

**Associations between Internet addiction behavior and perceived health status**

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**Abstract**

Internet addiction is prevalent among people in numerous countries, especially young people. Internet addiction behavior is influenced by many factors and affects entire societies and cultures. This study explored the relationship between Internet addiction behavior and perceived health status. SPSS 24.0 statistical analysis was conducted on 1566 valid survey samples. The results indicate that after prolonged mobile phone use, women were more likely than men to experience eye soreness, muscle soreness, or other physical discomfort. Participants with high scores in self-rated Internet addiction were more likely to go to bed late, resulting in mental inactivity during the day. They also reported more use of mobile phones before bedtime, resulting in decreased sleep time and quality. Respondents under 40 years of age were more likely than those aged 40–59 years to use a phone before bedtime and to experience consequent decreased sleep time or quality. Respondents under the age of 29 years experienced more difficulty concentrating than those aged 40–59 years. Finally, the prevalence of Internet addiction is increasing, and related problems affect people's physical and mental health. Thus, further research should be performed to extend relevant epidemiological findings.

**Key words:** Internet Addiction, Perceived health status, Gender

**Introduction**

According to the National Communications Commission, from the beginning of 2006 to the end of August 2015, the total number of mobile communication users climbed from 1.46 to 29.45 million, for a total user increase of 27.99 million over the prior 10 years (National Communications Commission, 2015). These new Internet users are prone to symptoms of Internet addiction. Ivan Goldberg proposed the recognition of Internet addiction disorder (IAD) in 1996. In addition to IAD, numerous descriptions of harmful conditions involving inability to control one's Internet use have been suggested in the literature, such as Internet dependency, problematic Internet use, and pathological internet use (Chou, Condron, & Belland, 2005; Shapira, Goldsmith, Keck, Khosla, & McElroy, 2000). Numerous studies have been conducted to identify the causes of Internet addiction, and psychological and environmental risk factors have been reported (Wang, 2009). Researchers have systematically reviewed the literature and identified risk factors such as low self-esteem, alienation from peers, family dysfunction, boredom, schoolwork setbacks, nervousness, depression, and social anxiety.

Based on their collations of previous studies, Ko et al. (2012) and Kuss and Griffiths (2014) have reported that 4% of students (14–18 years old) in the United States exhibited problematic Internet use behavior; 2.0% of adolescents (12–18 years old) in Norway demonstrated Internet addiction; the prevalence of Internet addiction among Finnish teens (12–18 years) was 1.4%–1.7%; studies conducted in the Netherlands have indicated that 3.7% of adolescents (11–19 years of age) exhibited potential Internet addiction; Spain's relevant studies have indicated that the percentage of adolescents with

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Internet use problems was between 5.0% and 6.1%; the prevalence of Internet addiction among Greek students was 5.3%–15.2%; Italian studies have reported Internet addiction among 36.7% of high school students and severe Internet addiction among 0.8% of high school students; and a Turkish survey revealed that 5.0%–11.6% of teenagers exhibited Internet addiction or Internet overuse.

Researchers have identified a positive relationship between time spent online and Internet addiction (e.g., Chou, Chou, & Tyan, 1998; Chou & Hsiao, 2000; Lin, Ko & Wu, 2011; Yang & Tung, 2007). Internet addiction may also be related to communication pleasure. Internet users with higher enjoyment of communication are more likely to develop Internet addiction (Chou, Chou, & Tyan, 1998; Chou & Hsiao, 2000). Furthermore, personality traits of high happiness are related to Internet addiction (Chen et al., 2003). Social- or recreational-based motivations and satisfaction are also positively related to Internet addiction (Yang & Tung, 2007). Related research has revealed a partial link between Internet addiction and mental disorders, including substance use disorder, attention deficit hyperactivity disorder, depression, social phobia, and hostility. (Ko et al., 2012; Yen et al., 2007; Yen et al., 2009).

Greater degrees of Internet addiction are also associated with physical symptoms, including headache, insomnia, muscle numbness, dry eyes, and blurred vision. (Ministry of Education, 2016). According to environmental epidemiological observations, the prevalent use of computers, communication products, and consumer electronics has resulted in a new group: so-called “phubbers,” people who use mobile phones for long periods of time while ignoring their surroundings. Phubbers may exhibit humpback, lifted shoulders, and tight posture, resulting in stiff neck and shoulders. In severe cases, mobile-phone-use-related posture may cause tension headache, cervical antinow, arm pain, and finger numbness. Mobile phone overuse is also potentially associated with macular degeneration and brain tumors. Thus, Internet and mobile phone addiction are serious concerns. Accordingly, this study conducted an epidemiological investigation related to Internet addiction.

