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Are males more likely to be addicted to the internet than females? A meta-analysis involving 34 global jurisdictions

Wenliang Su[a,b,*], Xiaoli Han[a], Cheng Jin[a], Yan Yan[a], Marc N. Potenza[c,d,e,**]

[a] Department of Applied Psychology, School of Humanities and Social Sciences, Fuzhou University, Fuzhou, China
[b] Institute of Psychological and Cognitive Sciences, Fuzhou University, Fuzhou, China
[c] Department of Psychiatry, Child Study Center, Department of Neuroscience, Yale University School of Medicine, New Haven, CT, United States
[d] Connecticut Mental Health Center, New Haven, CT, United States
[e] Connecticut Council on Problem Gambling, Wethersfield, CT, United States

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ABSTRACT

Internet addiction (IA) is prevalent and associated with negative measures of health functioning, with males appearing more vulnerable than females. However, little is known about gender-related differences in the effect sizes of IA globally. This multinational meta-analysis addresses this gap in knowledge by providing estimates of effect sizes of gender-related differences in IA tendencies across jurisdictions and how they relate to global national indexes including gross domestic product (GDP) per capita, internet penetration, gender-related gaps in economies, internet penetration, alcohol consumption, smoking prevalence, life satisfaction and suicide rates. One-hundred-and-one studies consisting of 115 independent samples involving 204,352 participants from 34 countries/regions were identified. The average effect size of gender-related differences in IA in a random-effects model was small at $g = 0.145$. The highest gender-related effect sizes were in Asia with $g = 0.208$, and the lowest were in the North America with $g = -0.049$, Africa with $g = 0.092$ and Europe with $g = 0.114$. Meta-regression revealed that smaller effect sizes were observed in nations with greater GDP per capita and higher internet penetration. As operationalized, both the internet availability and social norms hypotheses were supported by effect sizes being positively related to gender-related differences in economic measures, internet penetration, smoking prevalence and alcohol consumption. The Psychological Well-being hypothesis was largely not supported, since the effect sizes were unrelated to gender-related differences in life satisfaction and negatively related to gender-related differences in suicide rates. Findings suggest economic factors, internet availability, social norms and some addiction-related health factors may relate importantly to gender-related differences in IA tendencies across countries.

1. Introduction

1.1. Internet addiction

Internet addiction (IA) is characterized by excessive or poorly-controlled preoccupations, urges or behaviors regarding internet use that lead to impairment or distress (Shaw & Black, 2008). IA is associated with suicidality even after adjusting for potential confounding variables including depression (Cheng et al., 2018). Such information dovetails with ongoing efforts of the WHO to promote public health and prevent internet-use-related harms and disorders, including with respect to the inclusion of hazardous gaming and gaming disorder in the eleventh edition of the International Classification of Diseases (ICD-11) (King et al., 2018; Potenza, 2018; Rumpf et al., 2018).

IA is a clinically relevant phenomenon that may affect both women and men (Anderson, Steen, & Stavropoulos, 2017; Liang, Zhou, Yuan, Shao, & Bian, 2016). The global prevalence of IA was estimated to be 6.0% (95% CI: 5.1–6.9) according to a meta-analysis from 31 countries spanning multiple global regions (Cheng et al., 2014). Despite multiple publications suggesting that males have higher prevalence estimates of IA (Mei, Yau, Chai, Guo, & Potenza, 2016; Tsitsika et al., 2014), relatively little is known regarding gender-related differences at a global level and gender-specific relationships with other measures across nations.

* Corresponding author. Department of Applied Psychology, School of Humanities and Social Sciences, Fuzhou University, Fuzhou, 350108, China..
** Corresponding author. Yale University School of Medicine, Department of Psychiatry, New Haven, CT, USA.
E-mail addresses: suwenliang@fzu.edu.cn (W. Su), marc.potenza@yale.edu (M.N. Potenza).

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1.2. Gender-related differences in internet addiction

Gender-related differences exist in most addictive behaviors. Studies of substance-use disorders indicate important gender-related differences in epidemiology, social factors and characteristics, biological responses, progressions to dependence, medical consequences, co-occurring psychiatric disorders, and barriers to treatment entry, retention, and completion (Tuchman, 2010). Men are more likely than women to use almost all types of illicit drugs (SAMHSA, 2014). Results from different fields of addiction also show an apparent gender-related disparity with females being less prone to exhibiting most addiction behaviors (Minutillo et al., 2016). This tendency also exists in many behavioral addictions, with many studies suggesting, for example, higher prevalence of IA among males than females (Mei et al., 2016; Tsitsika et al., 2014). A recent review of 7 studies across different cultural groups revealed that most findings converged with males at higher apparent risk for IA, with the difference in gender-related prevalence estimates of IA widening over time (Anderson et al., 2017). This pattern may reflect male tendencies to use applications with potentially high IA risk (e.g., online games or cybersexual activities) (Lin, Ko, & Wu, 2011). Males also score lower than females on IA-related protective factors (e.g., effortful control) and higher on potential risk factors (e.g., maladaptive cognitions) (Li, Zhang, Li, Zhen, & Wang, 2010). Furthermore, female adolescents often receive more family supervision than males, which may help prevent them from spending too much time on the internet (Yu et al., 2013).

Although many studies indicate that males usually have higher levels of IA than females, there exist some contrary data. In a cross-cultural comparison study of IA, males had higher IA prevalence estimates than females (male 15.7% versus female 5.8%) in Chinese samples, and females had higher IA prevalence estimates than males (male 7.3% vs. female 9.7%) in US. samples (Sun et al., 2012). In another study of Turkish high-school students, females had significantly higher IA scores than males (Aylaz, Günes, Günaydin, Kocaer, & Pehlivan, 2015). Furthermore, a recent fMRI study revealed females may have different vulnerabilities to internet gaming disorder than males (Wang et al., 2019). Males and females also show different developmental trajectory courses of IA as boys although reported higher IA scores than girls at initial assessment, they had more rapidly declining rates of change over time than girls (Li, Hou, Yang, Jian, & Wang, 2019). The discrepancy between findings concerning associations between IA and gender was found within and across nations. Some inconsistencies may possibly be explained by uninvestigated cultural differences (Kuss, Griffiths, Karila, & Billieux, 2014). Whereas some studies suggest gender-related differences may vary across countries, little is known about what specific factors may underlie variations in global gender-related differences in IA tendencies. Examination of this question may help illuminate mechanisms underlying this important phenomenon from a global perspective.

1.3. Three potential hypotheses

Internet Availability hypothesis Availability has long been considered an important determinant of addictive behaviors (Mann, 2005). The male predominance in IA prevalence in some countries may relate in part to gender-related differences in internet availability. As reported by the International Telecommunication Union (2016), internet penetration rates are higher for men than for women in virtually all regions of the world. The global internet user gender gap grew from 11% in 2013 to 12% in 2016. The regional gender gap is largest in Africa, at 23%, and smallest in the Americas at 2% (International Telecommunication Union, 2016). The percentage of women using the internet lags behind the percentage of men using the internet in developing countries across all age groups (Antonio et al., 2014). Typically gender-related divides in internet use are larger among new information and communication technologies (ICTs) with low penetration, decreasing gradually as penetration increases (Hafkin and Huyer, 2007). According to Weingarten (2013), two of the most critical factors that may influence whether a woman gets connected to the internet are availability and affordability; therefore, we propose the internet availability hypothesis, which proposes that in countries where it is relatively easier and affordable for individuals to access the internet, there will be greater IA tendencies, and these tendencies will track in a gender-sensitive fashion. To test this notion, we hypothesized that gender-related inequalities in economic participation & opportunity and gender-related gaps in internet penetration would be associated with effect sizes of the gender-related differences in IA tendencies.

Social Norms hypothesis Addictions represent both cultural and biological phenomena (Becker, McClellan, & Reed, 2016). Gender-related norms and values may influence men's and women's exposure to environmental risks in different ways, including through the types of behavior they adopt (WHO Regional Office for Europe, 2010). In the case of substance-use disorders, women may be more likely than men to become addicted when drugs are freely available, and social/legal constraints typically have a greater effect on women than on men (Becker et al., 2016). The use of substances for recreation and pleasure has generally been more acceptable for men than for women, and women may be more likely to be prescribed medications for their problems (Kandall, 1999). Some have argued that the greater constraints on women's drug-taking in many societies have had a protective effect against the development of addiction in women (Becker et al., 2016). Sociocultural customs may also be a factor that restricts women from accessing and using the internet (Hafkin et al., 2007). To examine the potential effect of social norms on gender-related differences in IA, we proposed a social norms hypothesis positing that in a country where its culture may preferentially favor males to engage in behaviors with addictive potential (e.g., alcohol consumption and smoking), there would be higher tendencies of IA in males than females.

Psychological Well-being hypothesis IA symptoms are usually associated with measures of poor psychological well-being (e.g., decreased life satisfaction (Wang et al., 2013), low self-esteem (Wang et al., 2013), subjective unhappiness (Akın, 2012) and depression (Ha and Hwang, 2014; Wang et al., 2013). Teenagers who reported 5 h or more of daily video games/internet use were more likely to exhibit sadness, suicidal ideation, and suicide planning (Erick, Juan, Anil, Manzoor, & Dale, 2011). Higher prevalence estimates of IA have been found in nations with lower life satisfaction indexes (Cheng and Li, 2014). Given that gender-related differences in life satisfaction vary among countries (for example, females have higher life satisfaction than do males in some regions (e.g., North America and Southeast Asia), but the reverse is true in other regions (e.g., Central and Eastern Europe) according to the *World Happiness Report* (Fortin, Helliwell, & Wang, 2015)), they may relate to gender-related differences in IA tendencies. It was also proposed that males' overindulgence in use of the internet may reflect desires to escape into cyberspace as a self-soothing behavior or self-medication in reaction to internalized depressed mood (Jang & Ji, 2012). Based on the above findings, we proposed a psychological well-being hypothesis positing that gender-related gaps in life satisfaction would negatively correlate with gender-related differences in IA tendencies across countries, while gender-related gaps in suicide rate would be positively correlated.

1.4. The current study

As understanding the biological, psychological and social processes underlying addictive behaviors is an important basis for improving prevention and treatment strategies (Potenza, Higuchi, & Brand, 2018), it is worthwhile to examine whether gender-related differences in IA exist across different countries and how these may be associated with gender-related differences in other theoretically linked domains including economic development, internet access, cultural norms and measures of well-being. Given seeming inconsistencies in gender-related differences in IA within and across the countries, a meta-analysis is possible and needed to address the following key questions:

(i) To what extent are males likely to exhibit IA in different jurisdictions globally?
(ii) What national factors may help to explain the observed heterogeneous gender-related effect sizes in IA across nations? Among the internet availability, social norms, and psychological well-being hypotheses, which ones will be supported?

2. Methods

2.1. Literature search

We searched the ScienceDirect, Springer, Wiley, MEDLINE, ProQuest, and Web of Science databases (year: 2010–2019) of peer-reviewed journals for the following terms: ("Internet addiction" OR "Problematic internet use" OR "Pathological internet use" OR "Net addict" OR "Cyber addict" OR "Online addiction" OR "Internet overuse" OR "Compulsive internet use" OR "Excessive internet use" OR "Internet dependence") AND ("Gender"). We entered these terms in the keywords, title and abstract sections. The literature search was completed in February 2019 (including online-first publications). The year 2010 was chosen as an initial time for articles given that the internet and how people use it have changed over time, and we believe that a focus on the most recent 10 years is most informative for understanding more current patterns of IA. Also, in order to detect other studies, the references of recent studies and reviews on this topic were considered.

2.2. Selection of studies

Our search resulted in 2622 records for screening to identify eligible studies. The articles in our meta-analysis were included based on the following criteria: a) studies reporting original empirical findings; b) the sample was recruited from community populations (rather than clinical samples) of both males and females; c) the study reported data that allow for calculating the effect sizes of gender-related differences in IA (Hedges' g); d) the IA measurement assessed generalized IA rather than specific subtype of IA (e.g., internet gaming disorder or smartphone addiction); and, e) the manuscript was written in English. Exclusion criteria: a) data were collected from more than one country and could not be separated by country; and, b) the manuscript reported the same sample pool used in previously included studies.

If there were more than one wave of data, then the latest data were chosen for coding. Studies that only reported the prevalence of IA were identified and the authors were emailed to request the means and standard deviations of IA for males and females (we emailed 71 authors, and 17 provided the effect-size data). In the end, 101 studies with 115 independent samples met the criteria for the meta-analysis (see Fig. 1).

2.3. Coding

Studies that met the inclusion criteria were coded for: study identification data (author, year of publication, title), year of data collection, effect-size data (sample sizes, IA means, standard deviations of gender groups; if standard deviations were not reported, then t-value or p-value were coded), IA measurement, sample age characteristics (mean, standard deviation, range, and age group), and country of the sample. Three coders (XH, CJ, YY) independently scored all coding dimensions. All coders had adequate research experience in meta-analysis, and were well trained in coding IA measurements and effect-size data. The inter-rater consistency was 0.96.

2.4. Data quality evaluation

For the purpose of weighting the effect size by study quality, we developed a Data Quality Index (DQI) through the following two measures: a) *Sample representativeness*, in which each included study would have initial score of 1, and if the sample came from a national distribution, with probability sampling, or with age diversity it would get 1 more point added to the score for each feature. Thus, scores ranged from 1 to 4. b) *Sample size*, in which the larger sample size would get higher scores, were determined logarithmically (score = lg (N)). The score of sample size was 2.00–4.52 in the current study. The DQI total score = sample representativeness score + sample size score.

