



# The influences of information literacy, internet addiction and parenting styles on internet risks

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## Abstract

The purpose of this study is to examine how demographics, addiction symptoms, information literacy, parenting styles and internet activities can predict 'internet risks'. Data were gathered from a probability sample of 718 adolescents and teenagers, aged 9–19 in Hong Kong, using face-to-face interviews. Results show that adolescents who are often targets of harassment tend to be older boys with a high family income. They are targets probably because they spend a lot of time on social networking sites (SNSs) and prefer the online setting. Adolescents who encounter a lot of unwelcome solicitation of personal or private information online tend to be older girls. In information literacy, they are generally very competent with publishing tools but are not structurally literate, especially in understanding how information is socially situated and produced. Implications and recommendations for future research are discussed.

## Keywords

children and adolescents, information literacy, internet addiction, internet risks, parenting styles

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## Introduction

Although the internet is a beneficial tool for youth, some children and adolescents are at risk of being victimized online (Finkelhor et al., 2000; Palfrey and Gasser, 2008). Past studies have reported that youth who spend time online are exposed to a variety of potential risks, including the risks of meeting dangerous people, exposure to deviant sexual content, contact with pedophiles, identity theft, encountering extreme sexual/violence or racist/hate material, being open to commercial exploitation and manipulation or misinformation, invasion of privacy, and unwelcome contact, to name a few (Keith and Martin, 2005; Livingstone, 2008b; Mesch, 2009; Ybara et al., 2007). The internet is a medium over which parents often have very little control, few rules for use, with minimum parental supervision – mostly due to their own lack of knowledge of the internet. In fact, many online activities are done alone, in an anonymous context. Thus, the purpose of this research is to examine how parenting styles, especially in terms of strictness at home and parental mediation, are important factors to help adolescents to lower or to avoid risks online.

This research was initiated based upon previous studies (Griffiths, 1998; Leung, 2004; Young, 1998a, 1998b) that indicated that some online users were becoming addicted to the internet in much the same way that others become addicted to gambling, drugs and alcohol. Concerns have been expressed that excessive internet use has been considered problematic, and has been associated with declines in communication with family members and declines in the size of a person's social circle. With so many health risks associated with problematic internet use, internet addiction has become a modern syndrome (Leung, 2008). Still, very little is known about how internet addiction is linked to online risks.

Today, children and adolescents are growing up with the internet and might be impressively technologically literate (Howe and Strauss, 2007; Taylor and Keeter, 2010). However, the new 'illiteracy' concerning many educators today is the lack of skill at being critical consumers and ethical producers of information (Rockman, 2002). Although we are becoming more and more dependent on the internet, little is known about how various dimensions of information literacy affect the perceptions of how information literate we are and, in turn, how much internet risk is impacted.

This research investigates factors associated with internet risks (e.g., being the target of harassment, privacy violation, and exposure to pornographic and violent content) adolescents face online. In particular, this study (1) identifies internet addiction symptoms that are uniquely associated with internet use among adolescents and (2) explores how demographics, internet addiction symptoms, information literacy, parenting styles, and internet activities can predict internet risks.

## Literature review

### *Defining information technology literacy*

The Association of Colleges and Research Libraries (2010) defines information technology literacy skills as those associated with an individual's use of computers, software applications, databases, and other technologies to achieve an academic, work-related or personal goal. To distinguish information literacy from one of its component skills, technology literacy (i.e., competence in using information technology), the association has re-defined information literacy as 'a set of abilities requiring individuals to recognize

when information is needed and have the ability to locate, evaluate, manage, and use effectively the needed information' (Farmer and Henri, 2008: 4).

Dupuis (1997) indicates that information literacy must include knowledge and understanding of the 'context' of information in today's society, information's composition and organization, as well as its use in life-long learning. Others also think of information literacy as skills that go beyond locating and using information to the knowledge for interpreting and evaluating information (Banta and Mzumara, 2004; Livingstone et al., 2005; Murray, 2003). Shapiro and Hughes (1996) proposed and operationalized information literacy as a seven-dimensional construct: (1) 'Tool literacy' refers to the ability to understand and use practical and conceptual information technology tools in respective professional life. (2) 'Resource literacy' means the ability to understand the form, location, access methods, and formats of information resources. (3) 'Social-structural literacy' reveals the understanding of how information is socially situated and produced. (4) 'Research literacy' indicates the ability to understand and use relevant information technology tools for research. (5) 'Publishing literacy' reflects the ability to format and publish research and ideas in textual and multimedia formats. (6) 'Emergent technology literacy' refers to the awareness and the ability to adapt to, understand, evaluate, and make use of emerging information technology. (7) 'Critical literacy' reveals the ability to critically evaluate the strengths and weaknesses, capabilities and limits, of information technologies (Farmer and Henri, 2008). As compared to previous studies (such as Livingstone et al., 2005) where information literacy or internet literacy was articulated in three dimensions (access, understanding, and creation), this study adopted a similar but more encompassing conceptualization – a seven-dimension construct – by Shapiro and Hughes (1996).

Using the straightforward definition of information literacy by Shapiro and Hughes (1996), this study explores how different dimensions of information literacy are related to internet addiction, parenting styles, and internet risks.

