Gender Differences on Computer Anxiety: A Meta-analysis of Studies from 1980s to 2010s

Yuen-kuang Cliff Liao
Center for Teacher Education, Chinese Culture University
yliao2009@gmail.com

Abstract: The present study aimed to employed meta-analytic approach to examine the gender differences on computer anxiety. Eight-four studies published between 1984 and 2017 and located from 24 countries/areas were collected. Their effect sizes were calculated by using Hedges's *g* (1985) formula. In addition, 5 moderators (i.e., sample region, age group, type of publication, year of publication, and instrumentation) were selected to examine their impacts on the overall mean Effect size. The overall mean effect size is 0.189 indicating that, in general, females were slightly more anxious than males when using computers. Moreover, analyses of moderator variables also found that sample region, age group had significantly impacts on the overall mean effect size. Findings of this meta-analysis were compared with previously review and meta-analyses.

Introduction and Research Purposes

Computer anxiety is referred to a psychological attitude towards working with a computer or completing a computer-related task that brings forth a level of uneasiness or the avoidance of computer use (Tuncer, Doğan, & Tanaş, 2013). Rosen and Weil (1995), particularly, defined computer anxiety as fear or anxiety about computers, resistance to talk about computers, and hostile or aggressive thoughts about them. As computers have been widely used in our society and daily life, computer anxiety has been richly studied over the past four decades by researchers across different cultures (Arigbabu, 2006; Korobili, Togia, & Malliari, 2010). Among these studies, much effort has gone into looking at gender differences and their causes on computer anxiety (e.g., Campbell, 1988; 1990; Cussó-Calabuig, Farran, & Bosch-Capblanch, 2017; Hong & Koh, 2002; Harb, Bakar, & Krish, 2014; Koohang, 1987; 1989; Loyd & Gressard, 1986; Sanalan, 2016). Several reviews and meta-analyses related to this topic were also been conducted (e.g., Chua, Chen, and Wong, 1999; Powell, 2013; Rosen & Maguire, 1990). However, the results of these individual studies and reviews were inconsistent, and had not provide a clear picture about the gender gap on computer anxiety. For example, Powell (2013) reviewed 80 articles published in 1990s and 2000s and found 40 articles reported females had more computer anxiety than males, while 35 articles found no difference between genders. Rosen and Maguire (1990) did a meta-analysis on computer anxiety and found that females showed slightly, but not significantly more, computer anxiety than males. The two meta-analyses (i.e., Chua et.al, 1999 and Rosen et al, 1990) represented two decades of research (1990-2000 and 1980-1990, respectively), while Powell's (2013) review characterized research between 1990 and 2010. Their efforts all contributed to literature of research on computer anxiety for their eras. The present studies aimed to collect research about gender difference on computer anxiety from 1980s to 2010s and employed the meta-analytic approach to investigate the relation between gender and computer anxiety. More specifically, this meta-analysis focused on the following two research questions:

1. Are there gender differences on computer anxiety as reported from previous empirical studies for past four decades?
2. Do these moderator variables (i.e., sample region, age group, type of publication, year of publication, and instrumentation) affect the overall effects of gender differences on computer anxiety?

Method

Data Sources and Search Strategy

The research method used in this study is the meta-analytic approach suggested by Borenstein, Hedges, Higgins, and Rothstein (2009). Their approach require researchers to (a) create the Effect Size

(ES) of each study, (b) calculate the overall mean ES across studies, (c) estimate the 95% confidence interval for the average ES, and (d) use the heterogeneity analysis to determine whether the ES of any particular group was affected by a moderator variable. The studies considered for use in this meta-analysis were located electronically and manually through a comprehensive search of publicly available literature from 1984 through 2017 and came from three major sources. The first group of studies came from electronic searches of following databases: ABI/Inform, Academic Search Premier (EBSCO), Compendex, Cambridge Scientific Abstracts, Canadian Research Index, Communication Abstracts, Education Abstracts, Education Resources Information Center (ERIC), PsycInfo, and Social Sciences Citation Index database of the Institute of Science Index (ISI). In addition, a Google Internet search was performed for grey literature. A second group of studies came from electronic and manual search of varied academic conference proceedings. The last group of studies was retrieved by manually branching from bibliographies in the documents located through reviews and computer searches. The keywords used for searching involving gender difference and computer anxiety included: gender, sex, computer, technology, anxiety, and *phobia. These keywords were used alone or grouped in different combinations to narrow down the search results.