2.5. National indexes

Gross domestic product (GDP) per capita GDP per capita (in U.S. dollars) of each country was downloaded from the website of the International Monetary Fund.[1] The dataset included 225 countries from year 2000–2022 (with predictions for future years). We used the natural log of the GDP per capita as an indicator of economic development (Souza et al., 2015).

Internet penetration Internet penetration by country was retrieved from the International Telecommunication Union (ITU) statistic.[2] The dataset included 229 countries'/regions' percentages of individuals using the internet from years 2000–2017.

Gender-related gaps in internet penetration A gender-disaggregated internet penetration dataset was retrieved from the ITU World Telecommunication/ICT Indicators database. The dataset used in the current study was combined from two separate reported data, one included the period of 2008–2010 with 67 economics[3] and another included the period of 2014–2017 with 90 economics.[4] We calculated gender-related odds ratios (ORs) as national indicators of gender gaps in internet penetration. ORs > 1 reflected higher odds of internet access for males as compared to females.

Gender-related gaps in economic measures We extracted the Economic Participation and Opportunity subindex from annual reports of *The Global Gender Gap Report* by the World Economic Forum.[5] The subindex measures gender-related inequalities in labor force participation and income. The value ranged between 0 (imparity) and 1 (parity). To be consistent with the directionality of the other national indexes, we reversed the data, so that the higher score corresponded with higher gender-related inequality (male dominant) in economic measures. We used the data from the reports in years 2010–2018, including 145 countries.

Gender-related gaps in smoking prevalence The dataset of gender-disaggregated smoking prevalence was retrieved from the World Health Organization (WHO).[6] Smoking prevalence was defined as "the percentage of the population aged 15 years and over that currently uses any tobacco product (smoked and/or smokeless tobacco) on a daily or non-daily basis."[7] Tobacco smoking included cigarettes, cigars, pipes or any other smoked tobacco products. The dataset provided 130 countries' gender-disaggregated smoking prevalence estimates in the years 2000, 2005, 2010, 2012 and 2015. We calculated the gender-related OR as the national indicator of the gender-related gap in smoking prevalence estimates. ORs > 1 reflect males having higher odds of smoking than females.

[1] http://www.imf.org/external/datamapper/NGDPDPC@WEO/OEMDC/ADVEC/WEOWORLD

[2] https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2018/Individuals_Internet_2000-2017_Dec2018.xls.

[3] http://www.itu.int/ITU-D/ict/statistics/gender/index.html.

[4] https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

[5] https://www.weforum.org/reports/the-global-gender-gap-report-2018.

[6] http://apps.who.int/gho/data/view.sdg.3-a-data-ctry?lang=en.

[7] http://apps.who.int/gho/data/node.wrapper.imr?x-id=346.

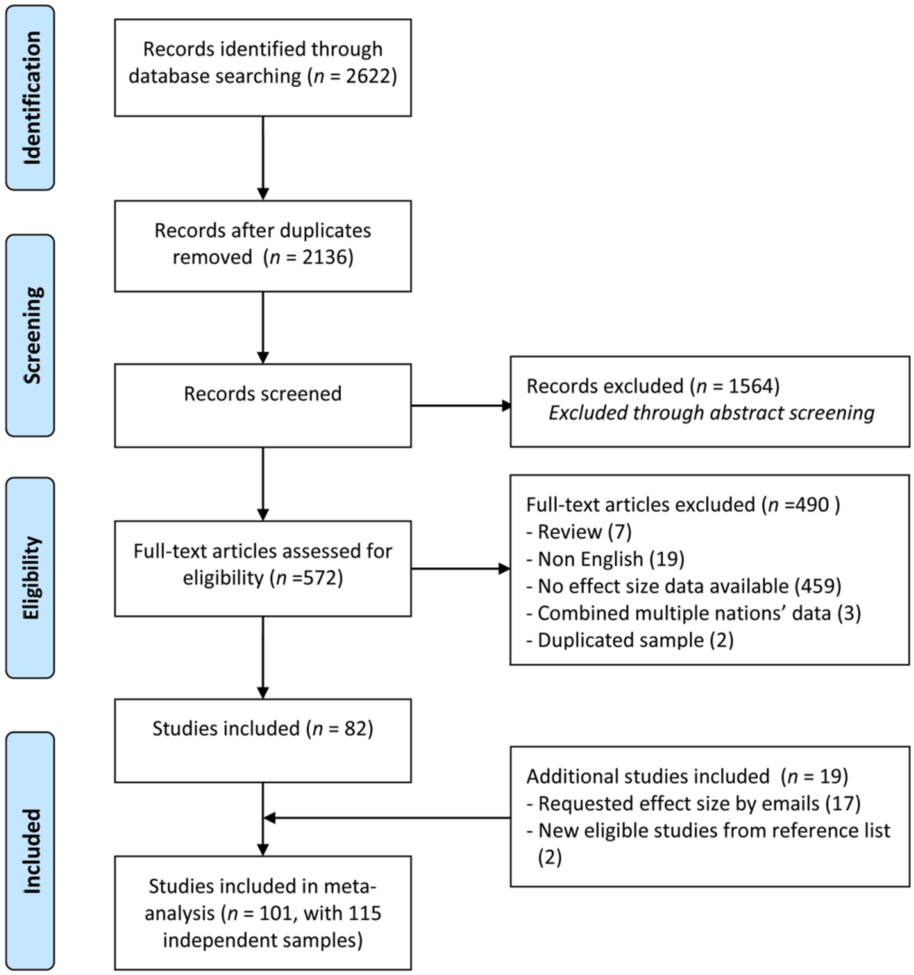

Fig. 1. Flow diagram for the included studies in meta-analysis.

Gender-related gaps in alcohol consumption The dataset of gender-disaggregated alcohol consumption was retrieved from the WHO.[8] Alcohol consumption was defined as total amount (recorded 3 year average + unrecorded) per capita (age 15+) consumption (in liters of pure alcohol) over a calendar year.[9] Recorded alcohol consumption refers to official statistics (production, import, export, and sales or taxation data), while the unrecorded alcohol consumption refers to alcohol that is not taxed and is outside the usual system of governmental control. It included data from 194 countries in the period of 2008–2010. We calculated gender-related ratios by dividing male consumption by female consumption, so that the ratios > 1 reflect males consuming more alcohol than females at national levels.

Gender-related gaps in life satisfaction The Gallup World Poll is a well-known source of cross-country data and research on self-reported life satisfaction (Ortiz-Ospina & Roser, 2017). Since we cannot retrieve gender-disaggregated data from the original source, the gender-related gap in life satisfaction was extracted from Montgomery (2016), which reported the gender-related gap data from the Gallup world poll including 109 countries surveyed in years 2011–2014. In Montgomery (2016), the gap was calculated as female scores minus males score with anchoring vignettes adjustments; thus, positive value reflect female being happier than males. To be consistent with directionality of the other national indexes, the data were reversed so that positive numbers reflect males reporting higher levels of life satisfaction than females.

Gender-related gaps in suicide rates The dataset of gender-disaggregated suicide rate (per 100,000 population) was retrieved from the WHO[10]. The dataset provides gender-disaggregated age-standardized suicide rates from 183 countries in years 2000, 2010, 2015 and 2016. We calculated gender-related ORs as national indicators of gender-related gaps in suicide rates. ORs > 1 reflect males demonstrating higher odds of suicide than females.

2.6. Data analysis

Since there were several zero values observed in one or both gender groups in some countries among the information/indexes derived from the national datasets, the computation of odds ratio would have yielded computational errors. Most meta-analytical software (e.g., RevMan) automatically check for problematic zero counts, and add a fixed value (typically 0.5) to all cells of study results tables where the problems occur (Higgins & Green, 2011 the OR which has such properties is obtained when adding 0.5 to each cell of the table and it was shown that this approach may have smaller finite sample bias and larger mean square error (Parzen, Lipsitz, Ibrahim, & Klar, 2002). Thus, to avoid computational error and decrease the finite sample bias in the current study, the ORs and relative ratios of the national indexes were adjusted by adding 0.5 to every cell.

The data of national indexes were matched with effect sizes by year. If a study's survey year was reported, then we matched by the survey

[8] http://apps.who.int/gho/data/node.main.A1036?lang=en.
[9] http://apps.who.int/gho/data/node.wrapper.imr?x-id=465.
[10] http://apps.who.int/gho/data/node.main.MHSUICIDEASDR?lang=en.

year; otherwise, we matched by publication year (among the 101 studies, 50 reported survey year). Since some of the national indexes datasets did not have complete records in every year, the effect sizes were matched to the closest year's data.

To control for variations in sample size among studies, we calculated Hedge's g coefficients for the effect size estimates. Effect sizes of ≥ 0.80 were considered large, ≥ 0.50 were considered moderate and ≥ 0.20 were small effects (Cohen, 1988). Positive effect sizes indicated that males had higher IA level than females, while negative effect sizes indicated females had higher IA level than males. Effect sizes were computed using random-effects models. We used the Q statistic to test the heterogeneity of effect sizes and the I^2 to describe what proportion of the observed variance would remain if we could eliminate the sampling error (Borenstein, Higgins, Hedges, & Rothstein, 2017). In order to explain the observed heterogeneity in effect size, we performed subgroup analyses with categorical variables (e.g., region and population) and meta-regression analyses with continuous variables (e.g., national indexes). To test the publication bias, we used funnel plots and Egger regression test (Egger, Smith, Schneider, & Minder, 1997) to assess for asymmetry. Confidence intervals (CIs) were used to interpret the significance of mean effect sizes. In this paper, a 95% confidence interval was calculated. If it excludes 0, the mean effect size is statistically significant at a 0.05 level.

The analysis was computed with independent sample level (k = 115) and country level (n = 34) separately. The average effect size, subgroup analysis and meta-regression were based on the sample level. We also provided visualized world distributions of effect sizes and relationships of effect sizes and national indexes at the level of countries. At country level, both effect sizes and national indexes were averaged by weighting the DQI. We used a logarithmic value since the pattern was heavily tailed across countries.

All statistical analyzes were run using the “metafor” package (version 2.0, Viechtbauer, 2010) for R software (version 3.4.2).

3. Results

3.1. Sample description

The dataset included 115 independent effect sizes of gender-related differences in IA tendencies from 204,352 participants in 34 countries/regions. The sample sizes ranged from 100 to 33,211. About half (48.1%) of the participants were male. Characteristics, including sample characteristics, measures and effect sizes, were recorded for each sample (see Table 1 for descriptive statistics and Table 2 for details).

3.2. Effect sizes of gender difference in IA

The results show a high level of heterogeneity in the studies with effect sizes ranging from −0.40 to 0.72. The Q statistic was significant ($Q(114)$ = 2863.01, $p < 0.001$) in our study, and I^2 values (95.15%) were over 75%, suggesting that the high levels of heterogeneity were due to real differences among the selected samples as opposed to sampling error (Higgins, Thompson, Deeks, & Altman, 2003). This observation warranted the use of a random-effects model (see Table 3). For the 115 independent samples from 34 countries/regions, the average effect size was 0.145 for the random effects, which was a small effect size according to Cohen (1988).

3.3. Subgroup analysis

In addition to the overall effect-size analysis, moderation effects were also examined. In the analysis, we examined whether there were systematic differences in effects sizes between different continental regions (e.g., North America, Asia and Europe). Table 3 indicated that the North America had a minimal but significant negative effect size of gender-related difference (g = −0.049), while Asia (g = 0.208), Africa (g = 0.092) and Europe (g = 0.114) had positive effect sizes. Information about each country's effect size is depicted visually in Fig. 3.

We also conducted subgroup analyses by age, and the results are presented in Table 4. The results show that college students (g = 0.206) and adults (g = 0.192) have larger effect sizes than adolescents (g = 0.118).

Table 1
Characteristics of the Sample Included in the Meta-Analysis (Total k = 115).

Variable	Category	K	%
Region	Africa	1	0.9
	Asia	49	42.61
	Europe	58	50.43
	North America	7	6.1
Article publication year	2010–2012	26	22.6
	2013–2015	30	26.1
	2016–2019	59	51.3
Sample Size	100–499	33	28.7
	500–999	34	29.6
	1000–1999	28	24.3
	2000+	20	17.4
Sample age	elementary school	2	1.7
	middle school	9	7.8
	high school	40	34.8
	adolescent	16	13.9
	high school & college	1	0.9
	college	30	26.1
	adolescent & adult	8	7.0
	adult	9	7.8
Measurement	IAT	48	41.7
	YDQ	15	13.0
	CIAS	6	5.2
	IAS	5	4.4
	OCS	5	4.4
	s-IAT	4	3.5
	APIUS	3	2.6
	PIUS	3	2.6
	Others	26	22.6

Note. k = number of effect sizes; IAT = Internet Addiction Test; YDQ = Young Diagnostic Questionnaire for Internet Addiction; CIAS = Chinese Internet Addiction Scale; IAS = Internet Addiction Scale; OCS = Online Cognition Scale; s-IAT = short Internet Addiction Test; APIUS = Adolescent Pathological Internet Use Scale; PIUS = Problematic Internet Use Scale.

3.4. Meta-regression analyses with national indexes

To examine the study hypotheses, a series of meta-regressions was conducted. As shown in Table 5, two national indexes related to national economic background (e.g., GDP per capita and internet penetration) negatively predicted statistically the effect size. This finding suggests that countries that are well developed from an economic perspective and have more robust internet infrastructures would be less likely to demonstrate a male predominance in IA tendency estimates. The findings (Table 5) support both the internet availability hypothesis and social norms hypothesis. Greater gender-related gaps in economic measures and internet penetration are related to larger effect sizes of gender-related differences in IA tendency estimates. Similarly, both the gender-related gaps in smoking prevalence and alcohol consumption were positively correlated with effect sizes. However, the psychological well-being hypothesis was not supported, since the gender gap in life satisfaction was not significant in the meta-regression, and the suicide rate was significant but in the reverse direction as hypothesized. For details of correlations between effect size and national indexes, please see Appendix Table A1.