### *Internet addiction as a concept for study*

Traditionally, the concept 'addiction' was based on a medical model and is properly reserved for bodily and psychological dependence on a physical substance – and not a behavioral pattern. Recent research has argued that addiction should be widened to cover a broader range of behaviors (Byun et al., 2009; Griffiths, 1998; Lemon, 2002; Shaffer, 1996). Griffiths (1996) proposed, as a subset of behavioral addiction, the concept of technological addiction, which is operationally defined as human-machine interaction and is non-chemical in nature. Despite debates about whether the excessive use of various technologies, such as internet surfing, TV watching, and computer gaming, can be or should be called an 'addiction', scholars have argued that excessive use of technology can be considered problematic (Byun et al., 2009; Griffiths, 1998; Griffiths and Hunt, 1998).

Derived from criteria associated with pathological gambling in the *Diagnostic and Statistical Manual* (fourth edition) (*DSM-IV*) (American Psychiatric Association, 1994), Young (1998a) presented a definition for internet-related disorders, called problematic internet use (PIU). This definition requires that individuals meet five of eight criteria for internet addiction to qualify as an addict. These criteria include (1) preoccupation with the internet, (2) need for longer amounts of time online, (3) repeated attempts to reduce internet use, (4) withdrawal when reducing internet use, (5) time management issues,

(6) environmental distress (family, school, work, friends), (7) deception around time spent online, and (8) mood modification through internet use.

Results from past research indicated that internet use had interfered with their academic work, professional performance, or their social lives (Young, 1998b). Others described skipping sleep, ignoring family responsibilities, and showing up late for work to fulfill their desire to visit chat rooms and surf the web. The evidence points to a psychological disorder, so researchers probed further and found that the participants' habits met the criteria for impulse control disorder, a mental illness characterized by an uncontrollable desire to perform a behavior. Drawing on the insights from the definitions and previous research, this study examines how this compulsive internet behavior is related to internet risks. Thus, we ask the following:

RQ1: What internet addiction symptoms can be identified among adolescents?

H1: The more information literate adolescents perceive themselves to be, the lower the likelihood they will be addicted to the internet.

### *Parenting styles*

In parenting, three types of media-related mediation styles – the ways in which parents try to buffer children's exposure to media content – typically dominate the research literature. First, 'active mediation' involves the kind of conversations that parents have with children about television or the internet (Fujioka and Austin, 2007; Livingstone, 2008b). Talk about media might be initiated by the parents, who aim to assist children in being more critical viewers or users. Second, 'restrictive mediation' involves the use of explicit rules about when children can and cannot use the internet, what games can be played, what channels can be watched, or how long a child can be on the web (Livingstone, 2008b; Mesch, 2009; Nathanson et al., 2002). Third, 'covieing' is the act of sitting in the same room as parents talk (or not) to children about content while watching television (Jordan, 2001; Lin and Atkins, 1989).

The present study expands the scope of parenting style to go beyond media-related parenting style to include a broad-based measure focusing the parenting climate as a whole at home. Similarly, Stattin and Kerr (2000) proposed that monitoring (i.e., tracking and surveillance) of children's behavior is an essential parenting skill and found that well-monitored youths are less involved in delinquency and other normbreaking behaviors. In principle, monitoring measures typically assess parents' knowledge, but not its source, from their children's free disclosure of information (e.g., of whether parents know where they were after school in the afternoon) as well as their own active surveillance efforts.

Using a typological approach, two non-media related parenting practices were adopted based on the items developed by Dornbusch et al. (1985) to approximate the demandingness and responsiveness dimensions such as strictness/supervision and acceptance/involvement. The former assesses the parental monitoring climate and supervision; and the latter measures the extent to which the adolescents perceive their parents as loving, responsive, and involved. A third dimension, media-related 'parental mediation,' as discussed earlier, was added to provide a more complete picture in conceptualizing parenting styles in internet behavior at home for children and adolescents. Thus, we hypothesize the following:

- H2.1: The stricter the parenting style, the lower the likelihood adolescents will be addicted to the internet.
- H2.2: The more involved the parenting style, the lower the likelihood adolescents will be addicted to the internet.
- H2.3: The more mediation exercised by parents, the lower the likelihood adolescents will be addicted to the internet.

### *Internet risks*

Internet harassment is an overt, intentional act of aggression towards another person online. Actions can take the form of purposefully harassing or embarrassing someone else, or making rude or nasty comments towards someone else while online (Ybarra et al., 2007). In a series of reports from the Center for Media Education (2001), there is a growing concern that many websites, even those directed at children, are requesting personal information (such as email addresses, phone numbers, home addresses, and information about their parents) without asking parental permission. Livingstone and Helsper (2007) found that making friends online has attracted particular attention as a risky behavior, especially when this leads to offline meetings, as has giving out personal or private information online.

For decades, parents and others have been consistently concerned about the potentially 'harmful' influences of exposure to pornographic and violent content. A recent survey in Sweden (Carlsson, 2006) asked adults what they perceive to be the factors that lead to violence in their society. While alcohol and drugs were the highest (90 percent), both TV and the internet were listed by 60 percent of respondents as having a strong and significant influence. Similarly, in a national pool in the United States, more than 85 percent considered the internet more of a risk problem for their children than TV (Common Sense Media, 2006).

