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# A Screen for Identifying Maladaptive Internet Use

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**Abstract** A screening tool (in Chinese) for maladaptive internet use was developed in two stages. Thirty-five factors were first extracted from data obtained from 378 adolescents with a 179-item questionnaire. Nine higher-order factors were then obtained from 35 factors. A 26-item screen that measures both endogenous and exogenous factors was constructed on the basis of the nine higher-order factors. The screen's split-half validity and concurrent criterion-related validity were ascertained with a new sample of 3,523 adolescents. The screen may be used to classify adolescent internet-users into four categories. Its endogenous part may be used to identify potential problem internet users.

**Keywords** Diagnostic screen · Maladaptive internet use · Addiction

## Introduction

Internet access is a technological marvel that changes inter-personal communication, as well as raises new concerns at both the personal and societal levels. The issue is that a non-negligible proportion of the populace, including adolescents, is surfing internet to an excessive extent. For example, Griffiths and Hunt (1995, 1998) found that a third of the 400 children they surveyed accessed the internet daily, and 7% of them did so for over 30 h/week on the average.

Of greater concern is the fact that adolescents' net surfing is maladaptive. Specifically, their net-surfing or net-access is driven by emotional needs (Seepersad 2004) or issues of identity (Long and Chen 2007). That is, some adolescents surf the internet in reaction, or as

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a means, to deal with some underlying emotional or psychological problems. There is also the worry that maladaptive net-surfing may serve as a conduit for other maladaptive activities (e.g., gambling or cyber-sex).

The phenomenon of excessive, maladaptive net-surfing is deemed so prevalent or serious that Goldberg's (2002/1995) half serious characterization, "internet addiction disorder," is now taken seriously by the general populace and researchers alike. This paper is an attempt to suggest a validated screen for identifying maladaptive internet access.

## Addiction and Internet Addiction

Borrowing a page from studies of alcoholism (e.g., Orford 2001, 2006), one may define "addiction" (regardless of the activity in question) in terms of the following observations:

1. compulsive behavioral involvement,
2. failing to control impulsive behaviors,
3. losing interests in activities other than the activity in question,
4. neglecting obligations or social activities,
5. maladaptive behavior or perseverance,
6. being irritable or aggressive if the activity in question is thwarted,
7. indulging in the activity in question longer than intended by any means,
8. displaying physical or mental symptoms of withdrawal when attempting to stop, and
9. suffering from academic or work difficulties as a consequence.

The phrase, "activity in question," refers to net-surfing in the present discussion. Hence, an individual is deemed "addicted" to the internet when a certain number of the aforementioned characteristics is applicable to the individual's net-surfing activities. As with "pathological gambling," the term "internet addiction" is controversial because of its unfounded medical connotation or the implied physiological dependence (Walker 1992). For example, drug addicts approach a drug-intake occasion with dread, not enthusiasm or optimism. Problem gamblers, on the other hand, approach a new gambling session with optimism and enthusiasm. For this reason, the term "problem internet-user" is used in the present discussion. In like vein, "maladaptive internet use" is used instead of "internet addiction."

Note, at the same time, that items (1) through (9) are not endogenous characteristics of an individual. Instead, they are how people around the individual characterize the individual or consequences brought about by the activity in question. For ease of exposition, characteristics (1) through (9) will be called "exogenous factors" henceforth as opposed to an individual's endogenous characteristics (e.g., attitudes or motives or traits).

## Problem Internet-Use

Professionals concerned with adolescents' welfare need to be able to identify *problem internet-users*—actual or prospective. They may appeal to extraneous factors (1) through (9) for such a purpose. Indeed, Young (1998) used many of those criteria in her screening tool. For example, an individual with a score of 80 (out of 100) or higher is deemed suffering from "internet addiction."

Useful as the exogenous factors are in singling out actual problem internet-users, they are not helpful in identifying prospective problem internet-users for preventive purposes. Nor are they informative as to why a novice internet-user might subsequently become a

problem internet-user. The simple reason is that exogenous variables say nothing about an individual's endogenous attributes (e.g., the individual's cognition or temperament or personality trait or attitudes). As endogenous factors have been recognized in some theories of gambling (e.g., Gupta and Derevensky 1998; Ladouceur et al. 1994; Walker 1992), endogenous factors are equally relevant to problem internet-use.

