

Do Online Investors Get Cold Feet on a PC or a Smartphone?

The Role of Perceived Risk and Device Type in Online Investment Decisions

Abstract

We investigate the impact of investors' device type on online crowdfunding decisions. The findings demonstrate that investors on a PC (vs. smartphone) perceive higher risk in their investment, which then lowers their willingness to invest, and this negative indirect effect is stronger in temporally-distant or socially-distant conditions.

Honor Statement

The authors confirm that (a) the presenting author is not listed as a presenter in more than two sessions in total, and (b) that the submission has not been submitted to multiple tracks, has not been previously presented at ACR, and has not been published or accepted for publication in any journal (including online publications and full-paper publications in conference proceedings).

Keywords: Device type, crowdfunding, perceived risk, psychological distance, willingness to invest

Introduction

Online investing platforms (e.g., E*TRADE, Robinhood) have grown quickly over the past few years, with online crowdfunding channels having also become popular investment options (Forbes, 2020; The Times, 2020). Many of those services are available exclusively through mobile apps and websites, and investors' overall service experiences are thus likely to differ as their devices often vary from PCs to smartphones. However, whether and how different devices affect investors' behavior remains largely unknown; in particular, the effect of device type on perceived risk and online investment decisions role is still unclear.

To address these gaps, this study examines, via three experiments, whether device type influences investors' perceived risk and willingness to invest (WTI) in different online investment conditions, as explained in the next sections.

Perceived Risk and Device type

Investment decisions often depend on objective and subjective risk factors of an investment target (Raghubir and Das, 2010). People who invest in financial products do not always make decisions rationally (Raghubir and Das, 2010; Shefrin, 2001). They tend to feel more comfortable and be more willing to invest larger amounts if risks involved are low (Distanik and Steinhart, 2015; Rai and Lin, 2019).

Risk-taking tendencies often depend on emotional sensitivity (Blekher *et al.*, 2019; Garry and Hardwood, 2018; Rick, 2011; Tang *et al.*, 2016), and devices with a larger screen are known to evoke stronger emotional responses such as increased excitement (Lombard *et al.*, 1997; Reeves *et al.*, 2000) and more positive attitudes (Nayler and Sanchez, 2018) toward content displayed. Thus, PCs, of which the average screen size is significantly larger than that of smartphones, may also amplify the level of an individual's perceived risk regarding investment information. In other words, when investors use a PC to make an investment online, their emotional sensitivity induced by their PC may increase their risk sensitivity. Thus:

H1. Investors who view investment information on a PC (vs. smartphone) perceive a higher risk.

Additionally, since perceiving a high risk negatively affects consumers' judgments such as product evaluations (Campbell and Goodstein, 2001), purchase intentions (Park *et al.*, 2005), and investment options (e.g., investing more in safer and conservative options; Mrkva *et al.*, 2020), we propose a reversed effect:

H2. Using a PC (vs. smartphone) indirectly influence WTI through higher perceived risk, resulting in lower WTI.

Impact of Psychological Distance on Investment Behavior

Based on construal level theory, a high-level (low-level) construal encourages abstract (detailed) thinking on perceived psychological distance (Liberman and Trope, 1998; Trope and Liberman, 2003), and this abstract information-processing style is more likely to make people engage in risky behaviors and present higher risk tolerance (Lerner *et al.*, 2015; Raue *et al.*, 2015).

However, a high-level construal may have both positive and negative effects. In donation settings, people are less willing to donate when they feel socially-*distant* from a donation target (high construal) and feel less positive towards it (Ein-Gar and Levontin, 2018; Lee *et al.*, 2018). The effect is the opposite when temporal distance varies; people donate more if they have sufficient time (temporally-*distant*; high construal) to make donation decisions (Macdonnell and White, 2015).

Similar to the donation settings, if investors feel socially-distant from an investment project, they may be less likely to invest; thus, the negative indirect effect in H2 may become stronger. A temporally-distant condition may also amplify the negative indirect effect in H2. Thus:

H3a. Investors' perceived temporal distance amplifies the negative indirect effect of a PC on WTI through perceived risk (as in H2).

H3b. Investors' perceived social distance amplifies the negative indirect effect of a PC on WTI through perceived risk (as in H2).