The current study extends the literature by examining the complex relationships between being a victim of internet risks and addiction symptomatology, information literacy, and parenting styles. Based on previous research on internet risks (e.g., Liao et al., 2005; Livingstone and Helsper, 2007; Livingstone et al., 2005; Peter and Valkenburg, 2006; and Ybarra et al., 2007), we propose the following:

- H3.1: The more adolescents are addicted to the internet, the more internet risks the adolescents will experience in terms of (a) being the target of harassment, (b) privacy exposure, and (c) pornographic and violent content consumed.
- H3.2: The more information literate adolescents perceive themselves to be, the fewer internet risks the adolescents will experience in terms of (a) being the target of harassment, (b) privacy exposure, and (c) pornographic and violent content consumed.
- H4.1: The stricter the parenting style, the fewer internet risks adolescents will experience in terms of (a) being the target of harassment, (b) privacy exposure, and (c) pornographic and violent content consumed.
- H4.2: The more involved the parenting style, the fewer internet risks adolescents will experience in terms of (a) being the target of harassment, (b) privacy exposure, and (c) pornographic and violent content consumed.
- H4.3: The more mediation exercised by parents, the fewer internet risks adolescents will experience in terms of (a) being the target of harassment, (b) privacy exposure, and (c) pornographic and violent content consumed.

### *Internet activities*

Since it is expected that much of adolescents' internet activity, like their other media use, occurs in private (e.g., Larson, 1995) and may not be known or understood by adults (Livingstone, 2002), use of the internet in the solitude of adolescents' own bedrooms is an important variable in this study. Many of these activities are internet-related – however, adolescents multitask, including watching television, listening to music, short message service (SMS) texting via their mobile phones, engaging with someone on social networking sites (SNSs), and having conversations on fixed-line phones in the privacy of the adolescents' own rooms. Thus, we posit the following:

- H5: The stricter, the more involved and the more mediation parents exercise in their parenting styles, the less time adolescents will spend on (a) SNSs, (b) downloading audio/videos, and (c) seeking entertainment news online.

Livingstone and Helsper (2010) also argued that it is difficult to separate the highly correlated relationship between taking up opportunities and limiting risks in the use of the internet. The positions in this contestation may stretch from the assertion that increasing opportunities will distract adolescents from exploring risky activities online to adolescents' desire to avoid parental intervention in internet activities which will lead them towards online risk taking. But in light of the fact that different internet activities may bring different opportunities and risks, this study limited its scope and examined the relationships between internet risks and the use of three activities online that children and adolescents often spend most of their time on (e.g., interacting on SNSs, downloading audio/videos, and seeking entertainment news online). Thus, we proposed the following hypothesis and research questions:

- H6: The more active adolescents are in internet activities (e.g., interacting on SNSs, downloading audio/videos, and seeking entertainment news online), the more likely the adolescents will be exposed to internet risks.
- RQ2: To what extent can demographics, information literacy, internet addiction symptoms, parenting style, internet activities, and location to go online predict internet risks in terms of (a) target of harassment, (b) privacy exposure, and (c) pornographic and violent content consumed?

## **Method**

### *Sample and sampling procedure*

Data were gathered from a probability sample of 718 adolescents and teenagers aged 9–19, using face-to-face structured questionnaire interviews from December 2008 to February 2009. Respondents were eligible members of randomly generated households (an operation requested by the authors and performed by the Census and Statistics Department in Hong Kong). Of the 2304 qualified households, 718 successfully completed the questionnaires, which resulted in a 31.2 percent response rate.

The sample consisted of 44.4 percent males. The mean age was 14.46. This age distribution resembled the 2008 population census in Hong Kong very closely. Of the 718

respondents, over 88 percent were high school students or high school graduates. In terms of family income, the mean was at the income bracket of US\$1928–2571 a month. According to Nielsen/NetRatings, the internet usage statistics is at 68.8 percent of the Hong Kong population and 81.9 percent broadband penetration in 2010.<sup>1</sup>

## Measures

*Information literacy.* An inventory of 15 items was used to assess the six dimensions (research literacy was excluded as it is less relevant for children and adolescents) of information literacy as proposed by Shapiro and Hughes (1996). Respondents were asked to indicate, ‘How confident were you in performing the following tasks?’, on a 5-point scale with 1 = not very confident, and 5 = very confident. Table 1 shows that factor analysis of the 13 tasks (after dropping two) yielded a five-factor information literacy structure, namely tool literacy, critical literacy, publishing literacy, emerging technology literacy, and social-structural literacy. The reliability alphas were high and ranged from .80 to .88.

*Internet addiction.* The 20-item Internet Addiction Scale (IAS) developed by Young (1998a) and additional items by Bianchi and Phillips (2005) were adapted to measure the level of internet addiction in this study. A 5-point Likert scale was used with 1 = not at all, and 5 = always. The reliability for the scale as indicated by Cronbach’s alpha was remarkably high at .90. Embedded in these 20 items, eight items were also adopted from the *DSM-IV* for screening gambling problems, which were also used by Young (1998a), to develop the short-form screening instrument for addictive internet use.