It follows that a more useful screening tool must, in addition to the exogenous factors, include endogenous attributes such as an individual's (1) attitudes towards the internet, (2) feelings about internet use, (3) motives underlying internet access, or (4) distorted thinking about net-surfing. Young (1998) has incorporated some cognitive features in her screening tool.

## A Screen for Internet Use (in Chinese)

Subsequent to a survey conducted in Hong Kong about adolescents' internet-use, we constructed a screening tool (in Chinese) for classifying internet-users, in which both exogenous and endogenous factors are incorporated (see Appendix 1 for the English translation of the screen). There were two phases to the screen-development project. An initial survey was conducted in Phase 1. The screen was validated in Phase 2. Also established in Phase 2 was the *Screen*'s reliability.

### Phase 1: A Survey

Data were obtained in Phase 1 from 378 participants, 173 males and 187 females. Their mean age was 12.84 with a standard deviation of 1.53. The participants came from the equivalents of Grades 6 through 10.

The research instrument used was a 179-item questionnaire about computer use. Apart from items about demographic information, the questionnaire was made up of Likert-scale items that went from −2 (Strongly Disagree) to 2 (Strongly Agree). The questions were about (a) how much time an individual spent on using computer or surfing net, (b) the reasons why they engaged in net-surfing, (c) the activities carried out while using computer or surfing net, and (d) whether or not their net-surfing resulted in difficulties or undesirable consequences.

### Exploratory Factor Analysis

The exploratory factor analytic (EFA) procedure with oblique rotation was used to ascertain the pattern among the 179 variables measured with the questionnaire. They yielded 35 factors, from which nine higher-order factors were derived with orthogonal rotation. A 26-item *Internet-user Assessment Screen* (called the *Screen* henceforth) was then derived from the nine higher-order factors (see Appendix 1).

### Phase 2: The *Screen*—Validity and Reliability

The main purpose of Phase 2 was to assess how well the *Screen* performs. Part and partial of the exercise is to ascertain its validity and reliability. Nonetheless, also of interest were an individual's net-surfing history, internet activities, and whether or not the individual had attempted to reduce his or her net-surfing activities.

Data were collected in Phase 2 from 3,523 students (the equivalents of Grades 6 through 10) with the *Screen*. The mean age of 1,947 boys was 12.33 (standard deviation=1.66). The mean age of 1,576 girls was 12.15 (standard deviation was 1.60).

**Table 1** Comparing Males and Females in Terms of Four Variables

| Variable | Male | Female | Significance of difference |
|---|---|---|---|
| Number of years using the computer | 3.98 (1,965) | 3.93 (1,584) | Not significant |
| Number of years surfing the net | 3.75 (1,965) | 3.70 (1,584) | Not significant |
| Average number of days per week surfing the net | 3.79 (1,962) | 3.58 (1,585) | $t_{(df=3545)} = 4.39$ |
| Average number of hours using the computer per day | 2.73 (1,961) | 2.48 (1,584) | $t_{(df=3543)} = 6.11$ |
| Average hour–day | 8.37 (1,951) | 7.09 (1,580) | $t_{(df=3529)} = 6.50$ |

*History and Frequency of Computer Use*

Table 1 shows that there is no statistical difference between males and females in terms of (1) how long they have been using the computer (Item *A*), and (2) how long they have been surfing the net (Item *B*). Boys spend more days per week $\left[t_{(df=3545)} = 4.39\right]$, as well as more hours per day at the computer $\left[t_{(df=3543)} = 6.11\right]$, than girls.

For validation, Items *C* and *D* are combined to derive the variable, "average day–hour" (i.e., $C \times D$). As the value of either item ranges from 1 through 5 (see the entries in square brackets in Appendix 1), the maximum value of "average day–hour" is 25. Boys scored higher than girls in terms of the "average day–hour" variable $\left[t_{(df=3529)} = 6.50\right]$.