Table 2
Sample demographics and measurement for the effects of gender-related difference in internet addiction.

Studies	Sample size (Male/Female)	Population	Age (M, SD; Range)	Measurement	Country/region	DQI	Effect size
Ahmadi (2014)	2114/2155	high school	16.6(1.52)	IAT	Iran	6.63	0.33
Ak, Koruklu, and Yılmaz (2013)	2001/2310	high school	17	IAT	Turkey	4.63	0.41
Akhter (2013)	156/103	college	19.34(17–23)	IAT	Pakistan	3.41	0.26
Amin and Kaur (2014)	70/140	college	NA	IAT-27	India	4.32	0.36
Andreou and Svoli (2012)	175/209	high school	16.27(0.64); 15-18	IAT	Greece	3.58	0.17
Aylaz et al. (2015)	233/200	high school	N/A	PIUS	Turkey	4.64	−0.28
Ballarotto, Volpi, Marzilli, and Tambelli (2018)	482/623	high school	15.55(1.68); 12-20	SPQ	Italy	4.04	−0.16
Banjanin, Banjanin, Dimitrijevic, and Pantic (2015)	116/222	high school	18.00	IAT	Serbia	3.53	−0.02
Bernal-Ruiz, Rosa-Alcazar, Gonzalez-Calatayud, and Rosa-Alcazar (2017)	132/178	high school & college	18.25(2.18); 16-23	GPIUS2	Spain	3.49	0.23
Boniel-Nissim and Sasson (2018)	470/530	adolescent	14.19(1.34); 12-17	SPIUT	Israel	5.00	−0.14
Bruno et al. (2014)	539/496	high school	17(13–22)	IAT	Italy	4.01	0.36
Canan et al. (2017)	283/369	college	20.8(2.1); 17-27	IAT	Turkey	3.81	0.23
Carbonell, Chamarro, Oberst, Rodrigo, and Prades (2018)	186/606	college	21.6(3.3)	CERI	Spain	3.90	0.01
Casaló and Escario (2019)	16253/16958	adolescent	14–18	EIU	Spain	7.52	−0.17
Çelik and Odacı (2013)	158/260	college	20.4(1.63)	OCS	Turkey	3.62	0.72
Chen, Chen, and Gau (2015)	573/580	adolescent	N/A	CIAS	Taiwan	4.06	−0.22
Cho, Kim, and Ha (2012)	275/158	middle school	14.50(0.71); 14-15	IAT	South Korea	3.64	0.46
Choi, Chun, Lee, Han, and Park (2018)	293/294	adolescent	11–19	IAS	South Korea	5.77	0.40
Cudo, Dobosz, Jarząbek-Cudo, and Basaj (2016)	118/142	high school	17.5(16–19)	TPUI	Poland	3.41	−0.19
Dalbudak et al. (2015)	251/331	college	20.99	BAPINT-SV	Turkey	4.76	0.26
Dhir, Chen, and Nieminen (2015a)	1173/739	high school	14.88	IAT	India	6.28	0.64
Dhir, Chen, and Nieminen (2015b)	245/172	high school	16.33(0.84); 15-18	CIUS	Taiwan	3.62	0.22
Di Nicola et al. (2017)	240/756	high school	16.47(4.85);	IAT	Italy	4.00	0.03
Dufour et al. (2016b)	1722/2209	high school	15.30(14–21)	IAT	Canada	4.59	−0.05
Durak and Senol-Durak (2013)	177/271	college	20.53(1.53); 18-25	OCS	Turkey	3.65	0.36
Durkee et al. (2012)							
Austria	349/594	adolescent	14.9(0.89)	YDQ	Austria	5.97	−0.05
Slovenia	345/819	adolescent	14.9(0.89)	YDQ	Slovenia	6.07	−0.30
Spain	529/495	adolescent	14.9(0.89)	YDQ	Spain	6.01	−0.22
Estonia	475/559	adolescent	14.9(0.89)	YDQ	Estonia	6.01	−0.23
France	318/685	adolescent	14.9(0.89)	YDQ	France	6.00	−0.24
Germany	687/751	adolescent	14.9(0.89)	YDQ	Germany	6.16	−0.10
Hungary	415/593	adolescent	14.9(0.89)	YDQ	Hungary	6.00	−0.04
Ireland	580/487	adolescent	14.9(0.89)	YDQ	Ireland	6.03	−0.06
Israel	755/196	adolescent	14.9(0.89)	YDQ	Israel	5.98	0.21
Italy	380/808	adolescent	14.9(0.89)	YDQ	Italy	6.07	−0.07
Romania	392/744	adolescent	14.9(0.89)	YDQ	Romania	6.06	0.14
Estevez, Jauregui, Sanchez-Marcos, Lopez-Gonzalez and Griffiths (2017)	208/222	high school	15.6(1.33); 13-21	IEQ	Spain	3.63	−0.01
Estevez, Urbiola, Iruarrizaga, Onaindia, and Jauregui (2017)	89/446	college	21.25(2.48); 18-31	MULTICAGE CAD-4	Spain	3.73	0.01
Evren, Dalbudak, Evren, and Demirci (2014)	2614/2343	middle school	15.56	BAPINT-SV	Turkey	5.70	−0.37
Fernández-Villa et al. (2015)	801/1979	college	20.45	IAT	Spain	6.44	0.16
Gencer and Koc (2012)	590/738	high school	N/A	IAT	Turkey	5.12	0.30
Gmel, Khazaal, Studer, Baggio, and Marmet (2019)	797/753	adolescent & adult	39.87(16.71); 15-88	CIUS	Switzerland	7.19	−0.03
Gunay, Ozturk, Arslantas, and Sevinc (2018)	551/737	college	20.7(2); 17–20 +	IAS	Turkey	5.11	0.22
Han et al. (2017)	104/109	college	18.87(0.76); 17-21	CIAS-R	China	3.33	−0.05
Hawi and Samaha (2019)	286/226	college	21.23(2.47); 18-38	IAT	Lebanon	4.71	−0.10
Hetzel-Riggin and Pritchard (2011)	199/226	college	19.00(1.70)	YDQ	USA	3.63	−0.05
Holdoš (2016)	83/322	adult	18–45	IRPS	Slovakia	3.61	0.17
Islam and Hossin (2016)	400/173	college	24.00	IAT	Bangladesh	4.76	0.59
Israelashvili, Kim, and Bukobza (2012)	134/110	high school	13–15	IAIA	Israel	3.39	−0.09
Jang and Ji (2012)	266/253	elementary school	11–12	KIAS	South Korea	3.72	0.55
Jelenchick et al. (2014)	219/498	college	19.70(1.40); 18-25	PRIUSS	USA	3.86	0.13
Kamal and Kamal (2018)	1324/1041	college	21.9(1.6)	PIUS	Egypt	5.37	0.09
Kandri, Bonotis, Floros, and Zafiropoulou (2014)	177/338	college	20.78(2.18)	IAT	Greece	3.71	0.02
Kittinger, Correia, and Irons (2012)	79/202	college	20.17(1.44)	IAT	USA	3.45	−0.08
Kojima et al. (2019)	456/456	high school	12–15	IAT	Japan	4.96	−0.11
Koronczai et al. (2013)	406/288	adolescent & adult	21.50(5.20); 14-34	PIUQ	Hungary	5.84	−0.07
Kostic, Pedovic, and Panic (2018)	135/204	high school	18–19	I-POE	Serbia	3.53	0.29
Lachmann, Sariyska, Kannen, Cooper, and Montag (2016)	2509/2343	adolescent & adult	28.96(6–93)	IAT-12	Germany	5.69	0.13
Lachmann et al. (2018)							
China	450/162	college	21.55(2.44); 18-32	s-IAT	China	3.79	0.05
Germany	97/207	adult	24.05(8.85); 18-63	s-IAT	Germany	4.48	0.16
Lee, Ko, and Chou (2015)	12807/12766	high school	15.87(1.70)	CIAS	Taiwan	7.41	0.45
Lee et al. (2016)	265/243	adult	20–49	IAT	South Korea	6.71	−0.01
Lee, Lee, Nam, Kim, Park, Kwon, ...Choi. (2018)	295/260	middle school	13.9(0.3);	IAT	South Korea	3.74	0.42
Lee, Kim, Bae, Kim, Shin, Yoon, et al. (2018)	546/622	high school	14.5(1.6); 13-18	IAT	South Korea	4.07	0.48

(continued on next page)

Table 2 (*continued*)

Studies	Sample size (Male/Female)	Population	Age (M, SD; Range)	Measurement	Country/region	DQI	Effect size
Li et al. (2010)	296/364	high school	14.14(0.86); 12-17	YDQ	China	3.82	0.57
Li et al. (2018)	388/475	middle school	14.34(1.66); 11-19	Adapted YDQ	China	4.94	0.30
Liu, Fang, Deng, and Zhang (2012)	1770/1786	high school	15.00(1.88)	APIUS	China	4.55	0.25
Liu, Fang, Zhou, Zhang, and Deng (2013)	2211/2348	high school	15.00(1.94); 12-21	APIUS	China	5.66	0.28
Mak et al. (2017)	212/377	high school	N/A	K-Scale	Japan	3.77	−0.17
Mei et al. (2016)	652/899	high school	15.43(1.89); 11-20	YDQ	China	5.19	0.13
Monacis, Sinatra, Griffiths, and de Palo (2018)	256/215	adult	24.72(8.66);	IDS-15	Italy	4.67	0.06
Muller et al. (2017)	77/140	adolescent & adult	23.41(7.77); 16-63	s-IAT	Germany	4.34	0.21
Musetti, Terrone, and Schimmenti (2018)	88/173	adult	31.88(13.88); 18-63	IAT	Italy	4.42	0.47
Nam et al. (2018)	268/251	middle school	14	IAT	South Korea	3.72	0.50
Nergüz (2011)	148/263	college	N/A	OCS	Turkey	3.61	0.40
Noh and Kim (2016)	68/91	college	22.19	IAT	South Korea	3.20	0.28
Odacı (2013)	233/323	college	19.25(1.55)	PIUS	Turkey	4.75	0.43
Odaci and Celik (2017)	169/454	college	19.11(0.91); 17-21	IAT	Turkey	3.79	0.50
Pace, D'Urso, and Zappulla (2019)	245/237	high school	17.88(0.57); 16-17	IAT	Italy	3.68	0.16
Pantic et al. (2017)	87/157	college	21.98(2.57)	IAT	Serbia	3.39	0.40
Poli and Agrimi (2012)	1123/1410	high school	16.40(1.51); 14-21	IAT	Italy	4.40	0.16
Puri and Sharma (2016)	50/50	high school	17.28(0.8); 16-18	IAT	India	3.00	−0.40
Reed, Vile, Osborne, Romano, and Truzoli (2015)	240/265	adult	29.73(13.65); 18-101	IAT	United Kingdom	4.70	0.13
Saraiva et al. (2018)	585/802	adolescent & adult	38.79(13.607); 17-65	IAT	Portugal	5.14	0.25
Sargin (2012)	150/150	elementary school	13–15	IAT	Turkey	4.48	0.32
Schimmenti, Passanisi, Gervasi, Manzella, and Famà (2014)	153/157	high school	18.37(0.49); 18-19	IAT	Italy	4.49	0.21
Schimmenti et al. (2017)	154/204	high school	18.36(0.48); 18-19	IAT	Italy	3.55	0.32
Scimeca et al. (2014)	311/289	high school	16.78(1.63); 13-22	IAT	Italy	3.78	0.10
Servidio (2017)	234/425	college	23.60(3.57); 18-41	IAT	Italy	3.82	0.42
Sharma, Rao, Benegal, Thennarasu, and Thomas (2017)	1392/1363	adult	36.48(13); 18-65	IAT	India	5.44	0.19
Shek and Yu (2016)	1821/1669	middle school	17.33(0.72)	YDQ	Hong Kong	5.54	0.09
Shrivastava, Sharma, and Marimuthu (2018)	173/73	adult	30.4(8.78); 21-64	IAT	India	4.39	0.58
Stavropoulos, Alexandraki, and Motti-Stefanidi (2013)	1027/1047	high school	16.16(0.91)	IAT	Greece	5.32	0.09
Sun et al. (2012)							
China	865/896	high school	15.90(0.76)	OCS	China	4.25	0.45
USA	669/513	high school	16.80(0.93)	OCS	USA	4.07	−0.14
Tang, Koh, and Gan (2017)							
China	467/567	college	19.6(1.18)	IAT	China	4.01	0.15
USA	559/566	college	21.49(1.96)	IAT	United States	6.05	−0.03
Singapore	414/693	college	21.45(1.8)	IAT	Singapore	4.04	−0.04
TaŞ and ÖZtosun (2018)	450/317	high school	N/A	IAS	Turkey	4.88	0.26
Tateno et al. (2018)	180/393	college	18.9(1.3)	IAT	Japan	3.78	0.10
Tian, Bian, Han, Gao, and Wang (2017)	138/223	adolescent	18.57(0.88)	GPIU	China	3.56	−0.01
Tran et al. (2017)	217/372	adolescent & adult	21.7(1.7); 15-25	s-IAT	Vietnam	5.77	0.08
Üneri and Tanidir (2011)	97/114	high school	15.77(1.06); 13-18	IAS	Turkey	3.32	0.36
Wang, Wu, and Lau (2016)	5062/4396	high school	N/A	CIAS	Hong Kong	6.98	0.07
Waqas et al. (2016)	194/328	college	N/A	IAT	Pakistan	3.72	0.49
Watters, Keefer, Kloosterman, Summerfeldt, and Parker (2013)	799/1149	high school	16–18	IAT	Canada	4.29	−0.05
Wu, Lee, Liao, and Chang (2015)	156/944	adult	N/A	CIAS	Taiwan	6.04	0.20
Wu, Li, Lau, Mo, and Lau (2016)	5062/4396	middle school	N/A	CIAS	Hong Kong	6.98	0.07
Wu, Lee, Liao, and Ko (2019)	1065/1082	adolescent & adult	15-65+	IAD-9	Taiwan	7.33	−0.08
Xu et al. (2012)	2534/2580	high school	15.90(11.3–20.4)	DRM	China	5.71	0.13
Yadav, Banwari, Parmar, and Maniar (2013)	328/224	middle school	15–18	IAT	India	3.74	0.33
Yang et al. (2018)	2335/2415	middle school	16(1.5)	IAT	China	5.68	0.20
Yayan, Arikan, Saban, Gürarslan Bas, and ÖzelÖzcan (2017)	864/809	high school	12.8(0.93); 11-15	IAS	Turkey	5.22	0.06
Yong, Inoue, and Kawakami (2017)	323/300	adolescent & adult	16-60+	IAT	Japan	5.79	0.18
Zhang et al. (2014)	302/372	high school	15.10(1.81); 12-17	APIUS	China	3.83	0.43

