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## Mental Health and Information Technology Catalysts as Determinants of Innovative Work Behavior

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## Accepted Manuscript

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### Abstract:

Interpersonal interactions, such as impromptu face-to-face workplace conversations, facilitate knowledge transfer and spur innovation within individual work roles; however, the move to remote work during the COVID-19 pandemic disrupted these dynamics. This research examines how innovation can be maintained in remote work settings by considering Information Technology (IT) catalysts (a combination of IT mindfulness, IT identity, and IT empowerment) during disruptive events and crises. We also highlight the importance of remote workers' mental health and coping as precursors for IT catalysts to stimulate innovative work behaviors. Our paper contributes to information systems (IS) theory by establishing remote workers' mental health and coping as distal factors of innovation and precursors to IT catalysts. In addition, we extend IS theory by establishing the relationships among the IT catalyst factors as well as their impact on innovative work behaviors. Our research provides insights for organizations interested in sustaining innovation, especially during crises or other stress-inducing events or conditions.

**Keywords:** IT Catalysts, IT Mindfulness, IT Identity, IT Empowerment, Mental Health, Coping, Innovative Work Behavior.

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## 1 Introduction

The novel coronavirus (COVID-19) pandemic (henceforward referred to as “the pandemic”) created an unprecedented impact not only on global physical health but also on the nature of work and work-environment conditions. Consequently, many governments imposed mandatory quarantines, social distancing procedures, and facial coverings policies for individual and societal safety measures. Organizations also encouraged and sometimes mandated their non-essential workers to work remotely to meet legislative requirements, limit ethical scrutiny, and accommodate workforce needs.

This pandemic, while unique in nature and magnitude, is not the first crisis that disrupted the modern workplace. Such crises include natural disasters (e.g., Cyclone Seroja), accidental or intentional human disasters (e.g., Beirut ammonium nitrate explosion), and industry or organization-specific impacts (e.g., Colonial Pipeline breach), to name a few. Information technology (IT) has become an increasingly vital component of disaster resilience, yet, research about worker resilience during crises is scarce (Sakurai & Chugthai, 2020). The disaster resilience research to date has been predominately conducted outside the information systems (IS) field, and if technology is included in these studies, the focus is on the influence of the technological artifact (e.g., IoT) or the implementation, not the workers (e.g., Das & Zhang, 2021; Kumar, Raut, & Narkhede, 2020). Similarly, in the limited IS literature on the topic, researchers have looked at the use of technology during crises, such as the use of decision support systems for organizational disaster resilience (e.g., Mendonça, 2007; Zobel, 2011) and the use of technology to support community resilience (e.g., Linnell, 2014; Pan, Cui, & Qian, 2020). Studies exploring the interaction between people and technology in a “workplace” setting during crises are notably absent.

To address this gap, in this research, we explore the interplay of the self and technology, and the influence of this interplay on innovative work behaviors of remote workers during a disruptive workplace event (i.e., crisis). According to Gartner, remote work (also known as work from home or telecommuting) is a type of flexible working arrangement that allows an employee to work from a remote location outside of corporate offices (e.g., Ahuja et al., 2007; Olson, 1983). We specifically chose remote workers in this context because often their only option for continuity during a workplace disruption is to use IT. For example, remote web-based video interactions increased from 4% of interpersonal interactions before the pandemic to 60% during the pandemic (Logitech, 2020). By offering collaboration technologies with features such as screen sharing and hand raising (e.g., Zoom, Microsoft Teams, Slack) technology, firms have created a reliable and accessible alternative for in-person interactions that may remain in place well beyond the pandemic. Thus, this research on remote workers is relevant during and beyond the pandemic.