*Attempt at Reducing Computer-Use*

Fifty-five percent of respondents reported having attempted to reduce computer-use or net-surfing. A higher proportion of female respondents (59.70%) than their male counterparts (52.21%) reported having attempted to reduce internet use. The difference between the number of boys and that of girls who attempted to reduce computer use is significant ($\chi^2_{(df=1)} = 19.52$; see Table 2).

Among those who had attempted to reduce computer use, the number of boys and that of girls differed in whether or not they succeeded $\left(\chi^2_{(df=1)} = 9.475\right)$. Eighty-one percent of boys succeeded, whereas 85.90% of girls succeeded (see Table 3).

*Internet Activities*

Adolescent respondents in the survey were asked to name three activities they most frequently carried out while surfing net. As shown in Table 4, doing homework was not among the three most commonly carried out activities; it was the fourth activity. Instead,

**Table 2** Number of Males and Females Who Attempted to Reduce Net-Surfing

| | | Sex | | Total |
|---|---|---|---|---|
| | | Male | Female | |
| G: reduction attempted? | Yes | 1,085 | 877 | 1,962 |
| | No | 993 | 592 | 1,585 |
| Total | | 2,078 | 1,469 | 3,547 |

**Table 3** Number of Successes For Boys and Girls Among Those Who Attempted to Reduce Computer Use

| | | Reduction successful? | | Total |
|---|---|---|---|---|
| | | Yes | No | |
| Sex | Male | 874 | 207 | 1,081 |
| | Female | 853 | 140 | 993 |
| Total | | 1,727 | 347 | 2,074 |

they socialized (ICQ) or amused themselves (surf net for games) or entertained themselves (e.g., downloading songs).

## Validity of the *Screen*

Scores on the exogenous factors do not inform an individual's endogenous attributes. However, the exogenous variables (as represented by Items C, D, E, F, 6, 11, 13 and 19 of the *Screen*; see Appendix 1) are often used as observable criteria of maladaptive internet use. The maximum value of the exogenous variables was 31 for the following reasons.

With exception of Items C, D, and F, agreeing with each of the other five exogenous variables has a score of 1, 0 otherwise. Disagreeing with Item F has a score of 1, 0 otherwise. The score-values of the five options of Item C or D are shown in square brackets in Appendix 1. Items *C* and *D* are used to derive the "average day–hour" variable (i.e., =C×D). Hence, the maximum value of the exogenous items is 31.

Sixteen items of the *Screen* (viz., Items 1, 2, 3, 4, 5, 7, 8, 9, 10, 12, 14, 15, 16, 17, 18 and 20), on the other hand, represent an individual's attitudinal, cognitive or emotional characteristics that are relevant to internet use. As they measure something 'inside' the individual, they may be characterized as the "endogenous" component of the *Screen*. The maximum value of the endogenous items is 16 because agreeing with each of the item gave a score of 1.

### Criterion-Related Validity

The endogenous component of the *Screen* has criterion-related validity to the extent that it correlates significantly with the *Screen*'s exogenous component. The significant correlation of 0.527 $(df = 3,376 \text{ at } \alpha = 0.05)$ between the endogenous and exogenous components means that the endogenous component of the *Screen* has criterion-related validity. As the endogenous and exogenous variables were measured at the same time, established was the concurrent criterion-related validity (Anastasi 1976).

**Table 4** Use of Computer for the Following Activities (Respondents Could Choose Up to Three Options)

| | Homework | Cyber games | Email | ICQ, etc. | Surf web | Collect information | Download songs, etc. | Blogging | News groups | Other reasons |
|---|---|---|---|---|---|---|---|---|---|---|
| *N* Valid | 104 | 224 | 69 | 237 | 133 | 91 | 150 | 78 | 44 | 12 |

### Reliability of the *Screen*

Four items of the *Screen* (viz., *A*, *B*, *C* and *D*) were excluded in ascertaining its reliability. Eleven pairs of conceptually related items may be identified from the remaining 22 screen items. They were divided into Sets *I* and *II* as follows:

Set I E, F, 1, 2, 3, 6, 7, 10, 13, 14, and 15
Set II 4, 5, 8, 9, 11, 12, 16, 17, 18, 19, and 20

The split-half reliability of the screen was ascertained with the correlation coefficient between Sets *I* and *II*. The correlation of.66 is statistically significant at the 0.05 level. That is, the screen has split-half reliability (Anastasi 1976).