*Parenting style.* This construct was measured in three dimensions: strictness, involvement, and parental mediation. Items were adapted from existing measures (Dornbusch et al., 1985). To assess ‘strictness’, respondents were asked three sets of questions: (1) In a typical week, what is the latest you can stay out on (a) school nights (i.e., Monday–Thursday) and (b) weekends (i.e., Friday–Saturday)? The scale used was 1 = till any time; 2 = till 12 a.m.–2 a.m.; 3 = till 10 p.m.–12 a.m.; 4 = till 8 p.m.–10 p.m.; 5 = before 8 p.m.; and 6 = not allowed to go out. (2) My parents know exactly where I am most afternoons after school using a scale with 1 = yes and 0 = no. (3) How much do your parents try to know the following: (a) Where you go at night? (b) What you do with your free time? And (c) Where you are most afternoons after school? The scale used for each question was 1 = never tried, 2 = tried sometimes, and 3 = often tried. To measure ‘involvement’, five items were used to assess the respondents’ opinions about their parents in a dichotomous scale with 1 = usually true and 0 = usually false. Items included the following: ‘You can count on them to help you out, if you have some kind of problem’; ‘your parents keep pushing you to do your best in whatever you do’; ‘your parents keep pushing you to think independently’; ‘your parents help you with your schoolwork if there is something you don’t understand’; and ‘when your parents want you to do something, they explain why’. The ‘parental mediation’ dimension in parenting style was measured by asking respondents the following: How often do your parents do the following: (1) limit the amount of time you use the internet? (2) restrict websites you

**Table 1.** Factor analysis of information literacy.

How confident are you in performing the following tasks?	Factors					Mean	SD
	1	2	3	4	5		
<b>Tool Literacy</b>							
1. Locate information in multiple sources / decide the type of resources needed to yield useful information for a particular need	.86					3.82	.90
2. Browse online databases to locate pertinent information	.79					4.05	.87
3. Recognize different access methods of information resources	.77					3.74	.87
<b>Critical Literacy</b>							
4. Compare and evaluate critically whether the information collected is credible and relevant		.89				3.24	.95
5. Judge critically whether information on websites is authentic and accurate		.87				3.19	.98
6. Compare and evaluate critically whether the information is timely and appropriate		.66				3.28	.95
<b>Publishing Literacy</b>							
7. Format and publish ideas electronically in textual form			.80			3.47	.99
8. Create contents in blogs, YouTube, and personal webpages for different audiences			.75			3.13	1.17
9. Format and publish ideas electronically in multimedia form			.71			3.02	1.01
<b>Emerging Technology Literacy</b>							
10. Be able to decide when to adopt the continually emerging innovations in information technology				.86		2.78	1.06
11. Aware of the latest product development in new information technologies and decide when to adopt				.85		2.84	1.06
<b>Social-structural Literacy</b>							
12. Understand how information is socially situated					.85	3.46	.94
13. Understand how information is socially produced					.83	3.41	.96
Eigenvalues	5.58	1.55	1.19	.92	.88		
Variance explained	42.97	11.95	9.12	7.06	6.75		
Cronbach's alpha	.83	.84	.77	.84	.82		

Notes: Scale used: 1 = not very confident and 5 = very confident; total variance = 77.86%; N = 718.

can use? (3) recommend good websites for you? and (4) participate in online activities with them while you are online? The scale used was 1 = never and 4 = often. Responses were multiplied into multiples of 12, summed and divided by 3. Cronbach's alpha was acceptable at .73.

*Internet risks.* This study adopted three risks generally encountered online by adolescents and were often researched in the literature (see Livingstone, 2008b; Livingstone and Helsper, 2010; Livingstone et al., 2005). The 'internet harassment' dimension of the construct internet risks was measured with five items using a 5-point Likert scale with 1 = once a year, 2 = few times a year, 3 = once or twice a month, 4 = once or twice a week, and 5 = almost every day. Respondents were asked if they had experienced harassment online. Sample items included the following: 'received rude or nasty comments from someone while online', 'received obscene or indecent photo or picture', and 'received threatening or aggressive comments while online'. Cronbach's alpha equaled .76. 'Privacy risk' was the second dimension measuring the internet risks construct. Respondents were asked the following: In the past year, has a stranger: (1) asked you to provide personal information while online? (2) asked you to provide your personal photo while online? (3) peddled merchandise goods to you? and (4) said he or she knew you but in fact you did not know him or her? Internet risk was also measured in the exposure to 'pornographic/violent content' dimension using four items. Respondents were asked if they had visited or used websites intentionally or unintentionally such as pornographic sites, adult forums, sites with violent or sanguinary contents, and auction sites or online shopping sites. Cronbach's alpha was .66 for this scale. The scale used for these dimensions was 1 = yes and 0 = no.

