.

Similar to previous studies (Bener et al., 2018; Mamun et al., 2019b; Mamun & Griffiths, 2019b; Vigna-Taglianti et al., 2017), the present study reported more frequent internet use as being a predictor of PIU. The greater internet use, the more likely the most common problematic internet activities (e.g., social networking, gaming, shopping, watching online videos, and viewing sexual content) are to be accessed (Kuss et al., 2014; Yam et al., 2019). In the present study, those who were

**Table 4**  
Hierarchical regression analysis predicting problematic internet use.

Model	B	SE	$\beta$	t	$\Delta R^2$
<b>Block 1</b> ( $F_{(21,328)} = 10.59; p < .001$ ) 0.36					
Academic performance <sup>a</sup>	-3.46	1.04	-0.15	-3.33**	
Pocket money <sup>b</sup>	-1.73	1.80	-0.04	-0.96	
Father's education <sup>c</sup>	-3.22	1.49	-0.10	-2.16*	
Mother's education <sup>c</sup>	-3.85	1.53	-0.12	-2.52*	
Mothers' occupation <sup>d</sup>	-4.44	1.82	-0.11	-2.44*	
Weekly use frequency <sup>e</sup>	-3.89	1.74	-0.12	-2.24*	
Daily use frequency <sup>e</sup>	-5.78	1.54	-0.18	-3.75***	
School <sup>b</sup>	-2.99	4.79	-0.03	-0.63	
Cyber cafe <sup>b</sup>	-3.38	3.48	-0.05	-0.97	
Computer <sup>b</sup>	-1.00	1.49	-0.03	-0.67	
Laptop <sup>b</sup>	-2.60	1.49	-0.08	-1.74	
Facebook <sup>b</sup>	-0.15	1.74	-0.00	-0.08	
Twitter <sup>b</sup>	0.99	2.73	0.02	0.36	
Instagram <sup>b</sup>	-2.06	1.67	-0.06	-1.23	
Skype <sup>b</sup>	-1.68	2.28	-0.03	-0.74	
E-mail <sup>b</sup>	0.10	1.51	0.00	0.07	
Entertainment or recreation <sup>b</sup>	2.57	3.43	0.03	0.75	
Chat and instant message <sup>b</sup>	-1.62	1.72	-0.05	-0.95	
Online gaming <sup>b</sup>	0.91	1.51	0.03	0.61	
Online shopping <sup>b</sup>	-3.04	1.62	-0.09	-1.87	
Adult entertainment <sup>b</sup>	-4.16	2.16	-0.09	-1.92	
<b>Block 2</b> ( $F_{(26,323)} = 10.96; p < .001$ ) 0.07					
Active mediation	-2.16	0.62	-0.18	-3.46**	
Restrictive mediation	-0.15	0.54	-0.03	-0.27	
Active mediation internet safety	-0.53	0.47	-0.13	-1.12	
Monitoring	0.20	0.57	0.02	0.35	
Technical mediation	-0.43	0.62	-0.04	-0.69	

Note: B = unstandardized regression coefficient; SE = Standard error;  $\beta$  = standardized regression coefficient; <sup>a</sup>1 = Grade B or less, 2 = Grade A, 3 = Grade A+; <sup>b</sup>1 = Yes, 2 = No;

<sup>c</sup> 1 = Up to higher secondary, 2 = Graduation and above; <sup>d</sup>1 = Working mother, 2 = Housewife; <sup>e</sup>1 = More than 4 days, 2 = Less than 4 days; <sup>f</sup>1 = 2 h and above, 2 = Less than 2 h;  $F_{(26,323)} = 10.96, p < .001, R_{Adj}^2 = 0.43; *p < .05, **p < .01, ***p < .001.$

frequent users of chatrooms, played online videogames, engaged in online shopping, and viewed pornography and sexual content had higher scores of PIU, which has been reported in studies examining PIU outside of Bangladesh (Simcharoen et al., 2018; Vigna-Taglianti et al., 2017). However, when these activities were included into a model with other variables (i.e., demographic variables, parental internet mediation variables) their effect became non-significant. This may be because the demographics and parental mediation variables had a stronger correlation with PIU when compared to internet use behaviors, which emphasizes the importance of examining the aforementioned variables' relationship with PIU using complex models (e.g., multiple regression).

As in previous studies (Akhter, 2013; Chen & Peng, 2008), the adolescents in the present study who had poorer academic grades had higher PIU. This may be because students who feel academically incompetent and/or unsuccessful may try to fulfil their need to be important or successful via engaging in excessive internet use, and compensate their real-life failures in online contexts. Furthermore, adolescents who have lower academic performance might have been simply avoiding negative feelings arising from their low grades via engaging in PIU. However, because of the cross-sectional design of the present study, the direction of this relationship cannot be determined. It may be that having a higher PIU might lead to lower academic achievement, or having lower grades may be related to elevated PIU. Furthermore, consistent with the previous literature (Chen & Peng, 2008; Kuss et al., 2014), parents' education level was also negatively related to higher PIU. Adolescents whose parents had lower education scored significantly higher on PIU. This may be because father's and mother's lower education level is associated with a dysfunctional family environment, which is associated with higher engagement in PIU

among adolescents as a maladaptive avoidance strategy (Li, Garland, & Howard, 2014).

Partially consistent with the hypothesis, while adjusting for the demographics and internet use behaviors, only the active mediation sub-dimension of parental internet mediation was significantly (negatively) associated with PIU. This result contradicts the findings from a previous study from Taiwan which reported that parental restrictive mediation was negatively related to PIU (Chang et al., 2015). It may be that, unlike the Taiwanese junior high school students, PIU of the Bangladeshi adolescents in this study can be mitigated using an active mediation rather than restricting internet use. However, unlike the aforementioned study (Chang et al., 2015), it should be taken into account that the present study used a multiple mediation model. Factoring in a large number of control variables might have led parental mediation dimensions to become insignificantly related to PIU because all sub-dimensions of the parental internet mediation were moderately correlated with PIU in the correlation analysis. The present findings indicate that parental mediation should be investigated taking its sub-dimensions into account instead of examining it as a single construct.

## 5. Limitations and conclusion

The present exploratory study is not without its limitations. First, the study is limited by its cross-sectional nature. Additionally, the sample only included participants from the Dhaka district. Therefore, the findings have limited generalizability and might not represent the parental mediation activities or PIU of adolescents in Bangladesh more generally. Additionally, all the participants in the study were adolescents. Parents of the adolescents were not interviewed. Therefore, it was possible that participants might not have given a totally accurate response about their parental mediation concerning their internet use as well as their responses concerning their actual internet use – particularly because it was conducted via a face-to-face interview (and may have led to socially desirable responses).

Taken together, this study showed that the prevalence of PIU was low, and this is the first Bangladeshi study to examine the role of parental mediation. Such information will be helpful for country and/or school level policymaking decisions such as increasing parental internet literacy levels, awareness building among adolescents regarding the consequences of PIU, and in facilitating further research inside or outside of Bangladesh.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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