Note. DQI = Data Quality Index; APIUS = Adolescent Pathological Internet Use Scale; BAPINT-SV = Addiction Profile Index Internet Addiction Form Screening Version; CERI = Cuestionario de Experiencias Relacionadas con Internet (Questionnaire on Internet-related experiences); CIAS = Chinese Internet Addiction Scale; CIUS = Compulsive Internet Use Scale; DRM = Deruimu Internet Use Scale; EIU = Excessive Internet use; GPIU = Generalized Problematic Internet Use Scale; IAD = Internet Addiction Disorder; IAIA = Israeli Adolescents' Internet Addiction; IAS = Internet Addiction Scale; IAT = Internet Addiction Test; IDS = Internet Disorder Scale; IEQ = Internet-related Experience Questionnaire; I-POE = Index of Problematic Online Experiences; IRPS = Internet-Related Problem Scale; KIAS = Korean version of the Internet addiction self-test scale; K-Scale = Korean Scale for Internet Addiction; OCS = Online Cognition Scale; PIUQ = Problematic Internet Use Questionnaire; PIUS = Problematic Internet Use Scale; PRIUSS = Problematic and Risky Internet Use Screening Scale; s-IAT = Short Version of Internet Addiction Test; SPIUT = Short Problematic Internet Use Test; SPQ = Internet abuse subscale of The Shorter PROMIS Questionnaire; TPUI = Test of Problematic Internet Use; YDQ = Young Diagnostic Questionnaire for Internet Addiction.

We also conducted a confound check with two measures of DQI as shown in the lower portion of Table 5. The possible confounding effects of sample size was not significant, but the sample representativeness was significant ($p = 0.020$), by which higher representativeness was more likely to have smaller effect sizes. The result suggests that the sample representativeness may also partially contribute the heterogeneity in this pool of studies.

Table 3
Continental regional subgroup analyses of the effect sizes.

Region	N	k	Hedges' g (95%CI)	p	Q	p	I^2(%)
Africa[a]	2365	1	0.092 [0.010,0.173]	0.027	–	–	–
North America	9609	7	−0.049 [-0.090,-0.009]	0.018	7.24	0.299	0.08
Asia	101479	49	0.208 [0.142,0.274]	< 0.001	952.07	< 0.001	95.75
Europe	90899	58	0.114 [0.055,0.174]	< 0.001	1066.93	< 0.001	93.69
Overall	204352	115	0.145 [0.098,0.192]	< 0.001	2863.01	< 0.001	95.15

Note. n = combined sample size; k = number of effect size; Hedges' g (random effects); CI = confidence interval; Q = homogeneity statistic; I^2 = inconsistency, measuring the proportion of variance.
[a] only Egypt was involved in the analysis.

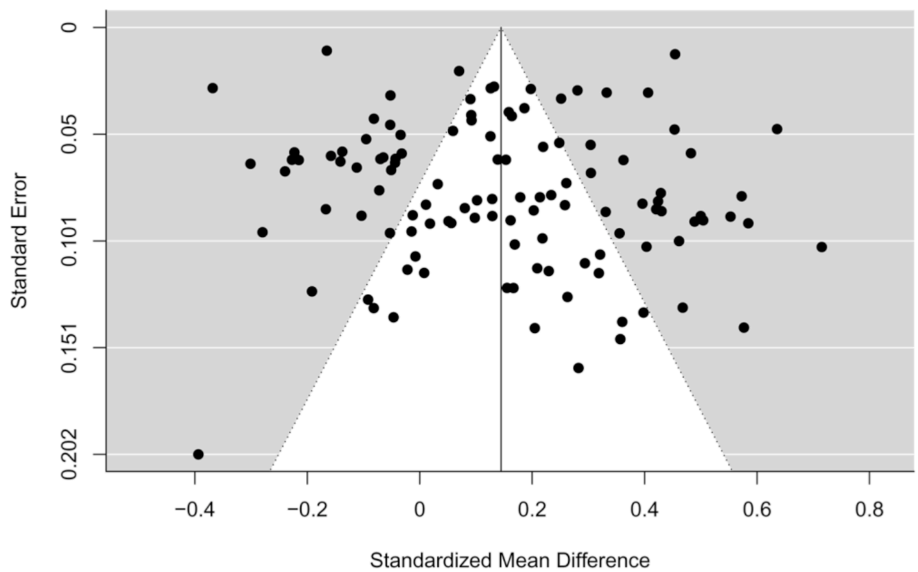

Fig. 2. Funnel plot of the effect sizes versus standard errors.

3.5. Publication bias

To test whether or not there is publication bias, we verified the asymmetry using both the funnel plot and Egger's regression test. The funnel plot for the meta-analysis is presented in Fig. 2. By visually inspecting the funnel plots, we observed that the plots are roughly centered on the mean effect size, which suggests publication bias may not present in the current analysis. The result of Egger's test (z = 1.42, p = 0.155) indicated that there is no evidence for publication bias.

3.6. Effect size analysis at country level

For country level examination, we calculated mean weighted effect sizes for each country/region (n = 34). As shown in Fig. 3, Asia is a region of male predominance of IA tendency with positive effect size, while in North America the reverse is evident (also see Table 3 for

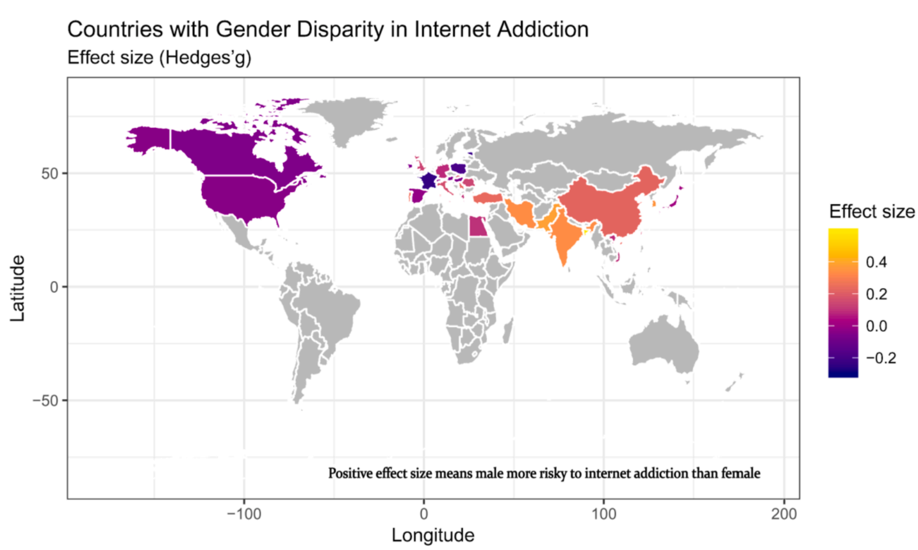

Fig. 3. World distribution of gender-related differences in internet addiction tendencies.

Table 4
Age-related population subgroup analyses of the effect sizes.

Population	*n*	*k*	Hedges' *g* (95%CI)	*p*	*Q*	*p*	I^2(%)
adolescent [a]	164,209	67	0.118 [0.059, 0.179]	< 0.001	2608.25	< 0.001	97.02
college student	6555	30	0.206 [0.128,0.284]	< 0.001	166.54	< 0.001	85.58
adult	21,219	9	0.192 [0.090,0.294]	< 0.001	19.46	0.013	65.53
others [b]	12,369	9	0.085 [-0.004, 0.173]	0.062	38.93	< 0.001	79.44

Note. n = combined sample size; k = number of effect size; Hedges' g (random effects); CI = confidence interval; Q = homogeneity statistic; I^2 = inconsistency, measuring the proportion of variance.
[a] Combined the categories of "adolescent", "elementary school", "high school" and "middle school".
[b] Combined the categories of "high school & college", and "adolescent & adult".

subgroup analysis). However, European countries are not consistent in the effect sizes. The average effect sizes for individual countries are included in Appendix Table A2.

To show the relationship of effect size with the national indexes, we present the scatter diagrams and regression slopes in Fig. 4. Similar with the meta-regression results at the study level, the national effect sizes were negatively correlated with GDP per capita (lg) ($r = -0.58$), internet penetration ($r = -0.56$), and the gender-related gap in suicide rate ($r = -0.52$). They were positively correlated with the gender-related gaps in economic measures ($r = 0.55$), internet penetration ($r = 0.45$) and smoking prevalence (lg) ($r = 0.59$). However, the effect sizes were not significantly correlated with the gender-related gap in alcohol consumption ($r = -0.13$) or life satisfaction ($r = -0.36$).

4. Discussion

The main goals of this meta-analytic study were to examine the extent of gender-related gaps in IA tendencies globally and to identify their potential economic, sociocultural and psychological correlates. This study suggests how and why gender-related differences in IA tendencies may operate across different countries. Given that a total of 115 independent samples from 34 countries/regions were identified, the findings have important implications for jurisdictions around the world.

The current study revealed global gender-related differences in IA tendencies with a small effect size ($g = 0.145$), which means that males are more likely to have higher level of IA than females in general. Specifically, the region of Asia has the largest effect size estimated to be 0.208, while the effect sizes of North America ($g = -0.049$) and Europe ($g = 0.114$) are minimal or negligible. The measure for Africa with Egypt included had an effect size of 0.092. The results suggest that Asian males may be particularly vulnerable to developing IA, consistent with reports of higher IA prevalence in Asia than in Western countries (Kuss et al., 2014). Asian cultures seemingly may have more significant problems dealing with problematic internet use compared to other areas of the world (Young, 2017). However, it should be acknowledged that there are national differences within continental regions, particularly in Europe where effect sizes ranged from 0.248 in Portugal to −0.301 in Slovenia. Since generalized IA was measured in the current study, we also acknowledge that gender may have different effect sizes (in magnitude and/or directionality) for specific subtypes of IA. For example, in the study by Tang et al. (2017) involving a Chinese sample, the effect size for generalized IA was small at 0.15, but it was 0.67 for online gaming and −0.10 for social networking; similarly, in a United States sample, no significant effect size was found in generalized IA ($g = -0.03$), but there were medium effect sizes for online gaming ($g = 0.58$) and social networking ($g = -0.42$). Therefore, gender-related differences in subtypes of IA should be examined further in future studies.

To examine potential factors associated with gender-related differences in IA tendency estimates across countries, three hypotheses were examined through meta-regression analysis. The internet availability hypotheses proposed that greater internet penetration, often in conjunction with greater economic prosperity, would be linked to IA tendencies in a gender-sensitive fashion. The results indicated that economic factors were significantly correlated with effect sizes of gender-related differences in IA tendency estimates. This hypothesis was supported in that the greater the GDP per capita and internet penetration in a country, the lower the gender-related gap in IA tendency estimates that was observed. This result is consistent with prior reports, in which economic development had been strongly correlated with gender-related equality, including digital inclusion (Woetzel et al., 2015). Widespread internet availability may substantially benefit people by enhancing access for information, social communication and entertainment, but it also may increase the likelihood for developing IA (Li, O'Brien, Snyder, & Howard, 2015). Greater internet availability may foster a greater engagement in online activities, in turn increasing one's susceptibility to IA (Cheng and Li, 2014). For example,

Table 5
Summary results of meta-regression analysis.

Moderator	*B*	*SE*	*p*	95% CI
National economic background				
GDP per capita (lg)	−0.088	0.023	< 0.001	[-0.133, −0.044]
Internet penetration	−0.004	0.001	0.002	[-0.006, −0.001]
Internet Availability hypothesis				
Gender gap in economy	0.759	0.180	< 0.001	[0.408, 1.111]
Gender gap in internet penetration (OR)	0.223	0.070	0.001	[0.086, 0.360]
Social Norms hypothesis				
Gender gap in smoking prevalence (OR)	0.003	0.001	< 0.001	[0.0002, 0.005]
Gender gap in alcohol consumption	0.056	0.014	< 0.001	[0.029, 0.083]
Psychological Well-being hypothesis				
Gender gap in life satisfaction	−0.116	0.181	0.522	[-0.470, 0.238]
Gender gap in suicide rate (OR)	−0.076	0.021	< 0.001	[-0.117, −0.035]
Confound checks				
Sample representativeness	−0.064	0.028	0.020	[-0.118, −0.010]
Sample size (lg)	−0.062	0.056	0.267	[-0.172, 0.048]

Note. Each moderator was run in a separate regression. SE = Standard error, OR = odds ratio, CI = confidential interval.