Study 1. Device Effects on Risk and WTI

This study focused on testing the main effect of device type on perceived risk (H1) and its indirect effect on WTI (H2).

Method

We recruited 166 U.S. residents via a paid online research panel (men: 58.4%; age 18–34: 63%; income > \$50,000: 70.5%). They were randomly assigned a PC, a smartphone, or a tablet condition. The tablet condition was included to rule out its potential effects although it is less commonly used in online transactions than PCs and smartphones (M+R, 2019; Wang, 2015). Device identification codes were embedded in the survey to automatically detect and filter device type, and as such to exclude participants that were not using the required device.

Participants read an investment scenario and evaluated their investment interest in a fictitious company's crowdfunding project to produce and sell face masks with advanced features, which offered a 20% return through a 12-month installment program.

Based on the scenario, participants answered three verification questions, and then completed questions on (1) perceived risk by completing a single-item risk scale (How do you perceive the level of risk of your investment?; 1=not risky at all, 7=very risky; Raghurir and Das, 2010), which is known to be more accurate than a multi-item scale in measuring perceived risk (Ganzach *et al.*, 2008); (2) WTI (1=strongly disagree, 7=strongly agree; $\alpha=.88$) using a 4-item modified Investment Intention scale for crowdfunding by Yang *et al.* (2019); (3) perceived temporal distance ($\alpha=.70$) on a 2-item modified scale by Liberman *et al.* (2007); (4) perceived social distance (1=very close, 7=very distant; $\alpha=.89$) by indicating how distant participants felt from the investment occasion and the product using the measure from Kim *et al.* (2008); and (5) demographics.

Results

Manipulation check. One-way ANOVA tests indicated that neither temporal ($F(2,163)=.51, p=.60$) nor social distances ($F(2,163)=2.13, p=.12$) significantly differed by device type, hence were controlled.

Perceived risk. An ANOVA test showed that using a PC led to higher perceived risk (PC>tablet>smartphone; $F(2,163)=5.90, p=.003$), but there was significant difference only between PC and smartphone users ($p=.001$). PC users ($M=4.93, SD=1.32$) perceived risk to be higher than smartphone users ($M=4.49, SD=1.44; p=.001$), but compared to tablet users ($M=4.00, SD=1.62$), PC users' perceived risk was not significantly higher ($p=.097$). Perceived risk also did not differ between those on a smartphone and those on a tablet ($p=.11$).

Mediation effect. A mediation analysis was conducted using PROCESS Macros (Model 4 with 50,000 bootstrap samples; Hayes, 2018). We found a negative indirect effect of device type (X) on WTI (Y) through perceived risk (M), and the difference was significant only between PCs and smartphones (Figure 1). The direct effect was reversed, resulting in higher WTI between PCs and smartphones ($b=.66, SE=.23, t(162)=2.86, p=.005$).

(Figure 1 here)

Discussion

The findings indicate that using a PC to view crowdfunding information increased investors' perceived risk more than using a smartphone, supporting H1. This higher perceived risk induced by PCs lowered WTI, supporting H2. However, these investors' WTI may increase if their perceived risks are controlled, and tablets did not show significant differences from other devices in perceived risk and WTI.

Study 2. Temporal Distance and Perceived Risk

This study tests the device-type effect on perceived risk (H1), the indirect effect of perceived risk on WTI (H2), and the role of temporal distance (H3a).

Method

We recruited 164 U.S. residents through a paid online research panel (men: 68%; age 18–34: 53.7%; income>\$50,000: 61.5%).

The study used a 2 (device type: PC vs. smartphone) x 2 (temporal distance: distant vs. close) between-subjects design. Participants were randomly assigned to a PC or a smartphone and read a scenario for either the temporally-distant or temporally-close condition. We used the same procedures, to verify device types, and a similar scenario as in Study 1. In the temporally-close condition, the message indicated that investors' returns (20% of investment) would begin to flow one month later in monthly installments over six months. In the temporally-distant condition, however, the message showed that investors would receive returns after two years (other details remained the same).