But, introducing new collaboration technologies can bring additional mental health risks, particularly for remote workers, such as a sense of being trapped “on camera” (Oppezzo & Schwartz, 2014), “Zoom fatigue”, burnout, deteriorated work-life balance, and increased loneliness and confinement, all of which can affect individual mental health and wellbeing (e.g., Fauville et al., 2021). Furthermore, pandemic-related remote work has led to increased workloads in many cases (Ingusci et al., 2021; Wang et al., 2020; Yang et al., 2020); and high workloads have been consistently found to cause stress and negatively influence mental health (e.g., Ilies et al., 2010; Kabasawa et al., 2021). Also, mental health consequences have become more publicly documented worldwide since the onset of the pandemic. For example, a survey conducted during the first week of the government-imposed quarantine in Ireland found that 22.8% of people screened positive for depression, 20.0% for anxiety, and 27.7% for both depression and anxiety (Hyland et al., 2020), and the World Health Organization reported a 25% increase in anxiety and depression worldwide during the first year of the pandemic. Given these significant changes, an initial mental health assessment is essential to establish a baseline before measuring work-related outcomes since “physical distancing, business and school closures, grief, [...] are aspects of the pandemic with significant mental health consequences” (Arevian et al., 2020, np). Previous research did not use mental health as an independent variable but as an outcome variable since scholars had assumed a “normal” distribution of the level of mental health among the population and thus looked at the influence of technology-related concepts (i.e., IT mindfulness) on mental health levels. They attributed a change in the level of mental health to the technology-related concept under study, which is not the case in this research. In the case of crisis, it is crucial to assess the baseline mental health levels and the influence of those mental health levels. Crises take a toll on people and assuming that people are the same before, during, and after a crisis of global magnitude such as the recent pandemic is not prudent.

And not just mental health at stake. Due to the fast-paced transition to remote work during the pandemic, the risk of innovation being stifled is high. Innovative work behaviors are the activities of employees that generate, introduce, or apply innovative ideas (AlEssa & Durugbo, 2021). In fact, prior research has found that organizations seek innovative behaviors such as idea exploration and idea generation (De Jong & Den Hartog, 2010; Yuan & Woodman, 2010). Organizations are continually trying to identify ways to not only sustain innovation, but also increase employees' level of innovation. Cultivating innovative work behavior within organizations is particularly vital since most businesses' long-term success (e.g., 3M, Apple, Microsoft) is strongly associated with their employees' ability to innovate (Scott & Bruce, 1994). Is it possible that during the pandemic, "what remote workers gain in productivity, they often miss in harder-to-measure benefits like creativity and innovative thinking" (Roose, 2020, np). Thus, organizations are presented with a conundrum – having your workforce work remotely may suppress individual innovative work behaviors at a time when you need those innovative work behaviors to survive. "With the uncertainty of this time, as well as the future, creativity may be more important now than ever before. Having a creative mindset ... may make the difference between success and failure in these volatile times" (Felber, 2020, np).

Since there are many employees who pivoted towards using technology to work remotely during the pandemic, we explore the potential effects of remote worker's mental health and the interplay of the self and IT on innovative work behaviors. We believe that mentally healthy remote workers can cope with crises (such as the pandemic) and that the interplay of the self and IT (expressed as IT catalysts) can facilitate the development of remote workers' positive relationship with technology, resulting in innovative work behavior. We use the term IT catalysts to capture the interaction between the individual and technology and the emergent influence of this interaction to accelerate individual innovation during crises. We see that when an individual is attentive, connected, and confident with a technology, this catalyzes, or accelerates, innovative work behavior. Given this discussion, key research questions become:

**RQ1: What is the impact of remote workers' level of mental health and coping on the interplay between the self and IT (i.e., IT catalysts)?**

**RQ2: What is the effect of the interplay among IT catalysts on remote workers' innovation?**

We answer these research questions by gathering data from full-time remote workers who use Zoom (a proprietary videotelephony software program) for their business interactions due to pandemic conditions. We test the influence of remote workers level of mental health and coping on three IT catalysts, and their influence on the innovative work behavior of remote workers. We contribute to research through our findings that a higher level of mental health of the remote worker influenced the IT catalysts' interactions. We also found that two of the IT catalysts – IT empowerment and IT mindfulness – have a direct influence on innovative work behavior.

The findings from this research could be incorporated into an organization's human resource (HR) practices and crisis management plans, specifically due to our findings. Supporting and cultivating remote worker's mental health, along with IT mindfulness and empowerment training in the work environment, may positively affect individual productivity, such as innovative work behavior. While our focus is on remote workers, the findings may be applicable to managing other human capital trends within the broader workforce, such as gig employees (Wang et al., 2019). Thus, this research has potential immediate and long-term implications for IS scholars and multiple organizational business functions.

## 2 Background

### 2.1 Mental Health, Stress, and Coping

The US Department of Health and Human Services (2020) defines mental health as "emotional, psychological, and social wellbeing." Our level of mental health (i.e., the strength and stability of our mental health) determines how we handle a stressful crisis, relate to others, and make choices. A mentally healthy population (i.e., good level of general mental health) is important to the economy, as the World Health Organization estimates that the global economic toll of mental health issues results in one trillion USD in lost productivity annually.