### Methods

This study conducted SPSS 24.0 statistical analysis of secondary data from the “2015 Internet Addiction Study,” sourced from the Survey Research Data Archive. Computer-assisted telephone interviewing (CATI) was used to collect data for the survey. A logic check was conducted during CATI to improve data quality. According to the September 2015 demographic data newly released by the Ministry of the Interior, this survey gathered samples based on the ratio of the population aged 12 years and over in all counties and cities in Taiwan. The distribution of samples across counties and cities was determined according to the stratification ratio, and the total population of each prefecture and city (i.e., the Internet-user and non-Internet-user population) was grouped hierarchically. A total of 1,566 valid samples were gathered in the survey.

The questionnaire comprised six parts. The first part investigated respondents’ personal Internet usage, including the Internet-enabled equipment they owned, whether their mobile phones were connected to the Internet, locations of Internet access in their daily lives, time spent on the Internet, and Internet use behavior. The second part involved self-assessment of Internet addiction, including the type and severity of Internet addiction. The third part assessed Internet

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addiction among respondents using the Chen Internet Addiction Scale (CIAS) (Chen et al., 2003). CIAS indicators include core symptoms of Internet addiction and Internet addiction-related problems. The fourth part evaluated participants' level of mobile phone addiction by using the short version of the mobile addiction scale. The fifth part surveyed participants regarding their perceived health status related to Internet addiction. Finally, participants' personal, social, and economic details, such as gender, age, and occupation, were recorded in the sixth part of the questionnaire.

### Result

The analysis revealed that men accounted for 48.7% of respondents and women accounted for 51.3%. The proportion of people aged 40–49 years was relatively high, accounting for 25.6% of participants, followed by the age groups of 30–39 and 20–29 years, accounting for 22.6% and 18.2% of participants, respectively. Individuals aged 50–59 and 12–19 years accounted for 14.8% and 15.0% of participants, respectively, and respondents aged over 60 years accounted for only 3.7% of the online population surveyed. Most participants were university graduates (38.1%), and the second most prevalent education status was senior high school graduate (30.5%). With regard to occupation, the majority of the participants were students (18.4%), followed by professionals (12.5%). Technicians and assistant professionals accounted for 11.3% and 11.6% of participants, respectively, and service and sales staff accounted for 9.2% of participants. Supervisors and managers accounted for 9.0% of participants. The highest proportion of participants (17%), lived in New Taipei City, followed by the proportions of residents in Taipei City and Taichung, cumulatively accounting for 12.4%. Kaohsiung citizens accounted for 11.6%, and the proportion of people living in other counties and cities was less than 10% (Table 1).

Table 1 Demographic Characteristics of Participants

| Variable  |                 | Number | Percentage |
|-----------|-----------------|--------|------------|
| Gender    | Male            | 788    | 48.7%      |
|           | Female          | 830    | 51.3%      |
| Age       | 12-19           | 242    | 15.0%      |
|           | 20-29           | 295    | 18.2%      |
|           | 30-39           | 366    | 22.6%      |
|           | 40-49           | 414    | 25.6%      |
|           | 50-59           | 239    | 14.8%      |
|           | >60             | 60     | 3.7%       |
| Education | Elementary      | 26     | 1.6%       |
|           | Junior high     | 127    | 7.8%       |
|           | Senior high     | 494    | 30.5%      |
|           | College         | 210    | 13.0%      |
|           | University      | 616    | 38.1%      |
|           | Master          | 141    | 8.7%       |
| Residence | Taipei city     | 201    | 12.4%      |
|           | New Taipei city | 284    | 17.6%      |

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|                |     |       |
|----------------|-----|-------|
| Taichung city  | 200 | 12.4% |
| Kaohsiung city | 188 | 11.6% |

The survey indicated that 21.2%, 17.9%, and 14.6% of people averaged 2–3, 1–2, and 3–4 hours of Internet access every day, respectively. On average, participants spent 3.4 hours a day on the Internet. Participants aged 20–29 years reported the longest Internet use times, with an average of 4.5 hours per day. The duration of daily Internet access decreased with increasing participant age; the daily average of people above 60 years of age was 1.7 hours. Higher academic qualifications were associated with longer periods of daily Internet use. Respondents with an education level below the primary school level averaged 1.4 hours of daily Internet access, and those with a university degree or above averaged 4.1 hours of daily Internet access. With regard to Internet-enabled equipment, 95% of participants owned a smart phone, 77.3% owned a desktop computer, 51.8% owned a laptop, 46.6% owned a tablet, 21.4% owned a TV that connected to the Internet, 3.8% owned wearable mobile devices, 0.1% owned other internet-enabled devices (such as game consoles), and 0.5% reported that they did not own any devices that could access the Internet. The survey found that 63.6% of respondents most often used smart phones to access the Internet, and 20.2% used a desktop computer most often, compared with a tablet (8.4%), notebook (4.5%), television (0.4%) or wearable mobile device (0.1%), which cumulatively were the favored devices of less than 10% of survey respondents.