Participants answered three verification questions, and then answered the same questions from Study 1 regarding: (1) perceived risk; (2) WTI ($\alpha=.89$); (3) perceived temporal distance ($\alpha=.70$); and (4) demographic information.

Results

We used one-way ANOVA for the temporal-distance manipulation check and factorial ANOVA tests and simple effect analyses for the rest of the variables are reported below.

Manipulation check. Temporal distance was manipulated successfully. Participants in the temporally-distant condition ($M=4.45$, $SD=1.20$) perceived the investment pay-off to be longer than those in the temporally-close condition ($M=3.38$, $SD=1.12$; $F(1,162)=34.67$, $p<.0001$).

Perceived risk. PC users perceived their investment risk to be greater ($M=4.76$, $SD=1.40$) than those who used a smartphone ($M=4.11$, $SD=1.49$; $F(1,160)=8.26$, $p=.005$), supporting H1. The interaction between device type and temporal distance was not significant ($F(1,160)=.004$, $p=.95$).

Mediation effect. We used PROCESS macros (Model 4 with 50,000 bootstrap samples; v.3.5; Hayes, 2018) to test a mediation effect of perceived risk (M), device type (X; 1=PC; 0=smartphone), and WTI (Y) while controlling for temporal distance. The indirect effect of device type was negative and significant through perceived risk when temporal distance was controlled for ($b=-.10$, $SE=.06$, 95%CI[-.23,-.01]); thus, H2 is supported. However, similar to Study 1, when perceived risk was controlled, the direct effect of using a PC was reversed, resulting in higher WTI ($b=.58$, $SE=.18$, $t(160)=3.19$, $p=.002$).

A separate analysis (Model 15; 50,000 bootstrap samples; Table 1) showed that the negative indirect effect of device type (1=PC; 0=smartphone) on WTI was significant in the temporally-distant condition only, supporting H3a. The model also showed a significant interaction effect ($X*W$) of device type (X) and temporal distance (W) on the direct effect of device type on WTI ($b=.76$, $p=.04$), suggesting a significant moderation effect of temporal distance.

(Table 1 here)

Discussion

These results indicate that online investors on a PC were less willing to invest in a long-term plan because they perceived it to be riskier. As in Study 1, however, PCs led to higher WTI when the risk was controlled, suggesting that the significant role of perceived risk in determining investors' WTI.

Study 3: Social Distance and Perceived Risk

This study verifies whether the effects found in Studies 1 and 2 would be consistent when social distance from the investment target varied, testing H1, H2, and H3b.

Method

We recruited 160 U.S. participants through a paid online research panel (men: 65%; age 18–34: 46.9%; income > \$50,000: 57.5%).

The study involved a 2 (device type: PC vs. smartphone) x 2 (social distance: distant vs. close) between-subjects design by varying social distance. The procedure remained identical to Study 2 except for the investment messages. The social distance conditions varied by their proximity to the participants' surroundings, similar to Ein-Gar and Levontin (2012). In the socially-close (socially-distant) condition, participants evaluated their investment interest in a restaurant crowdfunding project after reading detailed information for a fictitious gourmet organic burger restaurant (halal hot-dog cart), located in a major U.S. metropolitan area.

After reading the messages, participants answered the same questions used in Studies 1 and 2 regarding: (1) perceived risk; (2) WTI ($\alpha=.90$); (3) perceived social distance ($\alpha=.70$); and (4) demographic information.

Results

The same tools as in Study 2 were employed to analyze the manipulation checks, perceived risk, and mediation effects.

Manipulation check. Social distance was manipulated as expected. Participants in the socially-distant condition perceived the crowdfunding investment target to be more distant ($M=4.54$, $SD=1.26$) than those in the socially-close condition ($M=3.24$, $SD=1.37$; $F(1,158)=39$, $p<0001$).

Perceived risk. PC users ($M=4.55$, $SD=1.30$) perceived their investment risk to be higher than that of smartphone users ($M=4.11$, $SD=1.46$; $F(1,156)=4.14$, $p=.04$), supporting H1. Social distance did not significantly interact with device type ($F(1,156)=1.48$, $p=.23$).