Search Results

Firstly, about 350 research papers (including journal articles and conference reports) were located through the three major sources mentioned above. Next, after a cautious reading of the abstracts, around 110 studies as being relevant to the topic of this meta-analysis were selected. Finally, to include or exclude studies in the meta-analysis, the contents of these 110 studies were read thoroughly to ensure whether they met the following criteria: (1) studies had to assess the differences between males and females on computer anxiety; (2) studies had to provide sufficient statistics (e.g., means and standard deviations, t statistic or F statistic) for both males and females so that the ES could be estimated; (3) studies were written in English. Eight-four studies were identified through these search procedures and matched the established criteria. Among them, 73(87%) studies were retrieved from published journals, and 11 (13%) studies were from proceedings of conferences.

Selection and Coding of Moderator Variables

Five moderator variables were selected for coding each study in the present synthesis. The first 2 variables (i.e., sample region and age group) were coded so that potential different effects for samples with different background could be detected. The following 2 variables (i.e., type of publication and year of publication) were coded because it is important to know how effects are related to sources of information over time. Last variable (instrumentation) was coded so that effects related to characteristics of outcome measurement could be detected.

Calculating Effect Sizes

Hedges's *g* (Hedges & Olkin, 1985), defined as the mean differences between the treatment group (i.e., males in this study) and control group (i.e., females in this study) divided by the pooled standard deviation, was used to calculate ES for each study. In addition, when a sample size in a study is small, Hedges's *d* (unbiased estimate of ES) was calculated to remove possible sample bias (Hedges and Olkin, 1985, p.81). For those studies that did not report means and standard deviations, *F* values or *t* values were used to estimate the ES.

In most cases, when the values retrieved from different instruments, where high scores represented low computer anxiety, the formula given by Hedges and Olkin was quite straightforward. But in some cases, when the values denoted conversely in which high score represented high computer anxiety, the values were conversed so that the positive ES indicated that the males had lower computer anxiety than females. In addition, some studies reported values for both males and females on pretest measures and posttest measures. In such cases, pretest measures were kept for estimating ES so that any treatment which may change participants' original feelings about computers could be avoided.

In other cases, several subscales and subgroups were reported in a study (e.g., those that reported separate data by sample region or age group). They were grouped and analyzed based on their moderator variables. For example, Makrakis (1992) reported separate data for Japan and Swedish samples, the data from Japan was grouped and analyzed with Asia region, while data from Swedish was grouped and analyzed with Europe region. In addition, when a measurement of computer anxiety was a subscale of

another measurement, only the subscale measured computer anxiety was used (Chua, Chen, & Wong, 1999). For example, computer anxiety subscale was one of the four subscales in the Computer Attitude Scale (CAS) developed by Loyd and Gressard (1984). Data of this subscale were treated as if they were from an independent measurement.

Data Analysis

For the total set of 84 studies being investigated, Hedges and Olkin's (1985) homogeneity procedures were employed in aggregating and analyzing the ESs. Each ES was weighted by the inverse of its sampling variance. Thus, more weight was given to ESs that were based on larger sample sizes. The weighted ESs were then aggregated to form an overall weighted mean estimate of the treatment effect (g_+). The significance of the mean ES was judged by its 95% confidence interval (95% CI). A significantly positive (+) mean ES indicates that the results favor males; a significantly negative (–) mean ES indicates that the results favor females.

A series of subgroup moderator variable analyses were then conducted. Each coded moderator variable with sufficient variability was tested through two homogeneity statistics, between-class homogeneity (Q_{Between}) and within-class homogeneity (Q_{Within}). Q_B tests for homogeneity of ESs across levels (e.g., samples in secondary schools vs. in colleges).

A random-effect model (i.e., inverse variance method) was used, as suggested by Hedges and Vevea (1998), to combine all independent ESs to form an overall mean ES and to calculate Q_T. Since the samples of included studies were located from all over the world, the true effect size might differ from study to study. Under the random-effects model the studies included in the analysis are assumed to be a random sample of all possible studies that meet the inclusion criteria. The variance component Q_B was calculated using a mixed-effect model (Borenstein et al. 2009). All analyses were performed using Comprehensive Meta-AnalysisTM 3.0 (Borenstein et al. 2009).