The analysis of participants' online profiles revealed that participation in an online community (e.g., Facebook) accounted for 44.9% of participants' cyber activity, followed by the use of communications software (such as LINE), accounting for 38.9%. Other online activities reported were searching for life or leisure information (27.2%), watching videos (20.1%), reading news (18.8%), playing online games (18.1%), online shopping (7.6%), and listening to music or broadcasts (5.1%). Less than 5% of participants' online activities comprised viewing stocks and other financial information (3.2%), reading comics or novels (2.5%), managing online communities (1.7%), and participating in live broadcasts (such as through games and personal videos; 0.8%). The survey results indicated that outside of work or academic study contexts, 26.7% of participants could continuously access the Internet for a maximum of 1–2 hours a day, 18.5% could access the Internet for 2–3 hours, 16.5% could continuously access the Internet for 0.5–1 hours, and Internet access was available for 3–4 hours for 11.5% of participants. Average daily continuous Internet accessibility was 2.3 hours. Results of the t test revealed that men could continuously access the Internet for 2.4 hours per day, which is significantly higher than the accessibility period reported by women (average 2.1 hours). In addition, after using a mobile phone for a long time, women were significantly more likely than men to experience eye soreness, muscle soreness, or other physical discomfort. T test results are displayed in Table 2.

Table 2 T test of gender and perceived health status

| Variable Set             | Mean              |                     | T value | P value |
|--------------------------|-------------------|---------------------|---------|---------|
|                          | Male<br>(n = 788) | Female<br>(n = 830) |         |         |
| Backache                 | 2.01              | 2.11                | -1.540  | 0.124   |
| Negative physical health | 1.90              | 1.93                | -0.356  | 0.722   |

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| Reduce sleep time       | 1.58 | 1.53 | 0.893  | 0.372   |             |
|-------------------------|------|------|--------|---------|-------------|
| Mental inactivity       | 1.74 | 1.71 | 0.597  | 0.550   |             |
| Eye or muscle soreness  | 1.98 | 2.14 | -0.303 | 0.002** |             |
| Poor sleep quality      | 1.68 | 1.71 | -0.666 | 0.505   | ** p < 0.01 |
| Not concentrate on work | 1.48 | 1.46 | 0.461  | 0.645   |             |

ANOVA results

indicated that continuous daily Internet use differed significantly according to participants' age, education, and occupation. Participants aged 20–29 years reported longer times spent on the Internet as well as continuous Internet accessibility for 3.2 hours per day. By comparison, participants aged 50–59 years reported the maximum continuous access to the Internet of 1.3 hours per day. In terms of educational attainment, people with a high school degree or above could access the Internet for more than 2 hours per day on average. People with a primary education level or below reported daily Internet accessibility of 1.3 hours. In addition, those with high scores in self-rated Internet addiction were more likely to go to bed later than those with medium-level self-reported Internet addiction. The sleeping patterns of the group who scored high for self-reported Internet addiction may have caused mental inactivity during the day. Additionally, participants with high scores used mobile phones before bed more often than those with low scores. Accordingly, significant differences were determined regarding participants' sleep time and quality, as indicated in Table 3. Respondents under 40 years old were more likely than those aged 40–59 to use a phone before bedtime, resulting in reduced sleep time or quality. Respondents under the age of 29 years experienced significantly more difficulty concentrating than those aged 40–59 years (Table 4).

Table 3 ANOVA Test between Internet addition and perceived health status

| Variable Set             | Mean           |            |                |              |                  | Significance | Scheffe's Post Hoc Tests |
|--------------------------|----------------|------------|----------------|--------------|------------------|--------------|--------------------------|
|                          | Very low (n=4) | Low (n=33) | Median (n=151) | High (n=105) | Very high (n=26) |              |                          |
| Backache                 | 2.25           | 2.42       | 2.26           | 2.49         | 2.85             | 0.197        |                          |
| Negative physical health | 2.00           | 2.33       | 2.13           | 2.37         | 2.85             | 0.039*       |                          |
| Reduce sleep time        | 1.75           | 1.61       | 1.73           | 1.93         | 2.19             | 0.195        |                          |
| Mental inactivity        | 1.50           | 1.91       | 1.81           | 2.33         | 2.38             | 0.004**      | 4>3                      |
| Eye or muscle soreness   | 2.50           | 2.47       | 2.54           | 2.73         | 2.83             | 0.408        |                          |
| Poor sleep quality       | 1.50           | 1.66       | 2.20           | 2.35         | 2.13             | 0.008**      | 4>2                      |
| Not concentrate on work  | 1.25           | 1.55       | 1.75           | 1.90         | 1.77             | 0.245        |                          |