Mediation effect. We used the same PROCESS models (v. 3.5; Model 4 with 50,000 bootstrap samples). The mediation effect was consistent with that in Studies 1 and 2; device type (X : 1=PC; 0=smartphone) had a negative indirect effect on WTI (Y) through perceived risk (M) when social distance was controlled ($b=-.14$, $SE=.08$, 95%CI[-.30,-.005]). However, when the risks were controlled, the direct effect of PCs was again reversed, leading to higher WTI ($b=.71$, $SE=.20$, $t(156)=3.62$, $p=.0004$), suggesting an important role of perceived risk.

The separate mediation analysis in Table 1 (Model 15; 5,000 bootstrap samples) indicates a similar negative indirect effect, which was significant only in the socially-distant condition, supporting H3b. The direct effect of device type was not significant ($p=.08$).

Discussion

The results were consistent with Study 2; the introduction of risk led to lower WTI among PC users, supporting H2. As predicted, the negative indirect effect was significant only in the social-distance condition, supporting H3b. Moreover, as in Studies 1 and 2, if investment risks can be controlled, using a PC may rather increase WTI, but this effect was significant only in the socially-close condition, confirming the stronger negative indirect effect in a socially-distant investment (H3b).

General Discussion

Overall, the results show that crowdfunding investors who assess information online using a PC (vs. smartphone) were less willing to invest when they perceived higher risks. The negative impact was more apparent when the temporal- and social-distance from an investment target was farther while the negative indirect effect was attenuated and reversed when risks were controlled.

Theoretical Contribution

This study presents several theoretical implications. First, the study presents novel empirical evidence that device type is a potential visual cue that affects perceived risk and influences final investment decisions.

Second, it reveals that touchscreen effects on consumers' decisions – which are positive on consumers' purchase-related judgments (Brasel and Gips, 2014; Chung *et al.*, 2018; Shen *et al.*, 2016) – may be reversed if device type differs and may negatively influence risky investment decisions. The findings imply that the positive touchscreen effects are attenuated when screen size varies and a decision process involves certain level of risk.

Third, this study shows that the effects triggered by larger devices (PCs), are similar to those in higher-level construal conditions, suggesting a potential connection between device sizes and construal level. Specifically, the negative indirect effect of PCs on WTI was observed only in the higher construal conditions (temporally-distant; socially-distant), and this implies a possibility of a fit between PCs and distant conditions, strengthening the adverse effects, although further research is needed to test this.

Practical Implications

To improve WTI in high-risk crowdfunding products, crowdfunding services may want to display additional information on a PC so investors feel more comfortable. Alternatively, they may promote high-risk projects more through their mobile-version websites/apps, as smartphone users are likely to perceive a lower risk. However, for low-risk products or when risks are controlled, investment services may expect a higher WTI among large-device users. The services should thus be actively monitoring the device type condition with their online traffic and implementing accordingly appropriate strategies to optimize business outcomes. Although further research is necessary, this study is useful not only for online investment services but also for firms offering traditional offline financial services that aim to expand their online services, especially during the COVID-19 pandemic.

Limitations and Future Research Directions

Our results were limited to crowdfunding settings, thus, examining field data from investment services may add more insights such as when and which investment options are associated with device effects. Additional studies are required to assess whether the findings are generalizable to non-investment settings (e.g., online donations).