### Applicability of the *Screen*

A brief digression into gambling studies may prove helpful in a discussion of the applicability of the *Screen*. First, gamblers are classified on a continuum rather than in terms of an absolute dichotomy between "problem gambler" and "non-problem gambler." Specifically, an individual is classified as one of the four possible types of gamblers, namely, problem gambler, at-risk gambler, regular gambler or occasional gambler (Leung et al. 2003). Second, although actual estimates vary from study to study, it seems reasonable to assume that, in general, 5% of gamblers are problem gamblers, 15% are at-risk of being problematic, 65% are regular gamblers, and 15% are occasional gamblers.

#### The Total Screen Score

Suppose that internet-users are placed on a continuum which consists of "problem users," "at-risk users," "regular users," and "occasional users" in terms of the total *Screen* score. For such a purpose, Items *A* and *B* were not used. A "No" answer to Item *F* gave a score of 1 (i.e., failing to reduce internet use), whereas a "Yes" answer gave a score of 0. Agreeing the "Everyday" option of Item C gave a score of 1, whereas the other four options gave a score of 0. Agreeing with the "4 hours to 5 hours 59 minutes" gave a score of 1, whereas agreeing with the "6 hours or more" gave a score of 2. The other options gave a score of 0. Hence, the maximum total *Screen* score was 25.

Following the general practice adopted in gambling studies, one may use the 95th, 80th, and 15th percentiles of the total *Screen* score as the criteria for classifying individuals into the four categories depicted in Table 5. As may be seen from Table 6, the total *Screen* scores at the 95th, 80th, and 15th percentiles are 17, 12, and 3, respectively (out of 25).

**Table 5** Categories of Internet-Users

| User-category | Criteria | Symptoms |
|---|---|---|
| Occasional users | Hobby, not excessive, self control | Internet access in spare time only |
| Regular users | Habitual | Regular but sensible access |
| At-risk users | Impulsive, sometimes loses control | Getting hooked, some undesirable consequences |
| Problem users | Total loss of control<br>Anger when stopped | Maladaptive perseverance, personal or academic difficulties |

**Table 6** Proposed Cut-Off Criteria of Categories of Internet-Users Based on the Total or Endogenous Score of the *Screen*

| Categories of internet-users based on the total or endogenous score | | | |
|---|---|---|---|
| User-category | Percentile | Total score (out of 25) | Endogenous score (out of 16) |
| Occasional users | Below 15th | 3 or lower | 2 or lower |
| Regular users | 15th to below 80th | 4–11 | 3–7 |
| At-risk users | 80th to below 95th | 12–16 | 8–10 |
| Problem users | 95th or above | 17 or above | 11 or above |

## A Complication and Its Resolution

What is being established is the concurrent criterion-related validity of 16 endogenous items of the *Screen*. Yet, the criteria used to categorize computer-users are based on the total *Screen* score. Are the cut-off criteria based on the total *Screen* score valid? The 95th, 80th, and 15th percentiles of the endogenous scores are 11, 8, and 2, respectively (out of 16). As may be recalled, the cut-off point for the "Problem" category in the case of the total score is 17 (out of 25). The cut-off criterion for the "Problem" category in terms of the cumulative frequency of endogenous scores is 11 (out of 16). The two ratios, "17:25" (0.68) and "11:16" (0.6875) are nearly identical. That is, the cut-off criteria reported in Table 6 are warranted by the concurrent criterion-related validity of the endogenous component of the *Screen*.