*Internet activities.* To measure SNS-oriented internet activities, respondents were asked how often they used MSN, forums, Facebook, and blogs using a 5-point scale with 1 = never, and 5 = very often. Downloading is another popular internet activity among adolescents. Participants were asked how often they download or listen to music and download and view videos online using the same 5-point scale. Cronbach's alpha for both scales was .80. The third activity that is popular among adolescents was getting entertainment news online. Using the same scale, the respondents were asked how often they seek entertainment and educational news online. These two items were highly correlated with ( $r = .36, p < .001$ ).

*Demographics.* Social demographic variables were included in the present study as control variables: gender, age, education, monthly family income, and where they go online most often (bedroom = 1, non-bedroom such as living room = 0).

## Results

### *Internet Addiction Symptoms (IAS)*

The IAS was developed to collect responses from 718 adolescents to identify internet addiction symptoms and, as a composite index, to assess their level of internet addiction.

The mean score for the index was 51.69, and *SD* equaled 11.31. As shown in Table 2, the principal components factor analysis yielded a five-factor internet addiction symptoms structure and accounted for 62.61 percent of the total variance. The first factor was 'preference for online' reflecting the addicts are more comfortable with computers than with people, more confident socializing online than offline, and feel being treated better and safer relating to others in online relationships than in face-to-face. 'Loss of control' was the second factor. It included four items characterizing that adolescents feel the need to use the internet more and more to achieve satisfaction; feel loss, restless, depressed, and irritable if they can not go online; and have concealed the extent of their internet use. 'Preoccupation' was the third factor. It consisted of four items illustrating adolescents spend a good deal of time online, go online for longer than intended, and lose track of time online. The fourth factor, 'negative life consequences' contained four items indicating that adolescents find that excessive use of the internet has caused trouble such as missing class, work and social events, and feel worthless offline. The fifth factor was 'withdrawal', reflecting that addicts use the internet to talk with others when they feel isolated, lonely, and down.

As a whole, this study identified five internet addiction symptoms that were conceptually consistent with the theoretical origins described in the diagnostic criteria of pathological gambling in the *DSM-IV*. The original *DSM* measure for pathological gambling was based on eight items; however, this study employed 20.

### *Interrelationships among internet literacy, internet addiction, parenting styles, and internet activities, and internet risks*

Results in Table 3 show that internet addiction (in composite) was significantly and positively correlated with publishing literacy and emerging technology literacy. This indicates that, contrary to what was hypothesized, information literacy, especially in publishing and technology literacy, increases the likelihood of someone getting addicted to the internet. Such results may be explained by the fact that time spent on producing content (such as in social networking sites like Facebook, blogs, twitters, and producing video on YouTube) take much time, as well as technological and publishing know-how to do. Furthermore, producing multimedia content is a fun thing to do for adolescents. As a consequence, both publishing and technology literacy may significantly influence addiction. In other words, the more publishing and technological skills they have, the higher the likelihood they will be addicted. Thus, H1 was rejected.

Results in Table 3 also show a significant and negative bivariate relationship between strictness and internet addiction. This means that the stricter the parenting style, the lower the likelihood adolescents will be addicted to the internet. However, the relationships between involvement and parental mediation and internet addiction were not significant. This indicates that likelihood to be addicted is not influenced by how much parents are involved in adolescents' studies and how much time parents spent mediating their children's use of the internet. In order to lower the addiction likelihood, strict rules at home may be more effective. Therefore, H2.1 was supported while H2.2 and H2.3 were rejected.

**Table 2.** Factor analysis of general problematic internet use.

How often do you experience the following?	Factors					Mean	SD
	1	2	3	4	5		
<b>Preference for Online</b>							
1. More comfortable with computers than people	.77					2.64	0.95
2. More confident socializing online than offline	.77					2.69	1.07
3. Being treated better in online relationships than in face-to-face	.68					2.81	1.04
4. Feel safer relating to others online rather than face-to-face	.64					2.65	1.06
5. Being treated better online than offline	.59					2.95	1.09
<b>Loss of Control</b>							
6. I feel the need to use the internet more and more to achieve satisfaction* (2)		.76				3.13	1.13
7. I feel lost, restless, depressed, and irritable if I can't go online* (4)		.75				3.15	1.05
8. I have concealed the extent of my internet use* (7)		.74				2.88	1.15
9. Preoccupied with internet if I can't connect for some time* (1)		.72				2.70	1.01
<b>Preoccupation</b>							
10. Spent a good deal of time online			.82			2.74	1.03
11. Go online for longer time than I intended* (5)			.80			1.97	0.91
12. Lose track of time online			.73			2.53	1.02
13. Tried to stop using internet for long periods of time* (3)			.51			2.58	1.12
<b>Negative Life Consequences</b>							
14. Missed class or work because I was online				.80		1.44	0.73
15. Missed social event because of being online				.72		1.97	0.90
16. I feel worthless offline, but I am someone online				.66		1.85	0.82
17. Got in trouble in work/school b/c online* (6)				.50		2.33	1.08
<b>Withdrawal</b>							
18. Use internet to talk with others when I feel isolated					.87	2.75	0.98
19. Seek others online when I feel isolated					.81	2.67	0.95
20. Go online to make myself feel better when I'm down* (8)					.60	3.01	0.99
Eigenvalues	6.52	2.23	1.55	1.19	1.05		
Variance explained	32.57	11.13	7.75	5.93	5.23		
Cronbach's alpha	.81	.74	.83	.69	.81		

Notes: Scale used: 1 = strongly disagree and 5 = strongly agree; total variance: 62.61%;  $N = 718$ . Items with asterisk are the eight most conceptually equivalent to Young's screening instrument on internet addiction.