Scheffe's Post Hoc Tests: 1) Very low; 2) Low; 3) Medium; 4) High; 5) Very high  
 \* p < 0.05 \*\* p < 0.01

Table 4 ANOVA between age and perceived health status

| Variable Set | Mean          |               |               |               |               |            | Sig.  | Scheffe's Post Hoc Tests |
|--------------|---------------|---------------|---------------|---------------|---------------|------------|-------|--------------------------|
|              | 12-19 (n=242) | 20-29 (n=295) | 30-39 (n=366) | 40-49 (n=414) | 50-59 (n=239) | >60 (n=60) |       |                          |
| Backache     | 1.92          | 2.03          | 2.00          | 2.12          | 2.18          | 2.23       | 0.163 |                          |

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|                          |      |      |      |      |      |      |         |                       |
|--------------------------|------|------|------|------|------|------|---------|-----------------------|
| Negative physical health | 1.90 | 1.82 | 1.77 | 1.97 | 2.10 | 2.23 | 0.01**  |                       |
| Reduce sleep time        | 1.52 | 1.54 | 1.45 | 1.56 | 1.68 | 1.87 | 0.143   |                       |
| Mental inactivity        | 1.74 | 1.88 | 1.69 | 1.61 | 1.73 | 1.88 | 0.094   |                       |
| Eye or muscle soreness   | 2.20 | 2.17 | 2.05 | 1.94 | 2.01 | 2.02 | 0.024*  |                       |
| Poor sleep quality       | 1.92 | 1.89 | 1.78 | 1.50 | 1.42 | 1.52 | 0.000** | 1,2,3>4;<br>1,2,3>5   |
| Not concentrate on work  | 1.71 | 1.63 | 1.47 | 1.31 | 1.30 | 1.55 | 0.000** | 1 > 3,4,5;<br>2 > 4,5 |

Scheffe's Post Hoc Tests: 1) 12–19; 2) 20–29; 3) 30–39; 4) 40–49; 5) 50–59; 6) > 60

\*  $p < 0.05$  \*\*  $p < 0.01$

### Conclusion and Suggestion

A greater proportion of male participants in the 12–19-year-old group exhibited an Internet addiction risk compared with female participants in the same age group, and a higher proportion of women in the 20–39-year-old group exhibited an Internet addiction risk compared with men in the same age group. Controlling for Internet use related to work and study, the results indicated that 3.5% of participants exhibited Internet addiction risk, and a higher participant age was associated with lower proportions of Internet addiction risk. In addition, 10.4% of male participants aged 12–19 years were at a risk of Internet addiction, compared with only 5.0% of female participants in the same age group. Internet addiction among women in the age groups of 20–29 (6.7%) and 30–39 (6.9%) years was higher than that among men in the same age groups (4.1% and 2.2%). Cross-analysis further demonstrated that higher age was associated with lower proportions of mobile phone addiction risk among participants. Among 12–19-year-old participants, 18.4% exhibited an Internet addiction risk, but among participants aged 60 years and above, addiction risk prevalence was only 1.1%.

Relationship addiction may be related to Internet usage patterns. Online community and communication survey results revealed that 39.8% of respondents with self-reported Internet addiction also self-reported addiction to interpersonal relationships. Among survey participants, 23.2% reported feeling like they could not be separated from their mobile phone, and these participants also exhibited cell phone addiction; 22.2% reported that they liked to play games and were found to exhibit game addiction; and 15.2% said that they were interested in various types of information and exhibited addiction to accessing information on the Internet. Further analysis revealed that relationship addiction may have accounted for the high rates of participation in online communities (44.9%) and the use of communications software (38.9%). The survey also indicated that 52.6% of non-Internet addicted people reported experiencing an increased number of interpersonal connections and interactions through the Internet, and viewing this as the main benefit of the Internet, compared with Internet addicts, among whom 37.8% cited interpersonal connectivity as the main benefit of the Internet. Internet addicts mainly reported that the Internet offers a sense of entertainment (51.5%) and can be used to pass the time (42.7%).

This study explored the relationship between perceived health status and Internet addiction. Numerous related inquiries remain to be addressed in future studies. For example, researchers might investigate whether a tendency toward depression contributes to Internet addiction or whether Internet addiction leads to depression. The association between

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pressure from work and schoolwork and Internet addiction should also be examined. In conclusion, the prevalence of Internet addiction is increasing, and related problems are affecting people's physical and mental health. Further research should be performed to extend relevant epidemiological findings.

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