

Understanding Internet Self-Efficacy in a Post-Adoption World: A Meta-Analysis

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Abstract

This study presents a conceptual and empirical review of Internet self-efficacy (ISE). It starts by conceptually reviewing ISE, its definitions, and dimensions. It next empirically meta-analyzes 213 studies, and aggregates results across 215 independent samples. The results suggest that ISE plays a key role in the adoption and use of Internet tools, how individuals utilize eCommerce, and how we train individuals. In addition, the results suggest that the type of system utilized and the culture in which the study takes place may affect the strength of the relationship between ISE and variables of interest to the researcher. The consistency of the findings also suggest that it is time for the field to move beyond studies that focus on adoption and use of the Internet and to tackle the more complex questions of how ISE may contribute to or mitigate issues such as political engagement, cyberbullying, and misinformation.

Keywords: Internet self-efficacy, meta-analysis, social cognitive theory; measurement.

1. Introduction

The Internet is the backbone of modern commerce, communication, education, and politics, and became even more important during the COVID-19 pandemic as education and commerce moved online. Thus, the ability and confidence to successfully utilize Internet-based tools is critical to successful participation in society and gives individuals with higher ISE a competitive advantage over those with lower ISE (Chu & Chu, 2010). Not surprisingly, scholars from various fields such as communication, information systems, and medicine have investigated Internet Self-Efficacy (ISE). Like computer-self-efficacy (CSE) (Compeau & Higgins, 1995; Marakas et al., 1998), researchers have found that ISE affects outcomes such as communication, learning performance, stress, and buying products online (Galluch et al., 2015; Hong, 2006; Hsu & Chiu, 2004). In addition to its positive

effects, the potential exists for ISE to exacerbate or magnify harmful aspects of Internet use such as cyberbullying, disinformation, and criminal enterprises that exploit people around the world.

Despite the importance of ISE to practice and theory, our current understanding of ISE is characterized by several shortcomings. First, research is scattered across several fields, limiting the extent to which scholars can build cumulative knowledge. Second, there is inconsistency in how researchers define and measure the construct across studies. Third, very few studies have focused on the theoretical development of the construct itself and its nomological net. Most have simply utilized ISE as a variable within a broader framework. Finally, despite over 200 studies that have investigated ISE, we are unaware of any systematic theoretical and empirical review of this literature to synthesize research and stimulate new research ideas.

Therefore, the goal of this study is to synthesize the research on ISE using meta-analysis and to articulate an agenda for future research that moves research on this construct forward. First, we define ISE and discuss its dimensions. Second, we report the results of an empirical meta-analysis of 203 studies and evaluate the relationships between twenty-six variables. Third, we present an updated agenda for moving research forward on this important construct.

2. Internet Self-Efficacy

2.1. Construct Overview

ISE has roots in Social Cognitive Theory (Bandura, 1997) and is a specific instance of self-efficacy focused on the Internet. Although the field has not developed a consistent definition, from our review of the literature, ISE can best be defined as *an individual's belief in his or her ability to navigate, create, communicate, and evaluate content on the Internet* (Eastin & LaRose, 2000; Joo et al., 2000; Tsai, 2004). Although ISE is related to CSE, it is conceptually and empirically distinct (Johnson et al., 2017). The two constructs are

similar in that they both focus on the use of information and communication tools, and in our current app and cloud-based computing environment many software applications are web-based. However, they differ because CSE focuses on using computers and software (Compeau & Higgins, 1995) whereas ISE focuses on Internet-based tasks such as navigating, searching, and disseminating information over the Internet (Chuang et al., 2015; Eachus & Cassidy, 2006; Eastin & LaRose, 2000).