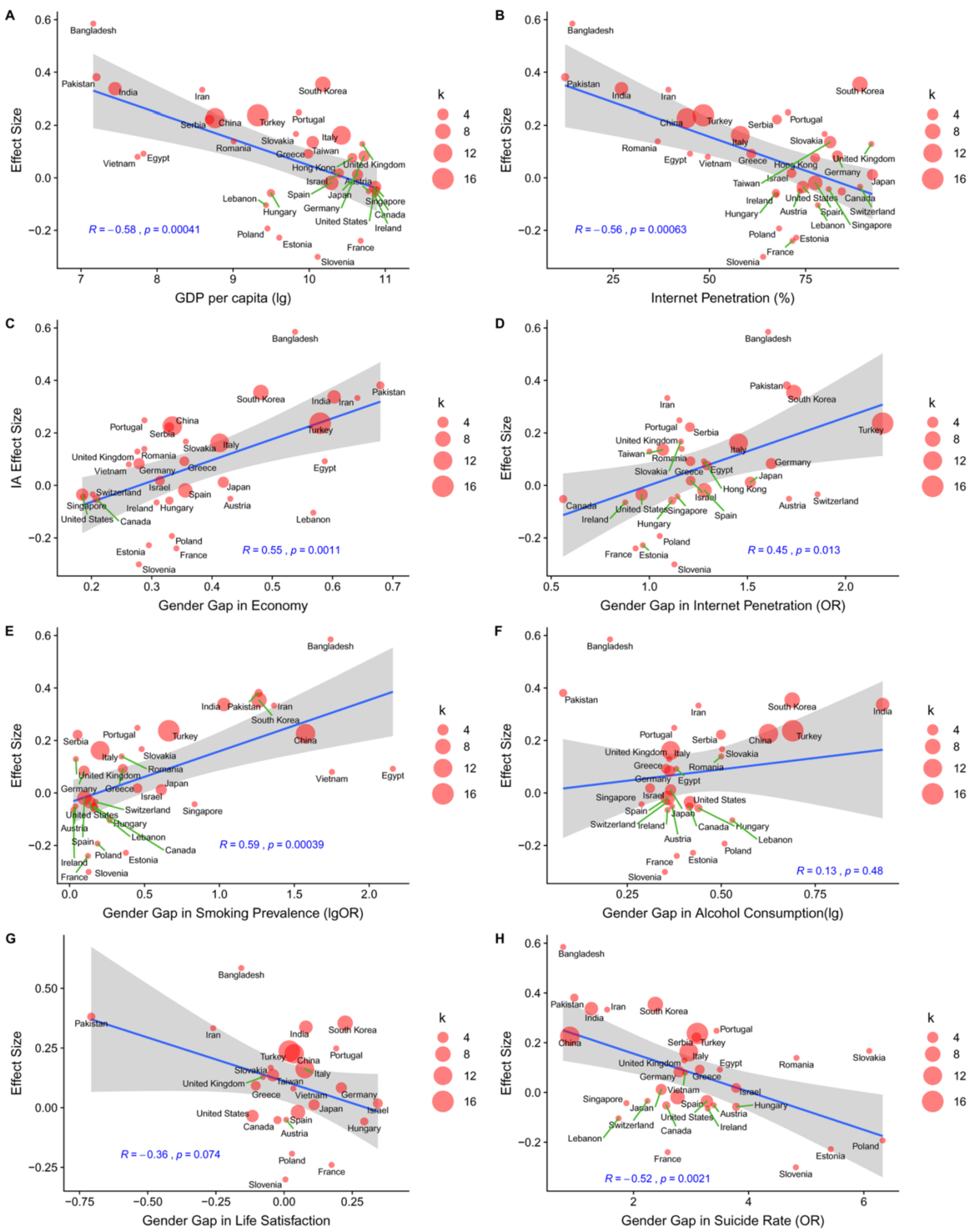

Fig. 4. Effect size of gender-related difference in internet addiction with national indexes.
Note. OR = odds ratio; Each circle represents a country/region. Circle size represents the number of independent samples (*k*) included for calculating the weighted mean effect size and national index. To present the correlation, the Pearson *r* values with *p*-values are shown.

adolescents with home internet ownership and higher daily internet use are more likely to experience IA (Dhir et al., 2015a). In conclusion, the study suggests internet availability is important in accounting for gender-related differences in IA tendencies.

While the internet availability hypothesis was supported, there was also support for the social norms hypothesis linking gender-related gaps in IA tendency estimates to those in licit substance use behaviors. It may be argued that internet availability and social norms may both place constraints on internet usage by females in many societies, preventing them from accessing the full benefits of the internet (Hilbert, 2011). On the other hand, it may provide unexpected protective effects against the development of IA in females, similar to proposed protective effects in drug addictions (Becker et al., 2016). The analyses at the country level confirm the above results, except for the gender-related gap in alcohol consumption. This finding suggests alcohol use may be more acceptable in societies and therefore not as sensitive and robust like smoking behavior that may have more cultural constraints for women. However, other possibilities are feasible (e.g., relating to biological effects of the substances) and thus more study is needed to examine further the observed links. The findings suggest cultural norms may contribute importantly to gender-related differences in IA. Cultural norms were the most frequently reported barrier preventing women from accessing and benefiting from the internet, according to one international survey (Internet Governance Forum, 2016). Another report revealed that one in five women in India and Egypt believe that the internet is not appropriate for them, or that their families would disapprove, and that engaging in online activities would not be beneficial regardless (Intel, 2012). Women in the developing world have significantly lower technology participation rates than men, likely as a result of entrenched socio-cultural attitudes about the roles of women in society (Antonio and Tuffley, 2014). It is argued that surfing the internet is considered more 'normal' behavior for boys than girls, and this may make boys more prone to developing IA (Liu et al., 2013).

Contrary to our hypothesis, the psychological well-being hypothesis was not supported since the gender-related effect size was not significantly correlated with the gender-related gap in life satisfaction in the meta-regression, and negatively correlated with suicide rate. Although a previous study had found IA prevalence was negatively correlated with quality of life (Cheng and Li, 2014), the current study examines gender-related differences. The potential explanation of unpredicted life satisfaction and effect size may due to gender-related differences in emotional regulation approaches. Girls with emotional difficulties such as subjective unhappiness or depressive symptoms had elevated IA propensities compared with boys with similar concerns (Ha and Hwang, 2014). Different psychological mechanisms may also operate across gender groups in relationships between mental health and IA. A recent study suggested that depression may lead to IA for males, whereas IA may lead to depression for females (Liang et al., 2016). The current results suggest important gender-related considerations with respect to suicidality. Specifically, in countries with greater male propensity to IA, there is greater female suicidality. Given data that suicidal ideation is positively correlated with IA (Kim et al., 2006), it raises the possibility that IA may be more closely particularly linked to suicide in countries in which it is less prevalent for females to experience IA. However, this possibility is speculative as other non-IA factors may be operating across gender groups with respect to suicidality. Nonetheless, this unanticipated result warrants further examination in future studies, as do gender-related considerations in relationships between psychological well-being and IA generally.

The results may have important implications for policymakers. In making policy for IA prevention, it will be important to consider gender-related differences including their sociocultural contexts. According to our study, males appeared more vulnerable to experiencing IA in developing countries, especially in the region of Asia (e.g., Bangladesh, Pakistan, South Korea and India), while in some European countries (e.g., Poland, Estonia, France, and Slovenia) females were more vulnerable than males to IA. This shift may reflect gender-related differences in economic equality, internet availability and sociocultural norms in each country.

Although the present study is an important step forward in examining gender-related differences in IA from a global perspective, there are several cautionary issues that warrant mentioning. First, the majority of the samples included in the current meta-analysis included children and adolescents (58%, including elementary school, middle school and high school) and college students (26%). Therefore, younger-aged populations may be over-represented in the meta-analysis. Thus, the results may not generalize to other (older) age groups. Although IA appears prevalent across the age spectrum (Kuss et al., 2014), more studies of gender-related differences in older-adult populations are needed in future. Second, data from the region of South America and Oceania were not identified in our literature search, and more research should be conducted in regions not represented in the current study. Third, English was the language used for screening for eligible manuscripts for inclusion in the current meta-analytic study as English is the most popular language for scientific publications over the world. While this approach retained many manuscripts from non-English-speaking jurisdictions, this limitation may have excluded some trials published in regions not speaking predominantly English. Fourth, the social norms hypothesis is related to investigation of use of licit substances with addictive potential. However, we could not identify any national indexes measuring social norms directly. As such, we instead used the gender-related gap in licit substance consumption (smoking prevalence, alcohol consumption) as indirect measures as the licit nature is accompanied by a social acceptance that may vary across countries in a gender-sensitive fashion. Nonetheless, other factors relating to social norms warrant direct examination in future studies. Fifth, males and females may preferentially use and have problems with different types of internet applications, e.g., males with gaming and pornography use and females with social networking and shopping (Chen et al., 2018; Dufour et al., 2016a; Ha and Hwang, 2014). In the current study, we only included studies measuring general IA rather than specific forms of IA in order to minimize the introduction of this potential confound. However, gender-related differences in specific types of IA should be examined in future studies, especially as nomenclatures systems (DSM-5, ICD-11) focus on specific types of internet use (gambling, gaming) as the focus of disorders (American Psychiatric Association, 2013; Rumpf et al., 2018; WHO, 2018). Finally, it has been proposed that there may be four types of gender-related differences in addiction (Becker, McClellan, & Reed, 2017) and only two of these types (quantitative differences and population differences) were investigated in the current study. Future studies may focus on other types of gender-related differences (e.g., convergent differences in which gender may differentially influence underlying processes that may mediate IA).

5. Conclusion

Despite the noted limitations, our study provides important information on the relationships between gender-related differences in IA at national, continental and global levels. The meta-analysis of gender-related differences in IA shows males have a relatively higher tendency to experience IA than do females with a small effect size ($g = 0.145$) at a global level. The largest effect size was found in the region of Asia, with smaller effect sizes in Europe, North America and Africa. The findings suggest economic development and gender-related differences in internet availability and social norms are important considerations in accounting for gender-related differences in IA tendency estimates generally. These findings may help policy efforts to prevent IA in different jurisdictions when considering how best to protect males and females.

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Conflicts of interest

No conflicts of interests are present among the authors of this paper.

Contributors

Wenliang Su designed the study. Xiaoli Han, Cheng Jin and Yan Yan conducted the literature searches and data coding. Wenliang Su conducted the statistical analysis and wrote the draft of manuscript. Marc Potenza contributed to supervised the study and revised this manuscript.

Appendix

Table A1
Correlations between effect size and national indexes.

Variables	1	2	3	4	5	6	7	8
1 Effect size	1							
2 GDP per capita (lg)	-.354**	1						
3 Internet penetration	-.294**	.816**	1					
4 Gender gap in internet penetration	.397**	-.322**	-.376**	1				
5 Gender gap in economy	.408**	-.539**	-.504**	.770**	1			
6 Gender gap in smoking prevalence	.200*	-.510**	-.336**	.051	.117	1		
7 Gender gap in alcohol consumption	.344**	-.578**	-.413**	.719**	.543**	.142	1	
8 Gender gap in life satisfaction	-.073	.347**	.425**	.041	-.211*	-.118	.176	1
9 Gender gap in suicide rate	-.325**	.456**	.372**	-.250*	-.194*	-.437**	-.342**	.197

Note: *$p < 0.05$, **$p < 0.01$.

Table A2
Country and Effect size of internet addiction gender-related difference (ordered by effect size).

Country/region	Hedges' *g*	*k*	Country/region	Hedges' *g*	*k*
Bangladesh	0.585	1	Vietnam	0.080	1
Pakistan	0.381	2	Hong Kong	0.076	3
South Korea	0.354	8	Israel	0.018	3
India	0.337	6	Japan	0.012	4
Iran	0.333	1	Spain	−0.019	7
Portugal	0.248	1	Switzerland	−0.034	1
Turkey	0.237	16	United States	−0.035	5
China	0.226	13	Singapore	−0.043	1
Serbia	0.222	3	Austria	−0.051	1
Slovakia	0.167	1	Canada	−0.052	2
Italy	0.162	12	Hungary	−0.058	2
Romania	0.139	1	Ireland	−0.065	1
Taiwan	0.136	5	Lebanon	−0.104	1
United Kingdom	0.129	1	Poland	−0.193	1
Greece	0.092	3	Estonia	−0.228	1
Egypt	0.092	1	France	−0.240	1
Germany	0.083	4	Slovenia	−0.301	1

Note. The effect size was the mean effect size of the samples from the country/region, weighted by each samples' data quality index. *k* = number of effect sizes.

References

Ahmadi, K. (2014). Internet addiction among Iranian adolescents: A nationwide study. *Acta Medica Iranica, 52*(6), 467–472.

Akhter, N. (2013). Relationship between internet addiction and academic performance among university undergraduates. *Educational Research and Reviews, 8*(19), 1793–1796. https://doi.org/10.5897/ERR2013.1539.

Ak, S., Koruklu, N., & Yılmaz, Y. (2013). A study on Turkish adolescent's internet use: Possible predictors of internet addiction. *Cyberpsychology, Behavior, and Social Networking, 16*(3), 205–209. https://doi.org/10.1089/cyber.2012.0255.

Akın, A. (2012). The relationships between internet addiction, subjective vitality, and subjective happiness. *Cyberpsychology, Behavior, and Social Networking, 15*(8), 404–410. https://doi.org/10.1089/cyber.2011.0609.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th-ed). Washington, DC: American Psychiatric Association.

Amin, S., & Kaur, K. (2014). A study of internet addiction and its impact on academic performance of university students. *Int. J. Educ. Manage. Stud. 4*(2), 130–133.