There are many types of stress that individuals may encounter, but this research focuses on work-related stress. Work-related stress is the harmful physical and emotional responses that can occur when the requirements of the job, role, or task exceed (or do not match) the capabilities, resources, or needs of the

worker (e.g., Bacharach et al., 2002). Work-related stress, which often results in lowered levels of mental health, accounts for 40% of work-related illnesses, affecting about 20% of working adults (Van Gordon et al., 2014). The work-related stress construct is used to be more inclusive of the various stresses encountered within the remote workplace (e.g., technostress; Brod, 1984). While some view work-related stress and technostress as arising from different conditions (Ayyagari, Grover, & Purvis, 2011; Maier, Laumer, & Eckhardt, 2015), within the context of remote work, the line between being stressed from your job/role and being stressed from the abrupt shift to fully IT-mediated work from home (and hence complete dependence on using IT) is significantly blurred.

Coping relates to how individuals deal with challenging or stressful situations (Lazarus & Folkman, 1984) and involves specific thoughts and actions to help manage perceived stress (Folkman & Lazarus, 1980). Two common coping approaches are problem-focused coping (aimed at resolving the situation) and emotion-focused coping (aimed at managing emotions evoked from the situation) (Lazarus & Folkman, 1984), both of which have been investigated in the IS literature (e.g., Liang et al., 2019; Liang & Xue, 2009). Although most work-related stressors elicit both types of coping, problem-focused coping tends to predominate when people feel that something constructive can be done, whereas emotion-focused coping tends to predominate when people feel that the stressor is uncontrolled and must be endured (Folkman & Lazarus, 1980). We examine problem-focused coping mechanisms, as such coping approaches focus on managing the source of stress (Folkman & Lazarus, 1980) and take place when individuals choose an action in hopes of resolving or circumventing a stressful situation (Carver, Scheier, & Weintraub, 1989).

## 2.2 IT Catalysts

A catalyst can be thought of as someone or something that causes change. We conceptualize an IT catalyst as the intersection of the self (someone) and the technology (something) that causes a change (increased innovative work behavior). In this research, we ground our work in three IT theories at the intersection of the self and IT: IT identity, IT mindfulness, and IT empowerment.

The first IT catalyst - IT identity is an individual trait that involves a person's connection to a technology (Carter & Grover, 2015; Carter et al., 2020). It is "the extent to which a person views [the] use of an IT as integral to his or her sense of self" (Carter & Grover, 2015, p. 938). IT identity theory asserts that the more individuals connect with a technology, the more enhanced their technology usage (Please refer to Appendix A, Table A1 for a brief outline of key IT identity literature).

The second IT catalyst - IT mindfulness is a dynamic personality trait in which a person (while using a technology) is attentive to, or aware of, the technology's features and affordances (Thatcher et al., 2018b). Unlike stable traits that exert a consistent influence across situations, IT mindfulness is a dynamic IT-specific trait that is malleable (Thatcher et al., 2018b). IT mindfulness theory asserts that the more an individual "focuses on the present, pays attention to detail, exhibits a willingness to consider other uses of IT, and expresses genuine interest in IT features", the more the individual is able to recognize differences in systems, be aware and open to multiple perspectives, and be curious to experiment with new systems and applications (Thatcher et al., 2018b; p. 834). (Please refer to Appendix A, Table A2 for a brief outline of key IT mindfulness literature.)

The third IT catalyst - IT empowerment is an individual state that represents an individual's level of confidence that a technology will help complete assigned work tasks (Junglas et al., 2014; 2019; Zaza & Junglas, 2016). Research on empowerment comes from the participative management domain (Conger & Kanungo, 1988; Wagner, 1994; Wilkinson, Godfrey, & Marchington, 1997), where an employee's work is considered a means of self-identification (e.g., Bennis & Nanus, 1985), self-expression (e.g., Shamir, House, & Arthur, 1989), and self-concordance (e.g., Bono & Judge, 2003). IT empowerment theory asserts that individuals' level of confidence with a technology (IT empowerment) stimulates and expands their IT usage (Please refer to Appendix A, Table A3 for a brief outline of key IT empowerment literature).

## 3 Hypotheses Development

We begin with a discussion of the distal antecedents of innovative work behavior - remote worker mental health; and then consider the proximal antecedents - IT catalysts (i.e., the concepts that capture the interplay of self and IT). Thus, we highlight the importance of maintaining a good level of remote worker mental health as a precursor for IT catalysts to stimulate innovative work behaviors.