2.2. Dimensions of ISE

In reviewing the extant literature, we found that researchers focused on four types of Internet-enabled activities when assessing ISE. These are navigation, information search, communication, and creation. *Navigation* reflects an individual's belief in his or her ability to browse, surf, or navigate different URLs and websites (e.g., Chuang et al., 2015; Hsu & Chiu, 2004; Wu & Tsai, 2006). *Information Search* reflects an individual's belief in his or her ability to search, find/retrieve, organize, and share information over the Internet or Web (e.g., Chuang et al., 2015; Eachus & Cassidy, 2006; Kim & Glassman, 2013; Tsai, 2004). *Communication* reflects an individual's belief in his or her ability to communicate synchronously or asynchronously with others over the Internet (e.g., Kim & Glassman, 2013; Wu & Tsai, 2006). Finally, *creation* reflects an individual's belief in his or her ability to generate, evaluate, and disseminate information online (e.g., Chuang et al., 2015; Eachus & Cassidy, 2006; Kim & Glassman, 2013).

2.3 ISE Study Contexts

ISE has been examined in four main contexts. The most studied context is e-learning (number of studies or $k=87$), with the majority of studies finding that individuals with higher ISE are more likely to adopt e-learning, engage in behaviors that enhance learning, and have more positive e-learning outcomes (e.g., Baturay, 2011; Chu, 2010; Yilmaz, 2017). However, some research has not found a positive relationship between ISE and course performance (e.g., Baturay, 2011; DeTure, 2004).

The second most studied context is eCommerce ($k=24$). Research has found that ISE was positively related to trust and perceptions of the vendor, consumer shopping experiences and the adoption of eCommerce (e.g., Carlson & O'Cass, 2010; Hsu & Chiu, 2004; Mensah, 2020). The third most examined context is digital libraries and information searching ($k=24$). Research has found that ISE is positively related to information seeking and evaluation and online

knowledge sharing (e.g., Jokisch et al., 2020; Liang & Tsai, 2009; Srivastava & Joshi, 2018; Van Hove et al., 2019). Finally, research has focused on engagement in political and governmental processes ($k=16$). Research has found that individuals with higher ISE were more likely to utilize online government services, to engage more fully in political activism, and be more positive digital citizens than those with lower ISE (e.g., Choi et al., 2018; Dozier et al., 2016; Wamuyu, 2017).

3. Method

3.1 Sample

To identify articles, we followed the procedures outlined by Johnson et al. (2017). First, we drew our sample from studies found in journals, dissertations, conference papers, and book chapters. Dissertations and conference papers were included to reduce the "file drawer problem" (Rosenthal, 1979). Key search terms included "Internet self-efficacy," "web self-efficacy," and "online technology self-efficacy" Databases searched included the ACM Digital Library, the AIS e-Library, Academic Search Complete, ERIC, ProQuest Dissertations and Theses, and Web of Science. Finally, the bibliographies of each article found through this search were reviewed for additional references until we ran out of articles to search and find. The search was conducted by one trained undergraduate student and two of the authors. This search yielded an initial sample of 520 papers.

3.2 Pool of Primary Studies

We established four inclusion criteria for the meta-analysis (Table 1). First, a study had to contain some form of ISE. For example, studies that mentioned the word Internet self-efficacy in the manuscript but did not actually investigate ISE or that focused on constructs other than ISE (e.g., Internet literacy, computer self-efficacy, information privacy self-efficacy, and general self-efficacy) were not included (e.g., Gupta & Bostrom, 2019; Liang et al., 2013). Second, studies that lacked empirical data were not included (e.g., Tsai et al., 2011). Third, we required studies to provide independent samples to avoid dependent data and to prevent unfair weighting (Wood, 2008). That is, we excluded studies in which the author used the same data set and reported the same correlations in another published or unpublished paper. When the same data were used in multiple papers, we chose the published journal paper (Hu et al., 2012) versus the conference proceeding or dissertation (Hu et al., 2009). Fourth, the study had to report correlation coefficients (r) or similar statistics that

allowed us to derive an estimate of r (e.g., d , t , F) with computer self-efficacy. If these data were not available in the study, we requested them from the authors via email. Of the 79 authors we contacted, we received correlation matrices from nine of them (11.4% response rate).

Table 1. Inclusion Criteria

Criteria	Studies	Percent
	Excluded	Excluded
1. Includes some form of ISE	127	23.1%
2. Empirical data available	20	3.6%
3. Non duplicate studies	9	1.6%
4. No correlation matrix	181	32.9%
Original Pool of Studies		550
Total Excluded Studies		337
Total Included, Unique Sample Studies		213

The final sample consisted of 213 empirical studies with 215 independent samples ($N = 80,262$). One hundred fifty-six were in journals, thirty-six were in dissertations, and fourteen were in conference papers.