Coder Reliability

To obtain more reliable outcomes from estimating ESs and coding moderator variables, the researcher of this study calculated and coded each study. In addition, one research assistant, who earned a master degree in education and had been well trained for conducting meta-analysis, calculated and coded 20% of studies independently. The inter-coder agreement rate for ES calculation and moderator variables coding were 90.4% and 88.5%, respectively. Moreover, disagreements between two coders were resolved through discussion. Final agreement had to be reached after discussion.

Results and Discussion

Descriptive Information

In total, there were 84 studies representing 31,308 participants included in the present meta-analysis; among them, 13,653 (44%) were males, and 17,555(56%) were females. For age group, nearly half studies (47.7%) used college students as subjects, and 19 (21.6%) studies used secondary-school students as subjects. For publication year, 29 (34.5%) studies were published between 1991 and 2000, and 20 (23.8%) studies were between 2001and 2010. As for instruments used, totally 19 scales for measuring computer anxiety were applied in the 84 studies; about 10 studies used researcher-develop instruments. The most popular instrument was Computer Attitude Scales developed by Loyd and Gressard (1984); about one third of studies (29/33.7%) used it. For sample region, 31,308 participants were selected from 24 countries/areas in 5 continents. About half studies (49.4%) used American as subjects.

Overall Effects

There were 94 ESs extracted from the 84 studies; among them 65 (69%) ESs were positive and favored the male group, while 28 (30%) of them were negative and favored the female group. One ES (Makrakis, 1992 for Japan samples) was 0, indicating there was no difference between male and female groups. The range of the study-weighted ESs was from -0.535 to 1.356. The mean ES ($g+$) was 0.189 (random-effect model), with a 95% confidence interval of 0.116 to 0.261. The standard deviation of 0.34 reflects the small variability of ESs across studies. According to Cohen (1992), an effect is said to be small when ES=0.2, medium when ES = 0.5, and large when ES = 0.8. The results indicate that there was a small but significant gender differences; male group had a significantly lower computer anxiety

than female group. The result is also confirmed by 65% of positive ES values. The slightness of the effect must be kept in mind, however. With more than 31,300 subjects across 24 countries/areas included in this meta-analysis, the generalization of this study is considered stable.

The Q statistics revealed that the ESs in the meta-analysis were heterogeneous ($Q_T = 674.3$, $df = 93$, $p < .0001$) indicating the total variability could be attributed to the true heterogeneity rather than the random error. A series of subgroup moderator variable analyses were then conducted.

The findings of this meta-analysis were compared with previous syntheses about computer anxiety and gender issue. Rosen et al. (1990) conducted a meta-analysis to investigate the myths and realities of computerphobia. Their study reported slightly gender differences on computerphobia. The weighted mean ES were 0.165, 0.112, and 0.132 for college students, elementary and secondary students, and adults, respectively. The study concluded that females were more computerphobic than males. Another meta-analysis by Chua, et al. (1999) reported that for university undergraduates, females were generally more anxious than males when using computers (Zr=0.077, p<0.01). The study did not report analyses for other age group due to inadequate data available. However, keep in mind that the number of effect size used for this analysis is quite small (N=8). In addition, there are two meta-analyses (i.e., Cai, Fan, & Du, 2017; Whitley, 1997) comparing the gender differences on computer attitudes. The computer anxiety was included in their analyses as one dimension (affect) of attitudes. The mean ESs for affect dimension of Whitley's and Cal et.als' studies were 0.259 and 0.1, respectively. Both studies reported statistically significant yet small effects in favor of males. The present study collected 84 studies published over 30 years and across 5 continents and found the mean ES was 0.189 which was quite consistent with previous synthesis. In general, females have slightly more computer anxiety than males.

Moderator Variables Analysis

Table 1 presents the results of the Q statistics for each moderator variables. Of the 5 variables analyzed, 2 variables (sample region and age group) were significantly related to the variability in the computer anxiety. Each of the variable is analyzed and discussed in the following section.