Anderson, E. L., Steen, E., & Stavropoulos, V. (2017). Internet use and problematic internet use: A systematic review of longitudinal research trends in adolescence and emergent adulthood. *International Journal of Adolescence and Youth, 22*(4), 430–454. https://doi.org/10.1080/02673843.2016.1227716.

Andreou, E., & Svoli, H. (2012). The association between internet user characteristics and dimensions of internet addiction among Greek adolescents. *International Journal of Mental Health and Addiction, 11*(2), 139–148. https://doi.org/10.1007/s11469-012-9404-3.

Antonio, A., & Tuffley, D. (2014). The gender digital divide in developing countries. *Future Internet, 6*(4), 673–687. https://doi.org/10.3390/fi6040673.

Aylaz, R., Günes, G., Günaydin, Y., Kocaer, M., & Pehlivan, E. (2015). Problematic internet usage among high school students and the relevant factors. *Turk. J. Publ. Health, 13*(3), 184–192.

Ballarotto, G., Volpi, B., Marzilli, E., & Tambelli, R. (2018). Adolescent internet abuse: A study on the role of attachment to parents and peers in a large community sample. *BioMed Research International, 2018, 10*. https://doi.org/10.1155/2018/5769250.

Banjanin, N., Banjanin, N., Dimitrijevic, I., & Pantic, I. (2015). Relationship between internet use and depression: Focus on physiological mood oscillations, social networking and online addictive behavior. *Computers in Human Behavior, 43*, 308–312. https://doi.org/10.1016/j.chb.2014.11.013.

Becker, J. B., McClellan, M., & Reed, B. G. (2016). Sociocultural context for sex differences in addiction. *Addiction Biology, 21*(5), 1052–1059. https://doi.org/10.1111/adb.12383.

Becker, J. B., McClellan, M. L., & Reed, B. G. (2017). Sex differences, gender and addiction. *Journal of Neuroscience Research, 95*(1–2), 136–147. https://doi.org/10.1002/jnr.23963.

Bernal-Ruiz, C., Rosa-Alcazar, A. I., Gonzalez-Calatayud, V., & Rosa-Alcazar, E. (2017). Is there a relationship between problematic Internet use and responses of social anxiety, obsessive-compulsive and psychological well-being among adolescents? *Anales de Psicología, 33*(2), 269–276. https://doi.org/10.6018/analesps.33.2.265831.

Boniel-Nissim, M., & Sasson, H. (2018). Bullying victimization and poor relationships with parents as risk factors of problematic internet use in adolescence. *Computers in Human Behavior, 88*, 176–183. https://doi.org/10.1016/j.chb.2018.05.041.

Borenstein, M., Higgins, J. P. T., Hedges, L. V., & Rothstein, H. R. (2017). Basics of meta-analysis: I2 is not an absolute measure of heterogeneity. *Research Synthesis Methods, 8*(1), 5–18. https://doi.org/10.1002/jrsm.1230.

Bruno, A., Scimeca, G., Cava, L., Pandolfo, G., Zoccali, R. A., & Muscatello, M. R. A. (2014). Prevalence of internet addiction in a sample of southern Italian high school students. *International Journal of Mental Health and Addiction, 12*(6), 708–715. https://doi.org/10.1007/s11469-014-9497-y.

Canan, F., Karaca, S., Duzgun, M., Erdem, A. M., Karacayli, E., Topan, N. B., ... Potenza, M. N. (2017). The relationship between second-to-fourth digit (2D:4D) ratios and problematic and pathological Internet use among Turkish university students. *J. Behav. Addict. 6*(1), 30–41. https://doi.org/10.1556/2006.6.2017.019.

Carbonell, X., Chamarro, A., Oberst, U., Rodrigo, B., & Prades, M. (2018). Problematic use of the internet and smartphones in university students: 2006–2017. *International Journal of Environmental Research and Public Health, 15*(3), 475. https://doi.org/10.3390/ijerph15030475.

Casaló, L. V., & Escario, J.-J. (2019). Predictors of excessive internet use among adolescents in Spain: The relevance of the relationship between parents and their children. *Computers in Human Behavior, 92*, 344–351. https://doi.org/10.1016/j.chb.2018.11.042.

Çelik, Ç. B., & Odacı, H. (2013). The relationship between problematic internet use and interpersonal cognitive distortions and life satisfaction in university students. *Children and Youth Services Review, 35*(3), 505–508. https://doi.org/10.1016/j.childyouth.2013.01.001.

Chen, Y., Chen, S., & Gau, S. S. (2015). ADHD and autistic traits, family function, parenting style, and social adjustment for internet addiction among children and adolescents in taiwan: A longitudinal study. *Research in Developmental Disabilities, 39*, 20–31. https://doi.org/10.1016/j.ridd.2014.12.025.

Cheng, C., & Li, A. Y. L. (2014). Internet addiction prevalence and quality of (real) life: A meta-analysis of 31 nations across seven world regions. *Cyberpsychology, Behavior, and Social Networking, 17*(12), 755–760. https://doi.org/10.1089/cyber.2014.0317.

Cheng, Y.-S., Tseng, P.-T., Lin, P.-Y., Chen, T.-Y., Stubbs, B., Carvalho, A. F., & Wu, M.-K. (2018). Internet addiction and its relationship with suicidal behaviors: A meta-analysis of multinational observational studies. *Journal of Clinical Psychiatry, 79*(4), https://doi.org/10.4088/jcp.17r11761.

Chen, L., Yang, Y., Su, W., Zheng, L., Ding, C., & Potenza, M. N. (2018). The relationship between sexual sensation seeking and problematic internet pornography use: A moderated mediation model examining roles of online sexual activities and the third-person effect. *J. Behav. Addict. 7*(3), 565–573. https://doi.org/10.1556/2006.7.2018.77.

Choi, D. W., Chun, S. Y., Lee, S. A., Han, K. T., & Park, E. C. (2018). The association between parental depression and adolescent's Internet addiction in South Korea. *Annals of General Psychiatry, 17*, 15. https://doi.org/10.1186/s12991-018-0187-1.

Cho, H.-I., Kim, M.-H., & Ha, J.-H. (2012). Testing the structural model of psychological variables affecting internet addiction and behavioral problems among Korean adolescents. *Paper presented at the computer applications for graphics*. Berlin, Heidelberg: Grid Computing, and Industrial Environment.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Cudo, A., Dobosz, M., Jarząbek-Cudo, A., & Basaj, Ł. (2016). Problematic Internet use and intrapersonal and interpersonal attitudes in adolescents. *Postępy Psychiatrii i Neurologii, 25*(3), 159–178. https://doi.org/10.1016/j.pin.2016.08.005.

Dalbudak, E., Evren, C., Aldemir, S., Taymur, I., Evren, B., & Topcu, M. (2015). The impact of sensation seeking on the relationship between attention deficit/hyperactivity symptoms and severity of Internet addiction risk. *Psychiatry Research, 228*(1), 156–161. https://doi.org/10.1016/j.psychres.2015.04.035.

Dhir, A., Chen, S., & Nieminen, M. (2015a). Predicting adolescent Internet addiction: The roles of demographics, technology accessibility, unwillingness to communicate and sought Internet gratifications. *Computers in Human Behavior, 51*, 24–33. https://doi.org/10.1016/j.chb.2015.04.056.

Dhir, A., Chen, S., & Nieminen, M. (2015b). Psychometric validation of the Chinese compulsive internet use scale (CIUS) with Taiwanese high school adolescents. *Psychiatric Quarterly, 86*(4), 581–596. https://doi.org/10.1007/s11126-015-9351-9.

Di Nicola, M., Ferri, V. R., Moccia, L., Panaccione, I., Strangio, A. M., Tedeschi, D., ... Janiri, L. (2017). Gender differences and psychopathological features associated with addictive behaviors in adolescents. *Frontiers in Psychiatry, 8*. https://doi.org/10.3389/fpsyt.2017.00256.

Dufour, M., Brunelle, N., Tremblay, J., Leclerc, D., Cousineau, M.-M., Khazaal, Y., ... Berbiche, D. (2016a). Gender difference in internet use and internet problems among quebec high school students. *Canadian Journal of Psychiatry, 61*(10), 663–668. https://doi.org/10.1177/0706743716640755.

Dufour, M., Brunelle, N., Tremblay, J., Leclerc, D., Cousineau, M.-M., Khazaal, Y., ... Berbiche, D. (2016b). Gender difference in internet use and internet problems among quebec high school students. *Canadian Journal of Psychiatry, 61*(10), 663–668. https://doi.org/10.1177/0706743716640755.

Durak, M., & Senol-Durak, E. (2013). Associations of social anxiety and depression with cognitions related to problematic internet use in youths. *Education in Science, 38*(169), 19–29.

Durkee, T., Kaess, M., Carli, V., Parzer, P., Wasserman, C., Floderus, B., ... Wasserman, D. (2012). Prevalence of pathological internet use among adolescents in Europe: Demographic and social factors. *Addiction, 107*(12), 2210–2222. https://doi.org/10.1111/j.1360-0443.2012.03946.x.

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ, 315*(7109), 629–634. https://doi.org/10.1136/bmj.315.7109.629.

Erick, M., Juan, C., Anil, S., Manzoor, U., & Dale, P. (2011). Sadness, suicide, and their association with video game and internet overuse among teens: Results from the youth risk behavior survey 2007 and 2009. *Suicide and Life-Threatening Behavior, 41*(3), 307–315. https://doi.org/10.1111/j.1943-278X.2011.00030.x.

Estevez, A., Jauregui, P., Sanchez-Marcos, I., Lopez-Gonzalez, H., & Griffiths, M. D. (2017a). Attachment and emotion regulation in substance addictions and behavioral addictions. *J. Behav. Addict. 6*(4), 534–544. https://doi.org/10.1556/2006.6.2017.086.

Estevez, A., Urbiola, I., Iruarrizaga, I., Onaindia, J., & Jauregui, P. (2017b). Emotional dependency in dating relationships and psychological consequences of internet and mobile abuse. *Anales de Psicología, 33*(2), 260–268. https://doi.org/10.6018/analesps.33.2.255111.

Evren, C., Dalbudak, E., Evren, B., & Demirci, A. C. (2014). High risk of Internet addiction and its relationship with lifetime substance use, psychological and behavioral problems among 10(th) grade adolescents. *Psychiatria Danubina, 26*(4), 330–339.

Fernández-Villa, T., Alguacil Ojeda, J., Almaraz Gómez, A., Cancela Carral, J. M., Delgado-Rodríguez, M., García-Martín, M., ... Martín, V. (2015). Problematic internet use in university students: Associated factors and differences of gender. *Adicciones, 27*(4), 265–275. https://doi.org/10.20882/adicciones.751.

Fortin, N., Helliwell, J. F., & Wang, S. (2015). How does subjective well-being vary around the world by gender and age? In J. F. Helliwell, R. Layard, & J. Sachs (Eds.). *World happiness report 2015* (pp. 43–74). New York: Sustainable Development Solutions Network.

Gencer, S. L., & Koc, M. (2012). Internet abuse among teenagers and its relations to internet usage patterns and demographics. *J. Educ. Technol. Society, 15*(2), 25–n/a.

Gmel, G., Khazaal, Y., Studer, J., Baggio, S., & Marmet, S. (2019). Development of a short form of the compulsive internet use scale in Switzerland. *International Journal of Methods in Psychiatric Research, 0*(0), e1765. https://doi.org/10.1002/mpr.1765.

Gunay, O., Ozturk, A., Arslantas, E. E., & Sevinc, N. (2018). Internet addiction and depression levels in erciyes university students. *Dusunen Adam. 31*(1), 79–88. https://doi.org/10.5350/DAJPN2018310108.

Hafkin, N. J., & Huyer, S. (2007). Women and gender in ICT statistics and indicators for development. *Information Technologies and International Development, 4*(2), 25–41.

Ha, Y. M., & Hwang, W. J. (2014). Gender differences in internet addiction associated with psychological health indicators among adolescents using a national web-based survey. *International Journal of Mental Health and Addiction, 12*(5), 660–669. https://doi.org/10.1007/s11469-014-9500-7.

Han, P., Wang, P., Lin, Q., Tian, Y., Gao, F., & Chen, Y. (2017). Reciprocal relationship between internet addiction and network-related maladaptive cognition among Chinese college freshmen: A longitudinal cross-lagged analysis. *Frontiers in Psychology, 8*. https://doi.org/10.3389/fpsyg.2017.01047 1047-1047.

Hawi, N., & Samaha, M. (2019). Identifying commonalities and differences in personality characteristics of internet and social media addiction profiles: Traits, self-esteem, and self-construal. *Behaviour & Information Technology, 38*(2), 110–119. https://doi.org/10.1080/0144929X.2018.1515984.

Hetzel-Riggin, M. D., & Pritchard, J. R. (2011). Predicting problematic internet use in men and women: The contributions of psychological distress, coping style, and body esteem. *Cyberpsychology, Behavior, and Social Networking, 14*(9), 519–525. https://doi.org/10.1089/cyber.2010.0314.

Higgins, J. P., & Green, S. (2011). *Studies with Zero-Cell Counts. Cochrane handbook for systematic reviews of interventions.* Retrieved May 5, 2018, from http://handbook-5-1.cochrane.org/chapter_16/16_9_2_studies_with_zero_cell_counts.htm.

Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *BMJ, 327*(7414), 557–560. https://doi.org/10.1136/bmj.327.7414.557.

Hilbert, M. (2011). Digital gender divide or technologically empowered women in developing countries? A typical case of lies, damned lies, and statistics. *Women's Studies International Forum, 34*(6), 479–489. https://doi.org/10.1016/j.wsif.2011.07.001.