3.4 Moderators

To determine which variables may affect variance across studies, we drew on theory (Bandura, 1997; Marakas et al., 1998) and previous meta-analyses (Blut et al., 2022; Gegenfurtner et al., 2013; Hess et al., 2014; Stajkovic & Luthans, 1998). Potential moderators examined included study design (experiment vs. survey and longitudinal vs. cross-sectional), study participants (students vs. non-students), national culture (individualism vs. collectivism), and the year in which the study was conducted. In addition, the culture of the country in which the study was conducted may also affect the relationship between ISE and the variables of interest in this study. Culture reflects the values, beliefs, communication patterns, assumptions, and social norms and is manifest in individuals' beliefs about what they can do, should do, and will not do (Hofstede, 1991). The cultural dimension relevant to ISE is the individualism-collectivism dimension (Bandura, 1997). Individualism-collectivism refers to the extent to which the identity of the members of a culture is shaped by either personal choices or by the group to which they belong (Hofstede, 1991). Specifically, in collectivistic cultures, ISE will be more likely to reflect both an individual's private assessment of capabilities as well as those of her or his relevant peers (Earley, 1994). Therefore, ISE may have a stronger relationship with other variables in individualistic cultures than in collectivistic cultures. Culture was measured as a continuous variable using Hofstede's score for the sample's country (Hofstede, 2010)

Fourth, the year of the study may also serve as a moderator. Internet-based tools have evolved greatly from the static, often text-based Internet tools of the late 1990s when the first studies were conducted. Today, Internet tools are often app-based, highly interactive, visual, and social. Thus, it is possible that the changing nature of the Internet may act as a moderator of ISE and its relationship with other variables. The year of the study was assessed as a continuous variable.

3.5 Analysis

The Schmidt and Hunter (2015) psychometric approach was used to conduct the meta-analysis. This technique uses coding and statistical procedures to combine results from independent studies that use similar constructs. We conducted the calculations with the Schmidt-Le program (Schmidt & Le, 2005). A key advantage of the Schmidt-Hunter approach is it allows for the correction of measurement errors. This is important as measurement error downwardly biases population correlation estimates (i.e., it makes them too small). To account for measurement error, we corrected the correlations for unreliability by using an artifact distribution of internal consistency measures of reliability (Schmidt & Hunter, 2015). By using these measures, we ensured our results would produce a conservative correction of the correlations (Schmidt & Hunter, 2015). In addition, because k -values below 10 can create a greater sense of uncertainty in interpreting conclusions (Switzer et al., 1992), we analyzed variables in our meta-analysis that were correlated with ISE in 10 or more studies.

4. Main Effects

We report our analyses in four parts. First, we discuss the main effects with respect to ISE and the four original core self-efficacy antecedents (Bandura, 1997). Second, we report the results for additional antecedents investigated by ISE researchers. Third, we report on the outcomes of ISE. Fourth, we report the results of the analysis of moderating variables. Table 2 contains the results of these analyses.

4.1 Core Four ISE Antecedents

Of the four key sources of efficacy information identified by Bandura (Bandura, 1997) (enactive mastery, verbal persuasion, vicarious experience, and emotional arousal), only enactive mastery and emotional arousal were studied enough to include in the meta-analysis. Interestingly, researchers were interested in the relationship between ISE and both computer and

Internet experience/anxiety. The corrected population correlation point estimate between computer anxiety and ISE was $\rho = -.175$ ($k = 10$, $N = 3,216$), Internet anxiety and ISE was $\rho = -.265$ ($k = 15$, $N = 4,737$), and Internet experience and ISE was $\rho = .392$ ($k = 15$, $N = 4,881$). The 80% credibility interval (CRI) ranged between .22 and .57 for computer experience and between -.75 and .40 for anxiety. However, the CRI for both computer and Internet anxiety included zero. Credibility intervals that include zero suggest that the

true correlation between variables may be zero, positive, or negative (Gerow, 2014). In other words, it is possible that the “true” correlation between ISE and these variables may be near zero. These findings are not consistent with the broader theory of self-efficacy. Finally, between 2% and 20% of the variance in correlations were due to measurement and sampling errors; suggesting that moderators may be present.