References

- Brasel, S.A. and Gips, J. (2014), “Tablets, touchscreens, and touchpads: How varying touch interfaces trigger psychological ownership and endowment”, *Journal of Consumer Psychology*, Society for Consumer Psychology, Vol. 24 No. 2, pp. 226–233.
- Blekher, M., Danziger, S. and Grinstein, A. (2019), “Salient volunteering behavior increases monetary risk-taking”, *Journal of Consumer Psychology*, Vol. 30 No. 3, pp. 525–533.
- Campbell, M.C. and Goodstein, R.C. (2001), “The moderating effect of perceived risk on consumers’ evaluations of product incongruity: preference for the norm”, *Journal of Consumer Research*, Vol. 28 No. 3, pp. 439–449.
- Chung, S., Kramer, T. and Wong, E.M. (2018), “Do touch interface users feel more engaged? The impact of input device type on online shoppers’ engagement, affect, and purchase decisions”, *Psychology and Marketing*, Vol. 35 No. 11, pp. 795–806.
- Disatnik, D. and Steinhart, Y. (2015), “Need for cognitive closure, risk aversion, uncertainty changes, and their effects on investment decisions”, *Journal of Marketing Research*, Vol. 52 No. 3, pp. 349–359.
- Ein-Gar, D. and Levontin, L. (2012), “Giving from a distance: Putting the charitable organization at the center of the donation appeal”, *Journal of Consumer Psychology*, Elsevier B.V., Vol. 23 No. 2, pp. 197–211.
- Forbes (2020), “Why investing will look more like e-commerce in the near future”, 9 October, available at <https://www.forbes.com/sites/forbestechcouncil/2020/10/09/why-investing-will-look-more-like-e-commerce-in-the-near-future/#14f94be8533b> (accessed 18 January 2021).
- Garry, T. and Harwood, T. (2019), “Trust and its predictors within a cyber-physical system context”, *Journal of Services Marketing*, Vol. 33 No. 4, pp. 407–428.
- Ganzach, Y., Ellis, S., Pazy, A. and Ricci-Siag, T. (2008), “On the perception and operationalization of risk perception”, *Judgment and Decision Making*, Vol. 3 No. 4, pp. 317–324.
- Hayes, A. F. (2013), *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*, Guilford Press, New York, NY.
- Kim, K., Zhang, M. and Li, X. (2008), “Effects of temporal and social distance on consumer evaluations”, *Journal of Consumer Research*, Vol. 35 No. 4, pp. 706–713.
- Lee, Y., Yoon, S., Lee, Y.W. and Royne, M.B. (2018), “How liberals and conservatives respond to equality-based and proportionality-based rewards in charity advertising”, *Journal of Public Policy and Marketing*, Vol. 37 No. 1, pp. 108–118.
- Lerner, E., Streicher, B., Sachs, R., Raue, M. and Frey, D. (2015), “The effect of construal level on risk-taking”, *European Journal of Social Psychology*, Vol. 109 No. 45, pp. 99–109.
- Liberman, N. and Trope, Y. (1998), “The role of feasibility and desirability considerations in near and distant future decisions: a test of temporal construal theory”, *Journal of Personality and Social Psychology*, Vol. 75 No. 1, pp. 5–18.

- Liberman, N., Trope, Y. and Wakslak, C. (2007), “Construal level theory and consumer behavior”, *Journal of Consumer Psychology*, Vol. 17 No. 2, pp. 113–117.