Holdoš, J. (2016). Type D personality in the prediction of internet addiction in the young adult population of Slovak internet users. *Current Psychology, 36*(4), 861–868. https://doi.org/10.1007/s12144-016-9475-6.

Intel (2012). *Women and the Web.* Retrieved April 3, 2018, from https://www.intel.com/content/www/us/en/technology-in-education/women-in-the-web.html.

International Telecommunication Union. (2016). *ICT facts and figures 2016.* from https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf.

Internet Governance Forum. (2016). *Overcoming barriers to enable women's meaningful internet access*.

Islam, M. A., & Hossin, M. Z. (2016). Prevalence and risk factors of problematic internet use and the associated psychological distress among graduate students of Bangladesh. *Asian J. Gambl. Iss. Publ. Health, 6*(1), 1–14. https://doi.org/10.1186/s40405-016-0020-1.

Israelashvili, M., Kim, T., & Bukobza, G. (2012). Adolescents' over-use of the cyber world – internet addiction or identity exploration? *Journal of Adolescence, 35*(2), 417–424. https://doi.org/10.1016/j.adolescence.2011.07.015.

Jang, M. H., & Ji, E. S. (2012). Gender differences in associations between parental problem drinking and early adolescents' Internet addiction. *Journal for Specialists in Pediatric Nursing, 17*(4), 288–300. https://doi.org/10.1111/j.1744-6155.2012.00344.x.

Jelenchick, L. A., Eickhoff, J., Christakis, D. A., Brown, R. L., Zhang, C., Benson, M., et al. (2014). The problematic and Risky internet use screening scale (PRIUSS) for adolescents and young adults: Scale development and refinement. *Computers in Human Behavior, 35*, 171–178. https://doi.org/10.1016/j.chb.2014.01.035.

Kamal, N., & Kamal, N. (2018). Determinants of problematic internet use and its association with disordered eating attitudes among minia university students. *International Journal of Preventive Medicine, 9*(1), 35. https://doi.org/10.4103/ijpvm.IJPVM_489_17.

Kandall, S. R. (1999). *Substance and shadow: Women and addiction in the United States.* Cambridge, MA: Harvard University Press.

Kandri, T. A., Bonotis, K. S., Floros, G. D., & Zafiropoulou, M. M. (2014). Alexithymia components in excessive internet users: A multi-factorial analysis. *Psychiatry Research, 220*(1–2), 348–355. https://doi.org/10.1016/j.psychres.2014.07.066.

Kim, K., Ryu, E., Chon, M.-Y., Yeun, E.-J., Choi, S.-Y., Seo, J.-S., et al. (2006). Internet addiction in Korean adolescents and its relation to depression and suicidal ideation: A questionnaire survey. *International Journal of Nursing Studies, 43*(2), 185–192. https://doi.org/10.1016/j.ijnurstu.2005.02.005.

King, D., Industry Response Consortium, G., Schimmenti, A., Billieux, J., Delfabbro, P., Potenza, M., ... Spritzer, D. (2018). Comment on the global gaming industry's statement on ICD-11 gaming disorder: A corporate strategy to disregard harm and deflect social responsibility? *Addiction, 113*(11), 2145–2146. https://doi.org/10.1111/add.1438.

Kittinger, R., Correia, C. J., & Irons, J. G. (2012). Relationship between Facebook use and problematic Internet use among college students. *Cyberpsychology, Behavior, and Social Networking, 15*(6), 324–327. https://doi.org/10.1089/cyber.2010.0410.

Kojima, R., Sato, M., Akiyama, Y., Shinohara, R., Mizorogi, S., Suzuki, K., ... Yamagata, Z. (2019). Problematic Internet use and its associations with health-related symptoms and lifestyle habits among rural Japanese adolescents. *Psychiatry and Clinical Neurosciences, 73*(1), 20. https://doi.org/10.1111/pcn.12791.

Koronczai, B., Kökönyei, G., Urbán, R., Kun, B., Pápay, O., Nagygyörgy, K., ... Demetrovics, Z. (2013). The mediating effect of self-esteem, depression and anxiety between satisfaction with body appearance and problematic internet use. *The American Journal of Drug and Alcohol Abuse, 39*(4), 259–265. https://doi.org/10.3109/00952990.2013.803111.

Kostic, J. O., Pedovic, I., & Panic, T. (2018). Problematic internet use among adolescents: Psychometric properties of the index of problematic online experiences (I-POE). *Temida, 21*(2), 207–227. https://doi.org/10.2298/tem1802207o.

Kuss, D. J., Griffiths, M. D., Karila, L., & Billieux, J. (2014). Internet addiction: A systematic review of epidemiological research for the last decade. *Current Pharmaceutical Design, 20*(25), 4026–4052. https://doi.org/10.2174/13816128113199990617.

Lachmann, B., Sariyska, R., Kannen, C., Cooper, A., & Montag, C. (2016). Life satisfaction and problematic Internet use: Evidence for gender specific effects. *Psychiatry Research, 238*, 363–367. https://doi.org/10.1016/j.psychres.2016.02.017.

Lachmann, B., Sindermann, C., Sariyska, R. Y., Luo, R., Melchers, M. C., Becker, B., ... Montag, C. (2018). The role of empathy and life satisfaction in internet and smartphone use disorder. *Frontiers in Psychology, 9*. https://doi.org/10.3389/fpsyg.2018.00398.

Lee, J.-Y., Kim, S.-Y., Bae, K.-Y., Kim, J.-M., Shin, I.-S., Yoon, J.-S., et al. (2018a). Prevalence and risk factors for problematic Internet use among rural adolescents in Korea. *Asia-Pacific Psychiatry, 10*(2), https://doi.org/10.1111/appy.12310.

Lee, Y., Ko, C., & Chou, C. (2015). Re-visiting internet addiction among Taiwanese students: A cross-sectional comparison of students' expectations, online gaming, and online social interaction. *Journal of Abnormal Child Psychology, 43*(3), 589–599. https://doi.org/10.1007/s10802-014-9915-4.

Lee, S. Y., Lee, D., Nam, C. R., Kim, D. Y., Park, S., Kwon, J. G., ... Choi, J. S. (2018b). Distinct patterns of Internet and smartphone-related problems among adolescents by gender: Latent class analysis. *J. Behav. Addict. 7*(2), 454–465. https://doi.org/10.1556/2006.7.2018.28.

Lee, T. K., Roh, S., Han, J. H., Park, S. J., Soh, M. A., Han, D. H., et al. (2016). The relationship of problematic internet use with dissociation among South Korean internet users. *Psychiatry Research, 241*, 66–71. https://doi.org/10.1016/j.psychres.2016.04.109.

Liang, L., Zhou, D., Yuan, C., Shao, A., & Bian, Y. (2016). Gender differences in the relationship between internet addiction and depression: A cross-lagged study in Chinese adolescents. *Computers in Human Behavior, 63*, 463–470. https://doi.org/10.1016/j.chb.2016.04.043.

Li, G., Hou, G., Yang, D., Jian, H., & Wang, W. (2019). Relationship between anxiety, depression, sex, obesity, and internet addiction in Chinese adolescents: A short-term longitudinal study. *Addictive Behaviors, 90*, 421–427. https://doi.org/10.1016/j.addbeh.2018.12.009.

Li, J., Li, D., Jia, J., Li, X., Wang, Y., & Li, Y. (2018). Family functioning and internet addiction among adolescent males and females: A moderated mediation analysis. *Children and Youth Services Review, 91*, 289–297. https://doi.org/10.1016/j.childyouth.2018.06.032.

Lin, M.-P., Ko, H.-C., & Wu, J. Y.-W. (2011). Prevalence and psychosocial risk factors associated with internet addiction in a nationally representative sample of college students in taiwan. *Cyberpsychology, Behavior, and Social Networking, 14*(12), 741–746. https://doi.org/10.1089/cyber.2010.0574.

Li, W., O'Brien, J. E., Snyder, S. M., & Howard, M. O. (2015). Characteristics of internet addiction/pathological internet use in U.S. University students: A qualitative-method investigation. *PLoS One, 10*(2), e0117372. https://doi.org/10.1371/journal.pone.0117372.

Liu, Q., Fang, X., Deng, L., & Zhang, J. (2012). Parent–adolescent communication, parental Internet use and Internet-specific norms and pathological Internet use among Chinese adolescents. *Computers in Human Behavior, 28*(4), 1269–1275. https://doi.org/10.1016/j.chb.2012.02.010.

Liu, Q., Fang, X., Zhou, Z., Zhang, J., & Deng, L. (2013). Perceived parent-adolescent relationship, perceived parental online behaviors and pathological internet use among adolescents: Gender-specific differences. *PLoS One, 8*(9), e75642. https://doi.org/10.1371/journal.pone.0075642.

Li, D., Zhang, W., Li, X., Zhen, S., & Wang, Y. (2010). Stressful life events and problematic internet use by adolescent females and males: A mediated moderation model. *Computers in Human Behavior, 26*(5), 1199–1207. https://doi.org/10.1016/j.chb.2010.03.031.

Mak, K.-K., Nam, J. K., Kim, D., Aum, N., Choi, J.-S., Cheng, C., ... Watanabe, H. (2017). Cross-cultural adaptation and psychometric properties of the Korean Scale for Internet Addiction (K-Scale) in Japanese high school students. *Psychiatry Research, 249*, 343–348. https://doi.org/10.1016/j.psychres.2017.01.044.

Mann, R. E. (2005). Availability as a law of addiction. *Addiction, 100*(7), 924–925. https://doi.org/10.1111/j.1360-0443.2005.01146.x.

Mei, S., Yau, Y. H. C., Chai, J., Guo, J., & Potenza, M. N. (2016). Problematic Internet use, well-being, self-esteem and self-control: Data from a high-school survey in China. *Addictive Behaviors, 61*, 74–79. https://doi.org/10.1016/j.addbeh.2016.05.009.

Minutillo, A., Pacifici, R., Scaravelli, G., De Luca, R., Palmi, I., Mortali, C., ... Berretta, P. (2016). Gender disparity in addiction: An Italian epidemiological sketch. *Annali dell'Istituto superiore di sanità, 52*(2), 176–183. https://doi.org/10.4415/ANN_16_02_08.

Monacis, L., Sinatra, M., Griffiths, M. D., & de Palo, V. (2018). Assessment of the Italian version of the internet disorder scale (IDS-15). *International Journal of Mental Health and Addiction, 16*(3), 680–691. https://doi.org/10.1007/s11469-017-9823-2.

Montgomery, M. (2016). Reversing the gender gap in happiness: Validating the use of life satisfaction. *Self-reports worldwide (job market paper)*. Retrieved from https://dornsife.usc.edu/assets/sites/1011/docs/mallory_montgomery_JMP_-_gender_happiness_gap_-_nov_10.pdf.

Muller, M., Brand, M., Mies, J., Lachmann, B., Sariyska, R. Y., & Montag, C. (2017). The 2d:4d marker and different forms of internet use disorder. *Frontiers in Psychiatry, 8*, 213. https://doi.org/10.3389/fpsyt.2017.00213.

Musetti, A., Terrone, G., & Schimmenti, A. (2018). An exploratory study on problematic Internet use predictors: Which role for attachment and dissociation? *Clin. Neuropsychiatry, 15*(1), 35–41.

Nam, C. R., Lee, D. H., Lee, J. Y., Choi, A. R., Chung, S. J., Kim, D.-J., ... Choi, J.-S. (2018). The role of resilience in internet addiction among adolescents between sexes: A moderated mediation model. *Journal of Clinical Medicine, 7*(8), https://doi.org/10.3390/jcm7080222.

Nergüz, B. S. (2011). An examination of predictor variables for problematic internet use. *TOJET - Turkish Online Journal of Educational Technology, 10*(3), 54–62.

Noh, D., & Kim, S. (2016). Dysfunctional attitude mediates the relationship between psychopathology and internet addiction among Korean college students: A cross-sectional observational study. *International Journal of Mental Health Nursing, 25*(6), 588–597. https://doi.org/10.1111/inm.12220.

Odaci, H., & Celik, C. B. (2017). Internet dependence in an undergraduate population: The roles of coping with stress, self-efficacy beliefs, and sex role orientation. *Journal of Educational Computing Research, 55*(3), 395–409. https://doi.org/10.1177/0735633116668644.

Odacı, H. (2013). Risk-taking behavior and academic self-efficacy as variables accounting for problematic internet use in adolescent university students. *Children and Youth Services Review, 35*(1), 183–187. https://doi.org/10.1016/j.childyouth.2012.09.011.

Ortiz-Ospina, E., & Roser, M. (2017). *Happiness and life satisfaction.* Retrieved Feb 12, 2018, from https://ourworldindata.org/happiness-and-life-satisfaction.

Pace, U., D'Urso, G., & Zappulla, C. (2019). Internalizing problems as a mediator in the relationship between low effortful control and internet abuse in adolescence: A three-wave longitudinal study. *Computers in Human Behavior, 92*, 47–54. https://doi.org/10.1016/j.chb.2018.10.030.

Pantic, I., Milanovic, A., Loboda, B., Błachnio, A., Przepiorka, A., Nesic, D., et al. (2017). Association between physiological oscillations in self-esteem, narcissism and internet addiction: A cross-sectional study. *Psychiatry Research, 258*, 239–243. https://doi.org/10.1016/j.psychres.2017.08.044.

Parzen, M., Lipsitz, S., Ibrahim, J., & Klar, N. (2002). An estimate of the odds ratio that always exists. *Journal of Computational & Graphical Statistics, 11*(2), 420–436. https://doi.org/10.1198/106186002760180590.

Poli, R., & Agrimi, E. (2012). Internet addiction disorder: Prevalence in an Italian student population. *Nordic Journal of Psychiatry, 66*(1), 55–59. https://doi.org/10.3109/08039488.2011.605169.