Sample region

As shown in Table 1, the $Q_{Between}$ statistics indicated that the mean ES of the sample regions differed statistically ($Q_{Between} = 15.909$, $df=4$, $p<.001$). Post hoe tests showed that the mean ESs for North American samples (0.227) and European samples (0.324) were significantly greater than Africa samples (-0.179). However, there was only one study located in Africa, the result may be considered tentative. The mean ES for Asian samples was quite low (ES = 0.053) and insignificant ($Z=1.062$, P>.05, 95% CI = -0.045~0.15), indicating that the males and females had no statistical difference on computer anxiety. As many countries in Asia were considered to be emerging areas, this finding was quite surprising.

Previous meta-analysis did by Cai, et al. (2017) reported significant gender differences on affect dimension of computer attitudes among samples from different regions. The findings is along with present study. But when looking at in detail, the mean ESs of their study were 0.15, 0.02, 0.21, and 0.21 for samples in Europe, North America, Asia, and others, respectively; Asian sample showed greatest mean ES, followed by European samples, and North American samples had lowest mean ES. The findings were quite different from the present meta-analysis. Bearing in mind that Cai, et als' meta-analysis included only 21 studies and the present meta-analysis gathered 84 studies, the variation of sample sources may yield different results.

Age group

For age group, the $Q_{Between}$ statistics indicated that the mean ES varied statistically ($Q_{Between} = 28.463$, $df = 5$, p<.0001). Post hoe tests showed that the mean ES for college students (0.232) were significantly greater than elementary-school students (-0.171), and mixed samples (-0.023), also the mean ES for secondary-school students (0.167) was significantly greater than elementary-school students. However, the number of ESs for elementary-school students (N=3) and mixed samples (N=4) were relatively small. The generalizability of the findings must be careful. When placing the mean ESs from the lowest to the highest, it seems to suggest the older the samples, the greater gender differences on computer anxiety.

Chua, et al. (1999) did a meta-analysis and found, female undergraduates were generally more anxious than males when using computers. Another meta-analysis conducted by Rosen et al. (1990) also reported that females had significantly higher computer anxiety than males, and the mean ES for college

students was greater than Elern + Sec Students, and Adults. The results of present meta-analysis are somewhat consistent with their findings. However, other meta-analyses presented different results. Whitley's (1997) meta-analysis found the mean ES for high school students was significant greater than adult, college, and grammar school students; also mean ESs for adult and college students were greater than the grammar school students. Cai, et als' (2017) meta-analysis also found the mean ES for secondary-school students was significant higher than college students and other age groups. Whitley and Cai, et als' studies investigated gender differences on computer attitudes. The "affect" dimension, defined as "emotional responses to computers, including such constructs as anxiety, liking, and fear." (Whitley, 1997, p5), was embedded as one dimension of computer attitudes. It is reasonable to assume the component of "affect" dimension was beyond computer anxiety. The findings from these two meta-analyses may therefore somewhat inconsistent with the present meta-analysis.

Type of publication

The results of the $Q_{Between}$ statistics for type of publication is shown in Table 1. The mean ES of the type of publication did not vary statistically ($Q_{Between}$ = 747, df=1, p>.05), indicating the mean ES for studies published in journals (N=73, ES=0.172) and those in conference proceedings (N=11, ES=0.258) was not statistically different from each other, yet the latter is higher than the former. Cai, et als' (2017) meta-analysis reported that mean ES of journal articles (0.07) was significantly lower than those of dissertation (ES=0.26). The consistent finding of these two meta-analyses was that journal article had lower mean ES than other type of publications.

Year of publication

Studies included in the present meta-analysis were published from 1984 to 2017. For analysis, studies were categorized into 4 decades as shown in Table 1. The $Q_{Between}$ statistics indicated that the mean ES did not differ statistically ($Q_{Between}$ = 2.459, df = 3, p>.05). The highest mean ES was 2001-2010 (0.252), followed by 1984-1990 (0.204), and 1991-2000 (0.186). The lowest mean ES was 2011-2017 (0.081). A review did by Powell (2013) comparing computer anxiety research from 1990 to 2010. The review collected 80 articles looking at gender and its effect on computer anxiety. The results showed that 35 articles found no difference on computer anxiety between genders. Of these, 21 were published in the 1990s, and 14 were published in the 2000s. In addition, 40 articles reported females had more computer anxiety than males. Of these, 20 were published in the 1990s and 19 were published in the 2000s. The results suggest there is no significant relationship between the number of published articles in the two decades and its effect on computer anxiety. Two meta-analyses (i.e., Cai, et al., 2017, and Whitley, 1997) also examined publication year on computer attitudes and concluded there is no meaningful relationship exist. The present meta-analysis is quite agreed with their views.