- Lombard, M., Ditton, T.B., Grabe, M.E. and Reich, R.D. (1997), “The role of screen size in viewer responses to television fare”, *Communication Reports*, Vol. 10 No. 1, pp. 95–106.
- Macdonnell, R. and White, K. (2015), “How construals of money versus time impact consumer charitable giving”, *Journal of Consumer Research*, Vol. 42 No. 4, pp. 551–563.
- Mrkva, K., Johnson, E.J., Gächter, S. and Herrmann, A. (2020), “Moderating loss aversion: Loss aversion has moderators, but reports of its death are greatly exaggerated”, *Journal of Consumer Psychology*, Vol. 30 No. 3.
- M+R. 2019. 2019 benchmarks study. [<https://www.mrss.com/lab/look-the-2019-mr-benchmarks-study-is-here/>]; (accessed on 8/30/2020).
- Naylor, J.S. and Sanchez, C.A. (2018), “Smartphone display size influences attitudes toward information consumed on small devices”, *Social Science Computer Review*, Vol. 36 No. 2, pp. 251–260.
- Park, J., Lennon, S.J. and Stoel, L. (2005), “On-line product presentation: Effects on mood, perceived risk, and purchase intention”, *Psychology and Marketing*, Vol. 22 No. 9, pp. 695–719.
- Raghubir, P. and Das, S.R. (2010), “The long and short of it: Why are stocks with shorter runs preferred?”, *Journal of Consumer Research*, Vol. 36 No. 6, pp. 964–982.
- Rai, D. and Lin, C.W. (Wilson). (2019), “The influence of implicit self-theories on consumer financial decision making”, *Journal of Business Research*, Elsevier, Vol. 95 No. August 2016, pp. 316–325.
- Raue, M., Streicher, B., Lermer, E. and Frey, D. (2015), “How far does it feel? Construal level and decisions under risk”, *Journal of Applied Research in Memory and Cognition*, The Society for Applied Research in Memory and Cognition, Vol. 4 No. 3, pp. 256–264.
- Reeves, B., Lang, A., Kim, E.Y. and Tatar, D. (1999), “The effects of screen size and message content on attention and arousal”, *Media Psychology*, Vol. I No. 1, pp. 49–67.
- Rick, S. (2011), “Losses, gains, and brains: Neuroeconomics can help to answer open questions about loss aversion”, *Journal of Consumer Psychology*, Vol. 21 No. 4, pp. 453–463.
- Shefrin, H. (2001), “Do investors expect higher returns from safer stocks than from riskier stocks?”, *Journal of Psychology and Financial Markets*, Vol. 2 No. 4, pp. 176–181.
- Shen, H., Zhang, M. and Krishna, A. (2016), “Computer interfaces and the ‘direct-touch’ effect: Can iPads increase the choice of hedonic food?”, *Journal of Marketing Research*, Vol. 53 No. 5, pp. 745–758.
- Tang, H., Liang, Z., Zhou, K., Huang, G.H., Rao, L.L. and Li, S. (2016), “Positive and Negative Affect in Loss Aversion: Additive or Subtractive Logic?”, *Journal of Behavioral Decision Making*, Vol. 29 No. 4, pp. 381–391.
- The Times (2020), “When the world went into lockdown, suddenly interactive was all the rage”, 10 October, available at <https://www.thetimes.co.uk/article/when-the-world-went-into-lockdown-suddenly-interactive-was-all-the-rage-vwnmlhvd> (accessed 18 January 2021)