Table 2 - Main Effects

Analysis	ρ	k	N	Var.	SDrho	80% CRI		PVA
						10% CV	90% CV	
<i>Core Four Antecedent</i>								
Computer Anxiety	-0.175	10	3216	0.201	0.448	-0.748	0.398	2%
Internet Anxiety	-0.265	15	4737	0.104	0.323	-0.678	0.148	4%
Internet Experience	0.392	15	4881	0.019	0.137	0.217	0.568	20%
<i>Additional Antecedents</i>								
Age	-0.115	27	9616	0.029	0.169	-0.331	0.102	11%
Education	0.083	11	5331	0.003	0.058	0.009	0.156	42%
Sex	-0.080	22	8718	0.010	0.101	-0.208	0.051	22%
Attitude	0.345	38	14032	0.057	0.239	0.039	0.651	8%
Support	0.232	17	4749	0.182	0.427	-0.314	0.778	3%
<i>ISE Outcomes</i>								
Behavior	0.339	10	4383	0.033	0.182	0.106	0.572	8%
Ease of Use	0.446	36	12610	0.044	0.211	0.176	0.715	8%
Hedonic Motive	0.197	10	5850	0.064	0.253	-0.127	0.521	4%
Intention	0.374	48	18633	0.048	0.219	0.093	0.655	6%
Interaction	0.453	11	2967	0.118	0.344	0.013	0.893	5%
Outcome Expectancy	0.431	14	4631	0.040	0.201	0.175	0.688	14%
Satisfaction	0.374	13	5585	0.031	0.18	0.147	0.600	10%
Self-Regulated Learning	0.562	15	6406	0.084	0.289	0.192	0.932	6%
Subjective Norm	0.392	18	5332	0.078	0.278	0.036	0.748	15%
Training Satisfaction	0.476	18	4930	0.044	0.210	0.207	0.745	11%
Trust	0.310	13	5480	0.074	0.272	-0.038	0.658	7%
Use	0.386	44	18244	0	0	0.386	0.386	n/a
Usefulness	0.378	52	20492	0.037	0.192	0.133	0.623	10%
<i>Other Efficacies</i>								
Computer Self-Efficacy	0.700	13	4851	0.047	0.216	0.423	0.976	8%
Domain Self-Efficacy	0.467	14	4422	0.029	0.169	0.251	0.683	14%

Shaded cells are those credibility intervals which include zero; ρ = corrected population correlation point estimate; k = number of studies; N = number of observations; Var. = variance of true score correlations; 80% CRI = lower and upper bounds of the 80% credibility value for ρ ; PVA = percent of the variance in observed correlations attributable to sampling and measurement errors

4.2 Additional Antecedents

The findings also indicated that ISE was related to three demographic antecedents: age ($\rho = -.115$, $k = 27$, $N = 9,616$), sex ($\rho = -.080$, $k = 22$, $N = 8,718$) and education ($\rho = .083$, $k = 11$, $N = 5,331$). These findings

suggest that older individuals and women have lower ISE. However, it is important to note that the credibility interval for both age and sex included zero. These findings are also consistent with a meta-analysis on CSE (Johnson et al., 2017). In addition, the corrected population correlation point estimates of the relationship between ISE and Internet attitudes ($\rho =$

.345, $k = 38$, $N = 14,032$) and organizational/situational support ($\rho = .232$, $k = 18$, $N = 5,332$) were each positive. However, the credibility intervals for both support and trust included zero (see the “Additional Antecedents” section of Table 4). Overall, these results suggest that moderators may be present or that the true relationship between these variables may be near zero.