Instrumentation

Instruments used in the research of gender differences on computer anxiety may affect results. In total, there were 19 published instruments and some researcher-developed instruments in the present meta-analysis. For analysis, studies were grouped into 7 types as shown in Table 1. The $Q_{Between}$ statistics indicated that the mean ES did not vary statistically ($Q_{Between}$ = 6.112, df =6, p>.05). The most popular instrument was Computer Attitude Scale (CAS) created by Loyd and Gressard (1984); 29 (33.7%) studies used it, followed by Computer Anxiety Rating Scale (Heinssen, Glass, & Knight, 1987, CARS). The highest mean ES was studies used Computer Attitude Questionnaire (knezek & Rhonda, 1998, CAQ) (ES=0.384). The mean ES for studies used CAS (0.148) was significant (Z=3.182, p<.001, 95% CI=0.057~0.239), indicating males and females were statistically different on computer anxiety. However, the results did not found in studies used other types of instruments. A meta-analysis did by Chua, et al. (1999) examined how instrument used could influence the effects of gender differences on computer anxiety and found that when used Loyd and Gressard's CAS, the females are significantly more anxious than males when use computers, whereas if used Raub's (1981) instrument, no significantly gender difference was found. To a certain extent, findings from these two meta-analysis were consistent.

Evaluation of the Publication Bias

Rosenthal's (1991) Fail-safe *N* and Orwin's Fail-safe *N* formula were calculated to examine the

publication bias for the 84 studies. The Rosenthal's fail-safe *N* test showed that a total of 3806 studies with null results would be needed in order to nullify the ES. Moreover, the Orwin's fail-safe *N* also decided that the number of missing null studies required to bring the existing overall mean ES to a trivial level (g = 0.01) was 1398. It is unlikely that there are that many well-done studies sitting in file drawers that would negate our results.

Conclusions and Implications

Conclusions

This meta-analysis collect 84 empirical studies examined the gender differences on computer anxiety from published journals and conference proceedings for 4 decades and across 5 continents. The results indicated that, in general, females were slightly more anxious than males when using computers. The slightness should be kept in mind, however. The mean ES for the difference was 0.189. When this mean ES was converted to percentiles, the percentiles on the degree of computer anxiety were 58 for females and 50 for males. Moreover, the analyses of moderator variables revealed some interesting trends from accumulated research based, as followings:

1. Females in North America and Europe were more anxious than males when using computers, whereas gender gaps on computer anxiety for samples from Asia were little.
2. Age seems to have effects on the degree of gender differences on computer anxiety. The older the sample, the greater gender difference on computer anxiety.
3. Studies retrieved from journal tend to obtain lower effect sizes.
4. Publication years of studies seem to have no effect on gender difference on computer anxiety.
5. Most Instruments used to measure computer anxiety had no evident influence to the effect of gender differences, except, when studies used Computer Attitude Scale (CAS) created by Loyd and Gressard (1984) tend to reveal that females were more anxious than males on computer anxiety.

Implications

1. Providing more pleasing computer experiences for female students

In spite of the small mean ES, the gender gap on computer anxiety has been confirmed by this meta-analysis; females were more anxious than males when using computers. This uneasy feeling may discourage them to pursue higher levels of education or careers which relate to technology. The ROSE project reported by Sjøberg and Schreiner (2010) was based on a survey of 40,000 fifteen years old students from 40 countries carried out between the years 2003 and 2006. When asking their intention to develop their professional future in the field of ICT, around 50% of European boys responded that they were interested in jobs related to technology, but only 20% of girls did so. It is therefore necessary to resolve gender gap on computer anxiety when they are young. A large number of research reported that positive experiences was associated with lower computer anxiety (e.g., Al-Jabri & Al-Khaldi, 1997; Gos, 1996; McIlroy, Bunting, Tierney, & Gordon, 2001; Orr, Allen, & Poindexter, 2001). Providing more pleasing computer experiences for female students in educational settings could be an applicable way to equalize gender gap on computer anxiety.