Potenza, M. N. (2018). Do gaming disorder and hazardous gaming belong in the ICD-11? Considerations regarding the death of a hospitalized patient that was reported to have occurred while a care provider was gaming. *J. Behav. Addict. 7*(2), 206–207. https://doi.org/10.1556/2006.7.2018.42.

Potenza, M. N., Higuchi, S., & Brand, M. (2018). Call for research into a wider range of behavioural addictions. *Nature, 555*, 30. https://doi.org/10.1038/d41586-018-02568-z.

Puri, A., & Sharma, R. (2016). Internet usage, depression, social isolation and loneliness amongst adolescents. *Indian J. Health Wellbeing, 7*(10), 996–1003.

Reed, P., Vile, R., Osborne, L. A., Romano, M., & Truzoli, R. (2015). Problematic internet usage and immune function. *PLoS One, 10*(8), https://doi.org/10.1371/journal.pone.0134538 e0134538-e0134538.

Rumpf, H.-J., Achab, S., Billieux, J., Bowden-Jones, H., Carragher, N., Demetrovics, Z., ... Poznyak, V. (2018). Including gaming disorder in the ICD-11: The need to do so from a clinical and public health perspective. *J. Behav. Addict. 7*(3), 556–561. https://doi.org/10.1556/2006.7.2018.59.

SAMHSA. (2014). *Results from the 2013 national survey on drug use and health: Summary of national findings.* Rockville, MD: Substance Abuse and Mental Health Services Administration ((SAMHSA)).

Saraiva, J., Esgalhado, G., Pereira, H., Monteiro, S., Afonso, R. M., & Loureiro, M. (2018). The relationship between emotional intelligence and internet addiction among youth and adults. *Journal of Addictions Nursing, 29*(1), 13–22. https://doi.org/10.1097/jan.0000000000000209.

Sargin, N. (2012). Internet addiction among adolescence. *Educational Research and Reviews, 7*(27), 613–661. https://doi.org/10.5897/ERR12.202.

Schimmenti, A., Passanisi, A., Caretti, V., La Marca, L., Granieri, A., Iacolino, C., ... Billieux, J. (2017). Traumatic experiences, alexithymia, and internet addiction symptoms among late adolescents: A moderated mediation analysis. *Addictive Behaviors, 64*, 314–320. https://doi.org/10.1016/j.addbeh.2015.11.002.

Schimmenti, A., Passanisi, A., Gervasi, A. M., Manzella, S., & Famà, F. I. (2014). Insecure attachment attitudes in the onset of problematic Internet use among late adolescents. *Child Psychiatry and Human Development, 45*(5), 588–595. https://doi.org/10.1007/s10578-013-0428-0.

Scimeca, G., Bruno, A., Cava, L., Pandolfo, G., Maria Rosaria Anna, M., & Zoccali, R. (2014). The relationship between alexithymia, anxiety, depression, and internet addiction severity in a sample of Italian high school students. *Science World Journal.* https://doi.org/10.1155/2014/504376.

Servidio, R. (2017). Assessing the psychometric properties of the internet addiction test: A study on a sample of Italian university students. *Computers in Human Behavior, 68*, 17–29. https://doi.org/10.1016/j.chb.2016.11.019.

Sharma, M., Rao, G., Benegal, V., Thennarasu, K., & Thomas, D. (2017). Technology addiction survey: An emerging concern for raising awareness and promotion of healthy use of technology. *Indian Journal of Psychological Medicine, 39*(4), https://doi.org/10.4103/IJPSYM.IJPSYM_171_17.

Shaw, M., & Black, D. W. (2008). Internet addiction: Definition, assessment, epidemiology and clinical management. *CNS Drugs, 22*, 353–365. https://doi.org/10.2165/00023210-200822050-00001.

Shek, D. T. L., & Yu, L. (2016). Adolescent internet addiction in Hong Kong: Prevalence, change, and correlates. *Journal of Pediatric and Adolescent Gynecology, 29*(1 Suppl), S22–S30. https://doi.org/10.1016/j.jpag.2015.10.005.

Shrivastava, A., Sharma, M. K., & Marimuthu, P. (2018). Internet addiction at workplace and it implication for workers life style: Exploration from Southern India. *Asian J. Psychiatr. 32*, 151–155. https://doi.org/10.1016/j.ajp.2017.11.014.

Souza, F., Casas, D. d. L., Flores, V., Youn, S., Cha, M., Quercia, D., et al. (2015). Dawn of the selfie era: The whos, wheres, and hows of selfies on instagram. *Paper presented at the Proceedings of the 2015 ACM on conference on online social networks*.

Stavropoulos, V., Alexandraki, K., & Motti-Stefanidi, F. (2013). Recognizing internet addiction: Prevalence and relationship to academic achievement in adolescents enrolled in urban and rural Greek high schools. *Journal of Adolescence, 36*(3), 565–576. https://doi.org/10.1016/j.adolescence.2013.03.008.

Sun, P., Johnson, C. A., Palmer, P., Arpawong, T. E., Unger, J. B., Xie, B., ... Sussman, S. (2012). Concurrent and predictive relationships between compulsive internet use and substance use: Findings from vocational high school students in China and the USA. *International Journal of Environmental Research and Public Health, 9*(3), 660–673. https://doi.org/10.3390/ijerph9030660.

Tang, C. S., Koh, Y. W., & Gan, Y. (2017). Addiction to internet use, online gaming, and online social networking among young adults in China, Singapore, and the United States. *Asia-Pacific Journal of Public Health, 29*(8), 673–682. https://doi.org/10.1177/1010539517739558.

TaŞ, B., & ÖZtosun, A. (2018). Predictability of internet addiction with adolescent perception of social support and ostracism experiences. *TOJET - Turkish Online Journal of Educational Technology, 17*(4), 32–41.

Tateno, M., Teo, A. R., Shiraishi, M., Tayama, M., Kawanishi, C., & Kato, T. A. (2018). Prevalence rate of Internet addiction among Japanese college students: Two cross--sectional studies and reconsideration of cut-off points of Young's Internet Addiction Test in Japan. *Psychiatry and Clinical Neurosciences, 72*(9), 723–730. https://doi.org/10.1111/pcn.12686.

Tian, Y., Bian, Y., Han, P., Gao, F., & Wang, P. (2017). Associations between psychosocial factors and generalized pathological internet use in Chinese university students: A longitudinal cross-lagged analysis. *Computers in Human Behavior, 72*, 178–188. https://doi.org/10.1016/j.chb.2017.02.048.

Tran, B. X., Mai, H. T., Nguyen, L. H., Nguyen, C. T., Latkin, C. A., Zhang, M. W. B., et al. (2017). Vietnamese validation of the short version of internet addiction test. *Addict. Behav. Rep. 6*, 45–50. https://doi.org/10.1016/j.abrep.2017.07.001.

Tsitsika, A., Janikian, M., Schoenmakers, T. M., Tzavela, E. C., Ólafsson, K., Wójcik, S., ... Richardson, C. (2014). Internet addictive behavior in adolescence: A cross-sectional study in seven european countries. *Cyberpsychology, Behavior, and Social Networking, 17*(8), 528–535. https://doi.org/10.1089/cyber.2013.0382.

Tuchman, E. (2010). Women and addiction: The importance of gender issues in substance abuse research. *Journal of Addictive Diseases, 29*(2), 127–138. https://doi.org/10.1080/10550881003684582.

Üneri, Ö. S., & Tanidir, C. (2011). Evaluation of internet addiction in a group of high school students: A cross-sectional study. *Dusunen Adam. 24*(4), 265–272.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software, 36*(3), 1–48. https://doi.org/10.18637/jss.v036.i03.

Wang, Z., Hu, Y., Zheng, H., Yuan, K., Du, X., & Dong, G. (2019). Females are more vulnerable to Internet gaming disorder than males: Evidence from cortical thickness abnormalities. *Psychiatry Research: Neuroimaging, 283*, 145–153. https://doi.org/10.1016/j.pscychresns.2018.11.001.

Wang, L., Luo, J., Bai, Y., Kong, J., Luo, J., Gao, W., et al. (2013). Internet addiction of adolescents in China: Prevalence, predictors, and association with well-being. *Addiction Research and Theory, 21*(1), 62–69. https://doi.org/10.3109/16066359.2012.690053.

Wang, Y., Wu, A. M. S., & Lau, J. T. F. (2016). The health belief model and number of peers with internet addiction as inter-related factors of Internet addiction among secondary school students in Hong Kong. *BMC Public Health, 16*, 272. https://doi.org/10.1186/s12889-016-2947-7.

Waqas, A., Rehman, A., Malik, A., Aftab, R., Allah Yar, A., Allah Yar, A., et al. (2016). Exploring the association of ego defense mechanisms with problematic internet use in a Pakistani medical school. *Psychiatr. Res. 243*, 463–468. https://doi.org/10.1016/j.psychres.2016.07.021.

Watters, C. A., Keefer, K. V., Kloosterman, P. H., Summerfeldt, L. J., & Parker, J. D. A. (2013). Examining the structure of the internet addiction test in adolescents: A bifactor approach. *Computers in Human Behavior, 29*(6), 2294–2302. https://doi.org/10.1016/j.chb.2013.05.020.

Weingarten, E. (2013). *The developing world needs more female internet users.* Retrieved July 4, 2018, from http://www.slate.com/articles/technology/technology/2013/01/a_new_report_on_female_internet_users_from_the_developing_world.html.

WHO (2018). *ICD-11: Gaming disorder.* Retrieved Oct 10, 2018, from https://icd.who.int/dev11/f/en#http%3a%2f%2fid.who.int%2ficd%2fentity%2f1448597234http://www.webcitation.org/73HUQE2R9 Archived by WebCite® at .

WHO Regional Office for Europe (2010). *Social and gender inequalities in environment and health.* Retrieved March 23, 2018, from http://www.euro.who.int/en/health-topics/environment-and-health/social-inequalities-in-environment-and-health/publications-on-environment-and-health-in-the-european-region/social-and-gender-inequalities-in-environment-and-health.

Woetzel, J., Madgavkar, A., Ellingrud, K., Labaye, E., Devillard, S., Kutcher, E., ... Krishnan, M. (2015). *The power of parity: How advancing women's equality can add $12 trillion to global growth.* Retrieved May 15, 2018, from https://www.mckinsey.com/global-themes/employment-and-growth/how-advancing-womens-equality-can-add-12-trillion-to-global-growth.

Wu, C.-Y., Lee, M.-B., Liao, S.-C., & Chang, L.-R. (2015). Risk factors of internet addiction among internet users: An online questionnaire survey. *PLoS One, 10*(10), https://doi.org/10.1371/journal.pone.0137506 e0137506-e0137506.

Wu, C.-Y., Lee, M.-B., Liao, S.-C., & Ko, C.-H. (2019). A nationwide survey of the prevalence and psychosocial correlates of internet addictive disorders in Taiwan. *Journal of the Formosan Medical Association, 118*(1), 514–523. https://doi.org/10.1016/j.jfma.2018.10.022.

Wu, A. M. S., Li, J., Lau, J. T. F., Mo, P. K. H., & Lau, M. M. C. (2016). Potential impact of internet addiction and protective psychosocial factors onto depression among Hong Kong Chinese adolescents - direct, mediation and moderation effects. *Comprehensive Psychiatry, 70*, 41–52. https://doi.org/10.1016/j.comppsych.2016.06.011.

Xu, J., Shen, L., Yan, C., Hu, H., Yang, F., Wang, L., ... Shen, X. (2012). Personal characteristics related to the risk of adolescent internet addiction: A survey in shanghai, China. *BMC Public Health, 12*(1), 1106. https://doi.org/10.1186/1471-2458-12-1106.

Yadav, P., Banwari, G., Parmar, C., & Maniar, R. (2013). Internet addiction and its correlates among high school students: A preliminary study from ahmedabad, India. *Asian J. Psychiatr. 6*(6), 500–505. https://doi.org/10.1016/j.ajp.2013.06.004.

Yang, J., Guo, Y., Du, X., Jiang, Y., Wang, W., Xiao, D., ... Guo, L. (2018). Association between problematic internet use and sleep disturbance among adolescents: The role of the child's sex. *International Journal of Environmental Research and Public Health, 15*(12), https://doi.org/10.3390/ijerph15122682.

Yayan, E. H., Arikan, D., Saban, F., Gürarslan Bas, N., & Özel Özcan, Ö. (2017). Examination of the correlation between internet addiction and social phobia in adolescents. *Western Journal of Nursing Research, 39*(9), 1240–1254. https://doi.org/10.1177/0193945916665820.

Yong, R. K. F., Inoue, A., & Kawakami, N. (2017). The validity and psychometric properties of the Japanese version of the Compulsive Internet Use Scale (CIUS). *BMC Psychiatry, 17*(1), 201. https://doi.org/10.1186/s12888-017-1364-5.

Young, K. S. (2017). The evolution of Internet addiction. *Addictive Behaviors, 64*, 229–230. https://doi.org/10.1016/j.addbeh.2015.05.016.

Yu, L., & Shek, D. T. L. (2013). Internet addiction in Hong Kong adolescents: A three-year longitudinal study. *Journal of Pediatric and Adolescent Gynecology, 26*(3), S10–S17. https://doi.org/10.1016/j.jpag.2013.03.010.

Zhang, Y., Yang, Z., Duan, W., Tang, X., Gan, F., Wang, F., ... Wang, Y. (2014). A preliminary investigation on the relationship between virtues and pathological internet use among Chinese adolescents. *Child and Adolescent Psychiatry and Mental Health, 8*(1), 8. https://doi.org/10.1186/1753-2000-8-8.