H3.1 proposed that the more adolescents are addicted to the internet, the more internet risks they will experience. Results in Table 3 show that the internet addiction index is significantly and positively correlated to target harassment, privacy risks, and pornographic/violent content. Thus, H3.1 was fully supported.

H3.2 hypothesized that the more information literate adolescents perceive themselves to be, the fewer internet risks the adolescents will experience. Table 3 reveals that the bivariate correlations between publishing and emerging technology literacy were positively and significantly correlated with all three dimensions of internet risks. Contrary to the negative correlations expected, such positive and significant relationships indicate that the effects from the technical know-how in information literacy are operating much stronger on internet risks. The more literate adolescents are in publishing and emerging technology, the higher the likelihood that they will experience internet risks. In contrast, the insignificant critical, social, and structural literacy, as related to internet risks, may be explained by the fact that the technological dimension of information literacy, rather than the analytical and evaluative dimension of information literacy, was exerting much stronger effects on internet risks. Thus, H3.2 was rejected.

H4.1, H4.2, and H4.3 hypothesized that the stricter, the more involved, and the more mediation parents exercise in their parenting styles, the fewer internet risks adolescents will experience. Results in Table 3 demonstrate that all (except one) bivariate relationships between parenting styles and internet risks were significantly and positively related (Pearson's  $r$  coefficients ranged from  $-.11$  to  $-.27$ ). This indicates that the stricter, the more involved, and the more mediation in parents' parenting styles, the fewer internet risks adolescents will experience. Thus, H4.1, H4.2, and H4.3 were all supported.

H5 proposed that the stricter, the more involved and the more mediation parents exercise in their parenting styles, the less time adolescents will spend on (a) interacting on SNSs, (b) downloading audio/videos, and (c) seeking entertainment news online. The results shown in Table 3 indicate that, with the exception of parenting styles and seeking entertainment news online, all bivariate relationships between all dimensions of parenting styles and visiting SNSs and downloading audio/videos were significant and negative (Pearson's  $r$  ranged from  $-.09$  to  $-.22$ ). Thus, H5 was largely supported. However, parenting styles had no effect on online news consumption. This may be due to the fact that not only entertainment news exposure but also useful online news on current affairs was measured in the questionnaire.

H6 anticipated that the more adolescents are active in internet activities, the more likely the adolescents will be exposed to internet risks. The results shown in Table 3 also support this hypothesis because all bivariate relationships between internet activities and internet risks were significant and positive (Pearson's coefficients ranged from  $r = .18, p < .001$  to  $r = .41, p < .001$ ). This shows that those who interact frequently on SNSs, download music/videos, and get entertainment news online are much more likely to experience risks online than adolescents who are less frequent users. Thus, H6 was also fully supported.

### *Predicting online risks*

Table 4 shows the results of three hierarchical regressions on three dimensions of internet risks. Adolescents who were often targets of harassment tended to be older and male with

**Table 3.** Zero-order Pearson correlations among key variables.

	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Internet addiction (composite)	-.01	.06	.13***	.15***	-.04	-.15***	-.07	.01	.29***	.28***	.10*	.34***	.21***	.27***
Information Literacy														
2. Tool literacy	.41***		.43***	.34***	.53***	-.06	.06	-.05	.16***	.13***	.13***	.03	.06	.05
3. Critical literacy	.48***	.50***		.45***	-.02	-.02	.05	-.02	.19***	.10**	.16***	.07	.03	.07
4. Publishing literacy	.52***	.44***	.44***		-.05	-.05	.01	-.08*	.46***	.21***	.24***	.21***	.20***	.09*
5. Emerging technology literacy	.36***	.36***	.36***	.36***			.02	-.03	.28***	.12**	.22***	.18***	.13***	.14***
6. Social-structural literacy	.10*	.10*	.10*	.10*	.10*			-.04	.11**	.01	.12**	.03	-.00	-.01
Parenting Style														
7. Strictness	.36***	.39***	.39***	.39***	.39***	.39***			-.22***	-.13**	-.05	-.19***	-.16***	-.27***
8. Involvement	.35***	.35***	.35***	.35***	.35***	.35***	.35***		-.17***	-.09*	-.01	-.10*	-.11**	-.16***
9. Parental mediation	.19***	.19***	.19***	.19***	.19***	.19***	.19***	.19***		-.13**	.03	-.06	-.11**	-.19***
Internet Activities														
10. SNSs	.51***	.51***	.51***	.51***	.51***	.51***	.51***	.51***	.51***		.46***	.36***	.41***	.26***
11. Download audio/videos	.38***	.38***	.38***	.38***	.38***	.38***	.38***	.38***	.38***	.38***		.23***	.28***	.20***
12. Online entertainment news	.24***	.24***	.24***	.24***	.24***	.24***	.24***	.24***	.24***	.24***	.24***		.26***	.18***
Internet Risks														
13. Target of harassment	.42***	.42***	.42***	.42***	.42***	.42***	.42***	.42***	.42***	.42***	.42***	.42***		.45***
14. Privacy risks	.33***	.33***	.33***	.33***	.33***	.33***	.33***	.33***	.33***	.33***	.33***	.33***	.33***	
15. Pornographic/violent content														