4.3 ISE Outcomes

Two major types of outcomes have been investigated: training and adoption (see Table 4). With respect to training outcomes, the corrected population correlation point estimates for the relationship between ISE and training satisfaction ($\rho = .476$, $k = 18$, $N = 4,930$), self-regulated learning behaviors ($\rho = .562$, $k = 15$, $N = 6,406$), and peer interactions ($\rho = .453$, $k = 11$, $N = 2,697$) were each positive. Individuals with higher ISE had higher satisfaction with training and engaged in more self-regulated learning strategies and interacted more with their peers in online courses compared to those with lower ISE. We note that consistent with the theory, the relation between performance and ISE was positive ($\rho = .344$). However, with $k=9$, it fell below the threshold for inclusion.

With respect to the adoption-related variables, the corrected population correlation point estimates for the relationship between ISE and ease of use ($\rho = .446$, $k = 36$, $N = 12,610$), usefulness ($\rho = .386$, $k = 52$, $N = 20,492$), subjective norm ($\rho = .392$, $k = 18$, $N = 5,332$), hedonic motive ($\rho = .197$, $k = 10$, $N = 5,850$), outcome expectancy ($\rho = .431$, $k = 14$, $N = 4,631$), behavioral intention ($\rho = .374$, $k = 48$, $N = 18,633$), system use ($\rho = .386$, $k = 44$, $N = 18,244$), Internet behaviors ($\rho = .339$, $k = 10$, $N = 4,383$), satisfaction ($\rho = .374$, $k = 11$, $N = 2,967$), and trust ($\rho = .310$, $k = 13$, $N = 5,480$) were all positive. However, the credibility intervals between ISE and hedonic motive and trust each contained zero.

4.4 ISE and Other Efficacy Estimates

Researchers have also examined ISE and both CSE and domain-specific self-efficacy in the same studies. However, in these studies, rather than specifying a relationship between each, they would often include each as an independent variable in the model (Joo et al., 2000; Roca et al., 2006). Meta-analytic results showed that the corrected population correlation point estimates for the relationship between ISE and CSE ($\rho = .700$, $k = 13$, $N = 4,851$) and domain self-efficacy ($\rho = .467$, $k = 14$, $N = 4,422$) were each positive. These results should not be surprising in that researchers have long argued that CSE and ISE are related (Torkzadeh & Van Dyke, 2001) and each may represent specific technological domains within the general domain of computing or

information technology (Compeau et al., 2022). Although self-efficacy is domain-specific, researchers have also suggested that self-efficacy can exist as a broader, more trait-like, characteristic of an individual (Chen et al., 2001). This suggests that some individuals are more confident across a wide variety of tasks and contexts. Thus, it is possible that individuals who are more confident in a specific domain may also be more confident when using the Internet. However, given the diverse domains of functioning in which individuals must navigate, it would be inappropriate to assume a causal relationship between these variables.

5. Moderator Analyses

For the moderator analysis, we relaxed the sample size constraints and investigated only those variables for which five or more studies were available for each condition of the moderator. Thus, care must be taken when interpreting the analyses (Switzer et al., 1992). The study method, sample, timeframe, and self-efficacy scale level scale, and general vs. application specific self-efficacy were coded as categorical. The year of the study and individualism/collectivism were coded as continuous variables.

5.1 Categorical Moderators

In assessing whether the categorical moderators may affect the relationship between ISE and other variables, the moderator analyses focused on whether there was a meaningful overlap of credibility intervals rather than comparing mean differences between the moderator conditions. When credibility intervals have a large amount of overlap, it suggests that there is enough uncertainty in the estimates of the mean values that the researchers cannot with certainty determine that the two groups are meaningfully different (Gerow, 2014).

The results suggest that the type of publication (e.g., journal vs. other), the sample (student vs. employee) and the use context (general Internet, e-Commerce, or e-learning) each may moderate the relationship between ISE and other variables. The results do not indicate that the study design (e.g., survey vs. experiment, longitudinal vs. cross sectional) moderated the relationship between ISE and the other variables. However, it is important to note that over 95% of the studies were cross-sectional surveys. Thus, more research is needed that utilizes experimental designs and longitudinal studies.