## Summary and Conclusion

The *Internet-user Assessment Screen* has an exogenous as well as an endogenous component. It has split-half validity and concurrent criterion-related validity. Of interest is the fact that problem internet users could be identified with or without the exogenous component of the *Screen*. This state of affairs means that it may be possible to identify potential problematic internet users with only the endogenous component. This may prove useful for prevention of maladaptive internet use.

Suppose that an individual's net-surfing activities are not yet excessive (Items *C* and *D*) or that the individual has not attempted to reduce net surfing (Items *E* or *F*) or that the individual has not yet suffered from any undesirable consequences or difficulties. That is, the individual is not yet a problem internet user in terms of the exogenous variables. The individual's endogenous score may, nonetheless, be high enough to warrant special attention. That is, the endogenous component alone may be used as a predictive tool.

A constant refrain about problem internet use is the observation that the individual in question spends an excessive amount of time net-surfing. What is not obvious is the implicit assessment that the activities carried out on the net are deemed inappropriate or improper. For example, an adolescent surfing net every day for 3 h or more doing homework may not be deemed a problem internet user. It is, hence, of interest to know what adolescents do when they surf net.

As may be recalled from the "Internet activities" subsection, doing homework was only the fourth most commonly engaged internet use. One could have easily included activities like using ICQ, downloading music, and the like as an exogenous criterion for identifying

problem internet users. This criterion was not adopted because it might partly be a by-product of the curriculum for Grades 6 through 10 in Hong Kong. There might simply be no need for using internet resources for school work. Moreover, there might also be the possibility that there were insufficient internet materials in Chinese for the school grades in question.

## Appendix 1: A Translated Version of the Internet-Use Screen. [The value for an item is in square brackets.]

Problem Internet-Use Screening Tool

Name: Sex:
Age: Grade:

[A] How long have you been using computer?
[B] How long have you been surfing the net?
[C] How many days, on average, do you spent on using the internet? [Value used for validation in square brackets; value used for classification in parentheses]

| | | |
|---|---|---|
| □Less than 1 day [1] (0) | □1 to 2 days [2] (0) | □3 to 4 days [3] (0) |
| □5 to 6 days [4] (0) | □Everyday [5] (1) | |

[D] How many hours per day, on average, do you spent on using the internet? [Value used for validation in square brackets; value used for classification in parentheses]

| | | |
|---|---|---|
| □Less than an hour [1] (0) | □1 to 1 hour 59 minutes [2] (0) | □2 hours to 3 hours 59 minutes [3] (0) |
| □4 hours to 5 hours 59 minutes [4] (1) | □6 hours or more [5] (2) | |

[E] Have you attempted to reduce the amount of time using the internet? [1]
[F] Were you successful in your attempt to reduce the amount of time spent on the internet? [1 if the answer is "No"]

For each of the following items, choose the option that describes you: [1]

| | Description | Agree | Disagree |
|---|---|---|---|
| 1 | I often use MSN or ICQ of Blogs. | | |
| 2 | I surf net to avoid doing homework. | | |
| 3 | Net surfing is better than going to school or going out. | | |
| 4 | I surf net because I have nothing better to do. | | |
| 5 | I get onto the internet when I am unhappy or anxious. | | |
| 6 | My parents worry that I spend too much time surfing net. | | |
| 7 | I had gambled or visited pornographic sites on the net. | | |
| 8 | My cyber friends give me the supports I need. | | |
| 9 | I get onto the net for games or movies or music. | | |
| 10 | I can express myself on the net with no inhibition. | | |
| 11 | Net surfing affects my academic performance. | | |

| | |
|---|---|
| 12 | I feel lost or lonely when I am not on the net. |
| 13 | I quarrel with my family because of my net surfing. |
| 14 | I keep thinking about the net when I am not surfing net. |
| 15 | I need increasingly more time on the net to be satisfied. |
| 16 | I feel fidgety when I am not on the net. |
| 17 | I always spend more time on the net than budgeted. |
| 18 | I socialize less because of net-surfing. |
| 19 | I don't want my parents to know of my net-surfing. |
| 20 | I am addicted to the internet. |

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