Notes: \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ ;  $N = 718$ .

a high family income. They were targets probably because they spent a lot of time on SNSs and online entertainment news sites. The adolescents prefer the online environment and are often illiterate with internet tools in locating and identifying the right resources for needed information. They are preoccupied or often lose track of how long they have been on the internet and, as a result, suffer from negative consequences of internet use such as missing class, work, and social events.

Adolescents who encountered a lot of unwelcome solicitation of personal or private information such as names, pictures and phone numbers tended to be female and older. In information literacy, they were generally very competent with publishing tools but were not social-structurally literate, especially in understanding how information is socially situated and produced. In addition symptoms, older girls tended to be often preoccupied with the internet. Findings also show that the more active the girls are on SNSs and online entertainment news sites, the more they will be solicited for private information online.

Adolescents and teenagers who visited pornographic and violent content frequently on the internet tended to be older, male, and less educated. They tended to be preoccupied with the internet often and are frequent users of SNSs and online entertainment news sites with few rules at home and little parental mediation. They often go online in the privacy of their own bedrooms. The amount of variance explained ranged from 23 to 26 percent.

## Conclusions and discussions

### *Internet addiction and internet risks*

This study set out to empirically examine the inter-relationships among adolescents' encountered internet risks, internet addiction, information literacy, parenting style, and level of internet activities. According to the theory presented at the outset, children and adolescents who suffer from internet addiction are more likely to encounter various forms of internet risks than healthier individuals. The results reported above support the proposition that internet addiction symptoms are key indicators for internet risks, especially for being the target of harassment. This may be because internet addicts have a strong preference for the online world and perceive that they are more comfortable with computers than with people, more confident socializing online than offline, feel safer, and are treated better in the online environment (Caplan, 2003; Thayer and Ray, 2006; Turkle, 1995). With such perceptions, adolescents increase their chances of being harassment targets. In addition to preferring the online environment, internet addicts often lose track of time spent online and had difficulties themselves in controlling their amount of use, which may result in negative consequences such as missing class, work, and social obligations. All these symptoms are important signs that children and adolescents may have a higher probability of experiencing harassment or cyber-bullying online (Keith and Martin, 2005), being solicited for private information from strangers, and being exposed regularly to pornographic and violent content in the privacy of their own bedrooms. For parents and teachers, these symptoms may be the wake-up call for intervention and mediation. This block of predictors explained most of the variance (3 to 7 percent) after controlling for demographics and information literacy variables.

**Table 4.** Hierarchical regression analyses of internet risks.

	Internet Risks		
	Target of harassment $\beta$	Privacy exposed $\beta$	Pornographic violent content consumed $\beta$
<b>Block 1: Demographics</b>			
Gender (male = 1)	.07*	-.11*	.31***
Age	.15***	.13**	.27***
Education	-.06	.02	-.19**
Family income	.10**	.11	.01
$\Delta R^2$	.10*	.09*	.18*
<b>Block 2: Information Literacy</b>			
Tool literacy	-.08*	.01	-.03
Critical literacy	-.05	-.04	.01
Publishing literacy	.06	.11*	-.02
Emerging technology literacy	.05	-.02	-.00
Social-structural literacy	-.03	-.13*	-.07
$\Delta R^2$	.03*	.03**	.00
<b>Block 3: Internet Addiction Symptoms</b>			
Preference for online	.08*	.01	.05
Loss of control	-.03	.07	.04
Preoccupation	.12**	.15**	.13***
Negative life consequences	.14***	.09	.01
Withdrawal	-.02	-.02	-.06
$\Delta R^2$	.07**	.05*	.03*
<b>Block 4: Parenting Styles</b>			
Strictness	-.04	.02	-.10**
Involvement	-.02	-.00	-.05
Parental mediation	.01	-.02	-.11**
$\Delta R^2$	.00	.00	.02**
<b>Block 5: Internet Activities</b>			
SNSs	.16***	.21***	.12*
Downloading audio/videos	.00	.08	.05
Online entertainment news	.10**	.12*	.11**
$\Delta R^2$	.03**	.05*	.02**
<b>Block 6: Location to go Online</b>			
Bedroom = 1	.03	.07	.09**
$\Delta R^2$	.00	.00	.01**
$R^2$	.24	.21	.27
Adjusted $R^2$	.23	.22	.26

Notes: \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ ;  $N = 718$ .