The findings suggest that there are differences in the relationship between ISE and attitude, intentions, and self-regulated learning between those studies published in journals and those published in non-journals outlet. Specifically, the CRI contained zero for

non-journal publications. However, for subjective norms, the results were reversed (See Table 3).

Table 3. Journal vs. Other Publication

Analysis	$\hat{\rho}$	k	N	80% CRI	
				10% CV	90% CV
Journal vs. Other					
Attitude					
Journal	0.43	31	9761	0.18	0.67
Other	0.16	7	4271	-0.14	0.45
Intention					
Journal	0.40	33	12452	0.18	0.63
Other	0.31	15	6181	-0.04	0.66
SRL					
Journal	0.64	10	3960	0.37	0.91
Other	0.44	5	2446	-0.01	0.88
Subjective Norm					
Journal	0.32	13	3727	-0.07	0.71
Other	0.55	5	1605	0.44	0.67

SRL = Self-Regulated Learning

The results also found that the CRI for the relationship between ISE and education, trust, and situational support included zero for students but not for employees. Conversely, the critical interval between ISE and interaction, self-regulated learning, and subjective norm included zero for employees. One of the reasons for this is that many of the studies utilizing students focused on educational settings where classes are often designed to support peer interactions and student success whereas in organizational settings these same support systems may not be available. Table 4 summarizes these findings.

Table 4. Student vs. Employee

Analysis	$\hat{\rho}$	k	N	80% CRI	
				10% CV	90% CV
Student vs. Employee					
Education					
Student	0.09	5	1987	-0.02	0.19
Employee	0.09	5	2821	0.02	0.13
Interaction					
Student	0.67	5	1482	0.41	0.93
Employee	0.22	5	1428	-0.19	0.62
SRL					
Student	0.66	9	4426	0.40	0.92
Employee	0.33	5	1858	-0.09	0.75
Subjective Norm					
Student	0.39	11	3427	0.07	0.72
Employee	0.38	6	1788	-0.03	0.79
Support					
Student	0.04	9	2306	-0.64	0.72
Employee	0.47	7	1920	0.47	0.47
Trust					
Student	0.13	6	2061	-0.37	0.62
Employee	0.43	6	3335	0.36	0.50

SRL = Self-Regulated Learning

Finally, the results for the use context found that the CRI for the relationship between ISE and intention and usefulness included zero for eCommerce systems but not for the Internet. Conversely, the CRI for the relationship between ISE and attitude included zero for the Internet but not for eCommerce. Finally, the CRI for the relationship between ISE and support and trust included zero for e-learning, but not for eCommerce. These findings suggest several things. First, in the context of e-commerce, ISE may be less important to users when assessing the value of vendor when purchasing products. Factors such as price, product availability or trust in the vendor may be more relevant to consumers than ISE. In addition, in e-learning settings, simply providing support may not be enough to increase ISE. Instead, the influence of support on ISE may be higher when this support matches trainees' epistemological beliefs about how learning should occur (Hornik et al., 2007).

Table 5. Internet vs. eCommerce vs. eLearning

Analysis	$\hat{\rho}$	k	N	80% CRI	
				10% CV	90% CV
Internet vs. eCommerce or eLearning					
Intention					
Internet	0.39	24	7399	0.16	0.63
eCommerce	0.40	8	2612	-0.01	0.82
Support					
Internet	0.45	6	2214	0.32	0.59
eLearning	-0.01	8	2017	-0.71	0.71
Attitude					
Internet	0.20	15	4453	-0.06	0.47
eCommerce	0.48	5	1797	0.44	0.53
Trust					
Internet	0.35	6	1510	0.23	0.46
eLearning	0.31	7	3970	-0.12	0.74
Usefulness					
eCommerce	0.24	6	2239	-0.06	0.55
eLearning	0.41	21	10248	0.21	0.62

Overall, the research suggests researchers should consider factors such as the sample, the setting, and the Internet technology of interest when designing future studies, as each could affect their findings. However, given the small k in many of the conditions, care should be taken when interpreting these findings.