- Trope, Y. and Liberman, N. (2003), “Temporal Construal”, *Psychological Review*, Vol. 110 No. 3, pp. 403–421.
- Wang, R.J.H., Malthouse, E.C. and Krishnamurthi, L. (2015), “On the go: How mobile shopping affects customer purchase behavior”, *Journal of Retailing*, New York University, Vol. 91 No. 2, pp. 217–234.
- Yang, X., Zhao, K., Tao, X. and Shiu, E. (2019), “Developing and validating a theory-based model of crowdfunding investment intention-perspectives from social exchange theory and customer value perspective”, *Sustainability (Switzerland)*, Vol. 11 No. 9, pp. 1–18.

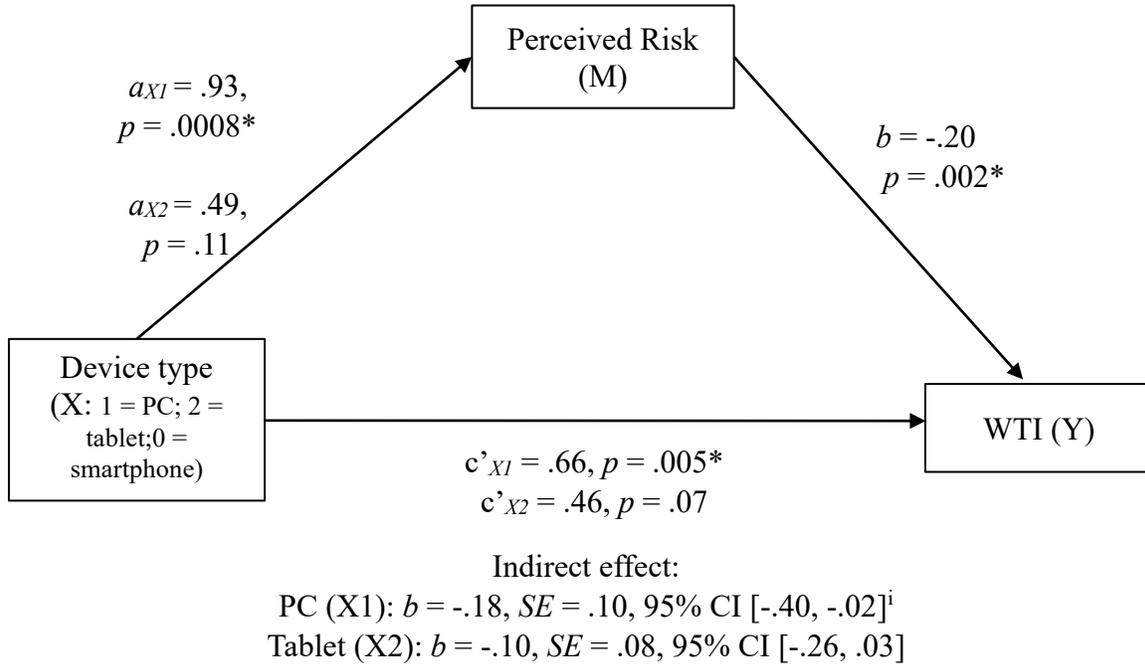
Tables

Table 1. Conditional Indirect Effects (Studies 2 and 3)

		Conditional indirect effect			Conditional direct effect			
W		<i>b</i>	<i>SE</i>	<i>95% CI</i>	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Study 2	Temporally-distant	-.15	.08	-.33, -.01	.95	.25	3.74	.0003
	Temporally-close	-.04	.05	-.16, .06	.19	.26	.74	.46
Study 3	Social-distant	-.15	.09	-.37, -.003	.50	.28	1.79	.08
	Social-close	-.13	.08	-.31, .001	.91	.28	3.22	.002

Notes. The boldfaced cells indicate support for H3a and H3b. In both studies, device type (X) was coded 1 for PC and 0 for smartphone. Temporal distance and social distance was also coded 1 for the temporally/socially-distant and 0 for temporally/socially-close conditions.

Figure 1. Mediation Effect (Study 1)



i..The effect is different from zero and is statistically significant.

*Statistically significant

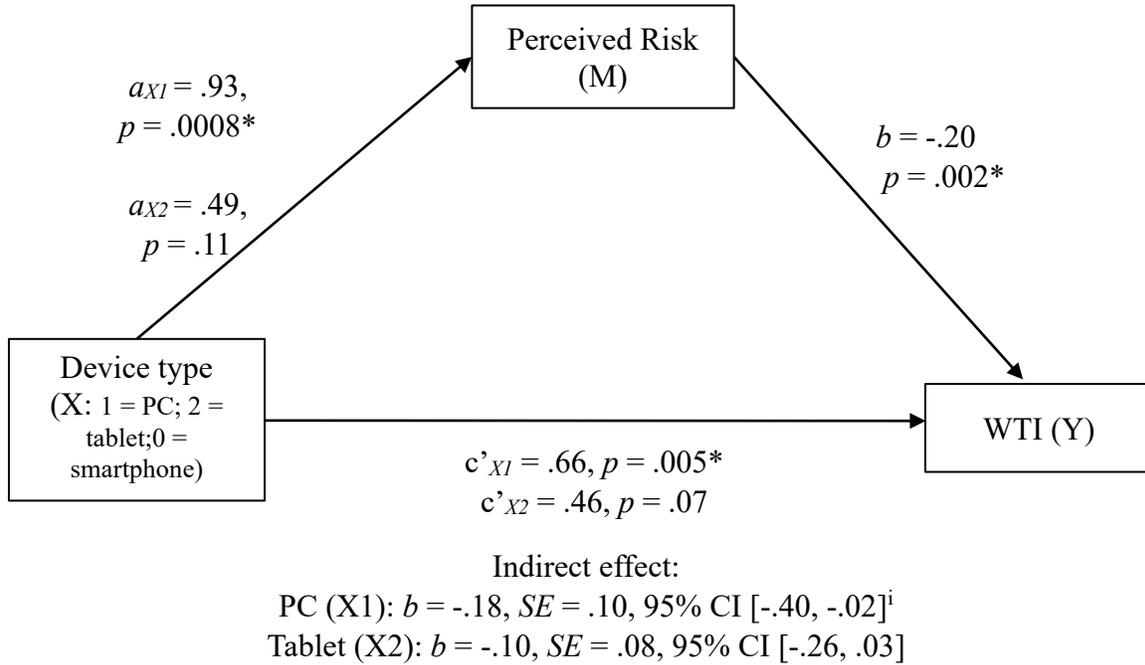
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