### *Information literacy and internet risks*

Exploratory factor analysis successfully confirmed the notion that information literacy is a multi-dimensional construct similar to the one proposed by Shapiro and Hughes (1996) and Dunn (2002). Such a result supports past research that, to be information literate, one must not only be competent in technology but also possess skills that go beyond locating and using information, as suggested by Murray (2003), by having the knowledge to interpret and evaluate the information. The regression results also support, to some degree, our expectation that the more information literate adolescents perceive themselves to be, the fewer internet risks the adolescents will experience. Specifically, adolescents who reported that they are more tool- and social-structural literate tended to report less often being the target of harassment and had been solicited less for private information. This reinforces the notion that adolescents who are competent with internet tools and understand how information is socially situated and produced tend to be knowledgeable in accessing, locating, retrieving, and evaluating information necessary online for making important life decisions (Murray, 2003). Tool-literate individuals tend to have deeper connections to the internet to make a more critical assessment of the net in their lives. As a result, these individuals are less likely to encounter internet risks.

In contrast, this study also found that adolescents who scored high in publishing literacy tended to encounter more privacy risks. Individuals who are literate in publishing or competent in generating content online generally use internet applications such as Facebook, MySpace, Friendster, blogs and YouTube to socialize, interact, seek recognition, and for entertainment to satisfy their social and psychological needs (Leung, 2009) and for a narcissistic fascination with self-display (Livingstone, 2008a). These activities increase the opportunities for people with bad intentions to solicit adolescents' names, addresses, and personal information, especially on widely used SNSs.

It is also interesting to note the lack of significant predictive power, especially from the critical and emerging technology literacy dimensions of information literacy, in impacting internet risks in our sample. One possible explanation may be that most children and adolescents do not have the ability to critically evaluate information and to be knowledgeable about the credibility, accuracy, and authenticity of the information acquired. Therefore, the results reported above seem to suggest that the technical expertise or competence dimension of information literacy, rather than the critical dimension of information literacy, may exert much stronger influence on internet risks. In other words, the more competent adolescents are with publishing content and the more familiar with the applications of the internet, the more internet risks the adolescents will encounter. Information literacy block explained 3 to 4 percent of the total variance.

### *Parenting styles and internet risks*

With respect to parenting styles, the results reported above provide strong bivariate support for the hypotheses which predicted that stricter rules, more involvement and more mediation exercised by parents would be linked to children and adolescents being less targeted for harassment, suffering less from privacy risks, and being less likely to be exposed to pornographic or violent content. However, with the exception of having an

impact on pornographic or violent content exposure, the multivariate regression results indicate that strict parental rules, involvement, and mediation had no or few effects on suffering from harassment and privacy risks. This suggests that adolescents may or may not be the target of harassment and having private information solicited 'at home'. They may be experiencing these risks in school or at friends' houses since the internet is a ubiquitous medium. Therefore, even if parents have the strictest rules and mediation in the use of the internet at home, adolescents may still be targets – neither parental supervision nor the use of filtering technology would decrease the solicitation risk. One interesting fact is that most teens today are often the household experts in computer use, which disrupted the parents' guiding role. Another sensitive concern most parents have is the easy access to pornographic and violent content online, which may present a tremendous negative impact on the psychological development of children and adolescents. Therefore, parents who exercise strict rules and provide guidance and mediation at home generally reduce the seductive influence of pornography and violent content online.

In contrast to the effect from internet activities, hierarchical regression results also show that controlling the amount of access to SNSs and online entertainment sites through self-disciplinary action appears more effective than parental interference in influencing internet risks. This means that the fewer SNSs and online entertainment sites visited, the less likely adolescents will be to encounter risks on the internet. The internet activities block explained 2 to 5 percent of the variance among the three equations, which is more influential than the parenting styles block.

One other interesting finding is that going online in the privacy of the adolescents' own bedrooms also allowed significantly more pornographic and violent content to be consumed. As expected, older boys and the less educated reported higher usage of pornographic and violent online content in their own rooms. The female and older are those who are often solicited for pictures, addresses, and other personal information. Demographic variables are the most powerful predictors, explaining 9 to 18 percent of the variance for the three equations.

In sum, as argued by Buckingham and Willett (2006), information literacy – in some way parallel to media literacy – provides people with 'awareness, analysis, reflection, action, and experience that leads to better critical skills such as comprehension, critical thinking, and informed judgments to discriminate all types of information' (2006: 169). These critical skills help to accomplish a large number of goals for social and self-understanding, for action and interaction, and for play.

### *Limitations and suggestions for future research*

As indicated in previous research, risk and harm are not always related (Peter and Valkenburg, 2006). Livingstone (2008a) has shown that it is difficult to limit the risks that young people take online without also reducing the take-up of opportunities. Thus, future studies should investigate what constitutes an optimum balance to be considered by parents. Second, considerable differences exist on developmental stages between teenagers and younger children. Future research in educational and prevention programs should recognize the developmental differences between young and adolescent internet users in terms of literacy, addiction symptoms, parenting style and their effects on

internet risks. Third, results also showed that after controlling for demographics and all other predictor variables, frequency and location of internet activities were able to explain 3 to 5 additional percent of variance on internet risks. Future research should test whether time online and internet activities mediated the relationship between socio-demographics and risks using path analysis.

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### Note

1. Retrieved on Jan.15, 2010 from <http://www.internetworldstats.com/asia/hk.htm> and <http://www.ofta.gov.hk/en/>

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