5.2 Continuous Moderators

These analyses suggest that the year of the study and culture may also serve as moderators (Table 6). With respect to year, the relationship between ISE and CSE ($r = .41$, $p = .08$, $k = 13$) and attitudes ($r = .73$, $p \leq .001$, $k = 38$) has grown stronger over time. This likely

reflects the greater integration of the traditional computing domains with the Internet domain. As such, individuals may view the Internet and computing as simply part of the broader domain of information technology (Compeau et al., 2022), and thus more closely related than when the Internet first emerged.

Table 6. Continuous Moderators

	Year		Culture	
	r	K	r	K
Antecedents				
CSE	.41 ^a	13	-.69**	12
Domain SE			.46 ^a	13
Outcomes				
Attitude	0.73***	38	.40**	37
Behavior			.71**	10

^a $p < .10$ ** $p \leq .01$ *** $p \leq .001$

In addition, the relationship between ISE and CSE was stronger in collectivistic cultures than in individualistic cultures ($r = -.69$, $p \leq .01$; $k = 12$). In addition, the relationship of ISE with domain self-efficacy ($r = .46$, $p = .06$; $k = 12$), Internet attitudes ($r = .40$, $p \leq .01$; $k = 37$), and behavior ($r = .71$, $p \leq .01$; $k = 10$) were each stronger in individualistic cultures.

Given that individuals in collectivistic cultures may focus on their group's efficacy perceptions rather than only on their own as they assess their sense of ISE. This can create an even stronger correlation between ISE and CSE in collectivistic cultures. In addition, consistent with the meta-analytic findings on CSE by Johnson et al. (2017), the weaker relationship between ISE, attitudes and behaviors in collectivistic countries suggests that the group component of an individual's ISE estimation means that the ISE scale may not be able to fully capture the individual portion of self-efficacy that links more closely with these outcomes.

6.0 Discussion

The goal of this study was to meta-analyze extant research on ISE in order to articulate a more complete understanding of the antecedents and consequences of ISE, and to offer an agenda for future research. This research contributes to our understanding of ISE in several ways. First, the results demonstrate that, consistent with self-efficacy research, enactive mastery, and emotion-focused coping (e.g., anxiety) are related to ISE. Second, the findings that ISE is positively related to the adoption and use of Internet tools as well as eLearning processes and outcomes is consistent with meta-analytic research on CSE (Johnson et al., 2017; Karsten et al., 2012). Second, the findings add to our understanding by demonstrating that ISE affects consumers' trust in the eCommerce process, their

assessment of risk, their hedonic motive, and their decisions to purchase (e.g., a behavior). However, the relationship between risk perceptions and CSE was positive, rather than negative, as may have been expected.

Third, the findings suggest that long-theorized demographic variables (such as age and sex) may not be as important as previous research has suggested. Together with meta-analytic findings from CSE (Johnson et al., 2017) the results suggests that further theorizing about age and sex differences may not be fruitful and should only examined where there is a clear contextual reason to do so.

Fourth, with the credibility interval for the relationship between ISE and hedonic motive, perceived risk, and trust, all including zero, it suggests that rather than ISE being critical in all contexts, its importance may be context dependent. That is, factors such as risk and trust may be affected not just by ISE, but by factors such as familiarity with the eCommerce vendor. This can attenuate the relationship between ISE and these variables in some contexts.

Finally, given the recent arguments of Compeau et al (2022) that the skills needed to succeed in today's IT domain will be drawn from a variety of software, devices, and Internet tools the consistency suggests that the IT domain may represent an even more general level than Marakas et al (Marakas et al., 1998).

7.0 Future Research Directions

The consistency in findings suggest that it may be time to move beyond studying how ISE affects adoption and use of Internet tools, and instead consider how it may play a role in the prominent issues that have emerged as part of the growth of the Internet. First, given the move of training and education to the online environment, the growth in remote working during COVID (where individuals were forced to quickly adapt to new learning and working patterns), and the need for a workforce which can balance on-site and remote work, research should assess how ISE may affect the development of and support for an adaptable and resilient workforce.