2. Conducting second level analyses of moderator variables

This meta-analysis analyzed 5 moderator variables to find out if the overall mean differences on computer anxiety were related to each individual variable. The analyses revealed some interesting trends regarding research of gender differences on computer anxiety. Further studies may examine the interactions among these moderator variables. For example, looking at the effects of different sample regions interact with age groups.

References

Al-Jabri, I., & Al-Khaldi, M. (1997). Effects of user characteristics on computer attitudes among undergraduate business students. J*ournal of End User Computing*, *9*(2), 16–22.

Arigbabu, A. A. (2006). Evidence of computerphobia in Nigerian education majors. *Pshychological Reports*, *98*, 433-436. http://dx.doi.org/10.2466/pr0.98.2.433-436

Borenstein, M., Hedges, L.V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Chichester, UK: Wiley.

Cai, Z., Fan, X., & Du, J. (2017). Gender and attitudes toward technology use: A meta-analysis. *Computers &*

Education, *105*, 1-13.
Campbell, N. J. (1988). Correlates of computer anxiety of adolescent students. *Journal of Adolescent Research*, *3*, 107 – 117.
Campbell, N. J. (1990). High school students' computer attitudes and attributions: Gender, and ethnic group differences. *Journal of Adolescent Research*, *5*, 485 – 499.
Chua, S. L., Chen, D-T., & Wong, A. F. L. (1999). Computer anxiety and its correlates: a meta-analysis. *Computers in Human Behavior*, *15*, 609-623.
Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*, 155-159.
Cussó-Calabuig, R., Carrera Farran, X., & Bosch-Capblanch, X. (2017). Are boys and girls still digitally differentiated? The case of Catalonian teenagers. Journal of Information Technology Education: Research, 16, 411-435.
Gos, M. (1996). Computer anxiety and computer experience: A new look at an old relationship. *Clearing House*, *69*(5), 271–277.
Harb, J., Bakar, N. A, & Krish, P. (2014). Gender differences in attitudes towards learning oral skills using technology. *Education and Information Technologies*, *19*, 805–816. DOI 10.1007/s10639-013-9253-0
Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.
Hedges, L. V., & Vevea, J. L. (1998). Fixed- and random effects models in meta-analysis. *Psychological Methods*, *3*, 486-504.
Heinssen, R.K., Glass, C.R., & Knight, L.A. (1987). Assessing computer anxiety: Development and validation of the Computer Anxiety Rating Scale. *Computers in Human Behavior*, *3*(1), 49-59. [doi: DOI: 10.1016/0747-5632(87)90010-0].
Hong, K. & Koh, C. (2002). Computer anxiety and attitudes toward computers among rural secondary school teachers: A Malaysian perspective. *Journal of Research on Technology in Education*, *35*(1), 27 – 48.
Koohang, A. A. (1987). A study of attitudes of pre-service teachers toward the use of computers. *Educational Communications and Technology Journal*, *35*, 145 – 149.
Koohang, A. A. (1989). A study of attitudes toward computers: Anxiety, confidence, liking, and perceptions of usefulness. *Journal of Research on Computing in Education*, *21*, 137 – 150.
Korobili, S., Togia, A., & Maliari, A. (2010). Computer anxiety and attitudes among undergraduate students in Greece. *Computers in Human Behavior*, *26*, 399-405. http://dx.doi.org/10.1016/j.chb.2009.11.011
Loyd, B. H., & Gressard, C. (1984). Reliability and factorial validity of computer attitude scales. *Educational and Psychological Measurement*, *44*, 501-505. http://dx.doi.org/10.1177/0013164484442033
Loyd, B. H., & Gressard, C. P. (1986). Gender and amount of computer expedience of teachers in staff development programs: Effects on computer attitudes and perceptions of the usefulness of computers. *AEDS Journal*, *19*, 302 – 311.
Makrakis, V. (1992). Cross-cultural comparison of gender differences in attitude towards computers in Japan and Sweden. *Scandinavian Journal of Educational Research*, *36*(4), 275-287.
McIlroy, D., Bunting, B., Tierney, K., & Gordon, M. (2001). The relation of gender and background experience to self-reported computing anxieties and cognitions. *Computers in Human Behavior*, *17*(1), 21–33.
Orr, C., Allen, D., & Poindexter, S. (2001). The effect of individual differences on computer attitudes: An empirical study. *Journal of End User Computing*, *13*(2), 26–40.
Powell, A. L. (2013). Computer anxiety: Comparison of research from the 1990s and 2000s. *Computers in Human Behavior*, 29, 2337–2381.
Raub, A. (1981). *Correlates of computer anxiety in college students*. Unpublished Ph.D., University of Pennsylvania.
Rosen, L. D, & Maguire, p. (1990). Myths and Realities of Computerphobia: A Meta-Analysis. *Anxiety Research*, *3*, 175-191.
Rosenthal, R. (1991). *Meta-analytic procedures for social research* (Rev.ed.). Beverly Hills, CA : Sage.
Sanalan, V. A. (2016). Computerphobia in preservice teachers. *International Education Studies*, *9*(3), 217-223.
Sjøberg, S., & Schreiner, C. (2010). The ROSE project: An overview and key findings. Oslo: University of Oslo, 1-31. Retrieved September, 2018 from http://www.uv.uio.no/ils/english/research/projects/rose/publications/the-rose-project.pdf
Tuncer, M., Doğan, Y., & Tanaş, R. (2013). Investigation of vocational high-school students' computer anxiety. *The Turkish Online Journal of Educational Technology*, *12*(4), 90-95.
Whitley, B. E., Jr. (1997). Gender differences in computer-related attitudes and behaviors: A meta-analysis. *Computers in Human Behavior*, *13*, 1 – 22.

Table 1
The effect sizes of categories and their related moderator variables

Category	*k*	%	*d*	*z*	95%CI	Q_B	Post Hoc
Sample region						15.909**	5>3, 4>3
1. Australia	2	2.3	0.324	1.055	[-0.278~0.925]		
2. Asia	31	35.2	0.053	1.062	[-0.045~0.150]		
3. Africa	1	1.1	-0.179	-1.375	[-0.433~0.076]		
4. Europe	13	14.8	0.324	3.467**	[0.141~0.506]		
5. North America	41	46.6	0.227	3.987***	[0.120~0.352]		
Age group						28.463***	3>1, 3>6
1. Elementary	3	3.4	-0.171	-1.845	[-0.353~0.011]		2>1
2. Secondary	19	21.6	0.167	2.18*	[0.017~0.317]		
3. College	43	48.9	0.232	5.728***	[0.153~0.312]		
4. Teacher	11	12.5	0.105	0.866	[-0.133~0.343]		
5. Adult	8	9.1	0.263	1.556	[-0.068~0.594]		
6. Mixed	4	4.5	-0.023	-0.514	[-0.109~0.064]		
Type of publication						0.747	
1. Journal article	73	86.9	0.172	13.13***	[0.146~0.197]		
2. Proceedings	11	13.1	0.258	3.048**	[0.093~0.424]		
Year of publication						2.459	
1. 1984-1990	19	22.6	0.204	3.283**	[0.082~0.326]		
2. 1991-2000	29	34.5	0.186	3.34***	[0.077~0.295]		
3. 2001-2010	20	23.8	0.252	2.635**	[0.065~0.439]		
4. 2011-2017	16	19.0	0.081	1.075	[-0.067~0.229]		
Instrumentation						6.112	
1. CAS (Loyd)	29	33.7	0.148	3.182**	[0.057~0.239]		
2. CARS (Heinssen)	13	15.1	0.148	1.957	[-0.000~0.297]		
3. CAS (knezek)	5	5.8	0.384	1.630	[-0.078~0.846]		
4. SSEQ (Spielberger)	3	3.5	0.176	0.842	[-0.234~0.587]		
5. CARS (Rosen)	3	3.5	-0.189	-0.888	[-0.605~0.228]		
6. Self-developed[a]	13	15.1	0.137	1.606	[-0.030~0.305]		
7. Others[b]	20	23.3	0.291	3.412**	[0.124~0.458]		

Note. CI = confidence interval.
[a] Self-developed = Researcher developed. [b] Others = instruments used by less than 3 studies.
*p < .05; **p < .01; ***p < .001.