Second, research can examine how ISE affects how individuals protect themselves online and how they respond to misleading information or fake news. For example, cyberbullying is an increasingly challenging problem facing society (Slonje et al., 2013). ISE may be a double-edged sword because it can increase the likelihood that individuals engage in cyberbullying (Savage & Tokunaga, 2017) but can also reduce the likelihood that they are victims of cyberbullying (Musharraf et al., 2019). Thus, understanding the role

that efficacy plays in reducing cyberbullying and victimization is an important area of research to pursue.

Third, researchers can examine the role ISE plays in the consumption and dissemination of fake news and misinformation online. Fake news and misinformation are of growing interest to IS scholars due to their potential social, economic, and political implications. Existing research has focused on factors such as political orientation and interface design (Kim & Dennis, 2019; Turel & Osatuyi, 2021), ISE may also inform our understanding of how individuals respond to misinformation. Research has found that individuals with higher ISE were more likely to engage in behaviors that reduced their susceptibility online (Sun et al., 2016; Wang et al., 2020). However, they were more susceptible to cybercrime (Cheng et al., 2020) and more likely to share misinformation when they did believe it (Wang et al., 2020). Thus, there is value in understanding under what conditions ISE can magnify or reduce the spread of misinformation and how interventions can be designed to reduce the spread of misinformation.

Fourth, given that some studies found that ISE was not statistically significantly related to performance in online courses (Baturay, 2011; Lynch & Dembo, 2004) it is important to examine more fully how ISE improves learning outcomes. For example, it is possible that when online learning tools are easy to use and learning support provided, that performance is not dependent upon the effective use of online tools but instead upon content domain knowledge. However, it is also possible that if individuals are highly efficacious about their ability to learn online, they may become overconfident and may place less preparatory effort into learning because of their confidence (Vancouver & Kendall, 2006). This can counter-intuitively lead to poor learning outcomes (Moore & Chang, 2009). Thus, future research should examine the potential negative implications of extremely high ISE in both eLearning and information search and assessment.

8.0 Limitations

Our work has limitations that must be considered. First, our in-depth review of the literature restricted attention to studies that examined ISE and the constructs in its nomological network using specific definitions from the literature. When coding the studies, we included data that referenced these constructs by their “generally accepted” names (e.g., ISE, age, anxiety) or whose conceptualization mapped to our conceptual/theoretical definitions. Second, the Internet continues to evolve at a rapid pace. The “Web” of today is a vastly different place than that of the late 1990s. We are living more of our lives online and the

communication and information-sharing capabilities of the web have expanded greatly. In addition, accessing the Internet has become less about web browsers and more about apps. Thus, new domains that are adjacent to current domains need inquiry and the findings from this meta-analysis should be revisited in the future as more studies are conducted in these adjacent domains. Finally, because our sample included a wide variety of studies, with varying definitions and measures of ISE, we may have introduced noise into our dataset that attenuated correlations (Hunter & Schmidt, 2004). However, in our coding of data, we focused closely on how closely the measurement of a construct mapped to their definitions. Thus, we are confident that the data adequately represents constructs.

9.0 Conclusion

This paper represents the first theoretical and empirical examination of the extant research on Internet self-efficacy. Using meta-analysis techniques, we drew on data from 215 unique samples from multiple disciplines, and analyzed over 10,000 effect sizes, and 23 variables. The findings are consistent with previous meta-analyses on CSE (Johnson et al., 2017), and demonstrate that ISE plays a crucial role in the adoption and use of Internet-based tools, the use of eCommerce, and success in online learning. Our findings also underscore the importance of considering how the culture in which the research was conducted, the study’s sample, the type of technology, and even the study design may affect the relationships of the variables with ISE. This is particularly important when considering how and when to provide support to users.

The findings of the meta-analysis suggest that rather than being unimportant as the Internet has become ubiquitous to business, commerce and society and the vast majority of individuals have experience using the Internet, ISE may be more important now than in the past. However, rather than continuing to focus on it as a factor in adoption and training, we should instead turn to how it may help or hinder us as the Internet has created new threats such as cyberbullying, and misinformation and fake news. By doing this, we may be able to help organizations and society better understand how we can leverage the Internet to improve communication, commerce, learning and other outcomes while reducing the negative outcomes which this network can create.

10. References

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