### 3.1 Remote Workers' Mental Health

The concept of remote work is not a new phenomenon, but what is a newer phenomenon is mandatory remote work. For this study, remote workers are defined as employees who have been mandated to work in a physically separate location from their office due to the pandemic. Recently, individuals' level of mental health has become particularly poignant, as the pandemic has spurred an overall decline in individuals' level of mental health (Halliburton et al., 2021). A stable, strong level of mental health of an employee enables clearer thinking, and improved mood, while reducing stress and anxiety (Pearlin, 1999).

Workers with a strong, stable level of mental health have increased cognitive capacity (Pearlin, 1999; Pearlin & Bierman, 2013). When employees are mentally healthy (i.e., have a stable, strong level of mental health), they will have the cognitive capacity to apply more effective problem-focused coping mechanisms to deal with perceived stressors (Aldwin & Revenson, 1987; Pinquart & Silbereisen, 2008; Trougakos, Chawla, & McCarthy, 2020). Thus, an individual with a good level of mental health is better able to function cognitively, process the situation, and identify appropriate actions to mitigate (or resolve) the sources of stress. This is particularly important for remote workers as they have been required to work in a physically separate location from their office and its associated resources. For example, when an internet connection becomes unstable during a video conference, it can be very stressful for remote workers (at home, by themselves). Individuals with a good level of mental health will have the cognitive capacity (i.e., the mental bandwidth to clearly think, learn, and/or remember) to engage in problem-focused coping, exploring various workarounds or resolutions (e.g., turn off the video and just use audio, dial in via smartphone). We therefore hypothesize:

**Hypothesis 1: Remote workers' level of mental health will positively influence their problem-focused coping**

### 3.2 IT Catalysts

Since increased levels of mental health result in better, more positive feelings about the self (Barlow, 2002; Brown et al., 2010; Caprara et al., 2006; Cheung & Sun, 2000), increased levels of mental health will have a positive effect on the IT catalysts as they capture the interplay of self and IT. The first IT catalyst is IT Identity. The stronger one's IT identity, the more the technology is intertwined with the perceptions of the self, and the more one thinks of themselves in relation to the IT (Carter & Grover, 2015). Once individuals exhibit such an integral connection with technology, they will likely explore the technology's features and capabilities (Ogbanufe & Gerhart, 2020). In essence, if IT is part of who I am, I will seek to cultivate an understanding of what this means to me.

Remote workers who exhibit increased levels of mental health will have a greater mental capacity available to develop enthusiasm about or interest in the technology. They will have the cognitive capacity available to think about a technology, explore its features and potential affordances, and the meanings attached to the self in relation to the technology (i.e., Carter & Grover, 2015). According to Carter, Petter, Grover, and Thatcher (2020, p. 1315), "an overlapping of boundaries between personal resources/characteristics and IT capabilities can extend the boundary of a person's self-concept." For example, remote workers with higher levels of mental health will have the cognitive capacity (i.e., mental bandwidth) to explore the facets of the technology (e.g., Zoom virtual backgrounds) that help them feel energized or enthusiastic when thinking about the technology and integrating "the IT capabilities as personal resources" (Carter & Grover, 2015). Without such cognitive capacity, it is difficult to imagine an individual expending mental effort on expanding their self-concept to include the technology or developing enthusiasm for a technology as an extension of their personal resources. Thus, we hypothesize:

**Hypothesis 2: Remote workers' level of mental health will positively influence their IT identity**

Recall that problem-focused coping involves finding ways to improve or alter a stressful situation (Carver et al., 1989; Liang & Xue, 2009), and these responses aim to directly confront the situation (Synard & Gazzola, 2019). Individuals who use problem-focused coping in response to perceived stressors can devise alternative scenarios and approach stressors with a solution-oriented mindset (Compas et al., 1988; Compas et al., 1996) and generally have better outcomes (Higgins & Endler, 1995). For example, an individual, who is working remotely and on their own, learns new skills to cope with a computer malfunction (e.g., turning off the video on Zoom when the bandwidth will not support it is using a problem-focused coping strategy such as "Fixing the IT" (Salo et al., 2020)). While engaging in the problem-solving

process with IT, remote workers will increase their knowledge of and, in many cases, their attachment to the technology, with their IT identity growing stronger. When the remote worker learns more about a technology the perceptions of the self in relation to the technology may change. With one's perceptions of their own computer savviness perhaps increasing, the technology can become more intertwined with perceptions of the self, thereby increasing IT identity. Thus, we hypothesize:

**Hypothesis 3: Remote workers' problem-focused coping will positively influence their IT identity**

The second IT catalyst is IT mindfulness. While the term mindfulness is grounded in the idea of being conscious or aware of one's environment and having an open, observational mindset (Langer, 2014), it is distinct from IT mindfulness, which is being aware or attentive to specific technological aspects and being open to exploring potential uses of the technology (Thatcher et al., 2018b). Since general mindfulness has helped workers deal with focusing on the importance of being present in the moment in relation to events and experiences (Weinstein et al., 2009), a more targeted mindfulness towards technology (i.e., IT mindfulness) would likely involve a similar state of presence but in relation to the technology (Kotwinski, 2017; Maier et al., 2019), resulting in being able to adjust the technology to different situations (Ioannou & Papazafeiropoulou, 2017). Ioannou, Lycett, and Marshan (2022) test mindfulness and IT mindfulness as independent constructs in their model, noting that "IT mindfulness should be discriminated from mindfulness, as IT mindfulness holds more predictive power over IT related outcomes in post-adoption system use" (p. 16).

In a crisis situation, it is crucial to assess the baseline mental health level and its influence on IT-related concepts and/or work outcomes. Think about getting into an accident. When the paramedics arrive on scene, they will not immediately ask the injured person to get up and move to measure what they can do. Instead, the paramedics will first check that the person is conscious and determine if they can respond. The paramedics will check their blood pressure, heart rate, etc. - all to establish a baseline. Once the baseline is established the paramedics can ask the injured person to perform other tasks (e.g., sit up).

Crises take a toll on people, and assuming that people are the same before, during, and after a crisis, such as the recent global pandemic, is unwise. But previous research can provide some guidance. Some outcomes of a good level of mental health identified in prior research include clearer thinking (cognition) and increased self-esteem, which facilitates mindfulness (Boey, 1999). Individuals with good level of mental health will have the cognitive capacity and mental energy available to be more aware of the technology, be present and focus on the task and technology at hand, and be curious and open to trying novel approaches when using IT. For example, remote workers with good level of mental health will have the cognitive capacity (i.e., mental bandwidth) to explore the facets of a technology (communicating with colleagues using enterprise social media) but are also aware of and open to exploring additional aspects of the technology (e.g., creating polls within the enterprise social media).

Therefore, we hypothesize:

**Hypothesis 4: Remote workers' level of mental health will positively influence their IT mindfulness**

Within the remote work environment, when individuals engage in problem-focused coping they often focus attention on, and potentially solve, work-related tasks involving technology (Carver et al., 1989). As remote workers use problem-focused coping to solve technology-related issues, attending to the technology and exploring their thoughts on how to resolve a technology issue may result in noticing some its features (that were perhaps previously not identified). This potential link between effective coping and IT mindfulness has been identified in prior research as a way to reduce technostress ("inability to adapt or cope with new computer technologies in a healthy manner" Brod, 1984), but not formally tested (Ioannou & Papazafeiropoulou, 2017). This awareness of the technological features may encourage individuals to explore and adapt these technology features to their own use (IT affordances), resulting in being more IT mindful (Thatcher et al., 2018b). With remote workers being required to rely more on technology and their own technological skills during the pandemic, we hypothesize that engaging in problem-focused coping may allow the individual to explore the technology and experience greater IT mindfulness. For example, without the ability to access colleagues in person, which is a common problem-focused coping strategy (Becker et al., 2021; Goetz & Boehm, 2020; Harris et al., 2015; Rohwer et al., 2022; Zhao et al., 2020), to edit a dashboard report remote workers may be curious enough to explore dashboard reporting features on their own (e.g., "Google it"). We therefore hypothesize:



**Hypothesis 5: Remote workers' problem-focused coping will positively influence their IT mindfulness**

Research has found that identity is one of the main driving forces behind empowerment (e.g., Drury & Reicher, 2009; London, 1993; van Zomeren et al., 2008). Individuals with a strong sense of self can make choices with confidence (i.e., empowered choices) that are consistent with their identity (Nguyen, 2021). Applying this reasoning in the IT context, individuals with a strong IT identity, that view IT as fundamental to their sense of self, should have more confidence in their competence towards the technology. As part of the interplay of the self and IT, we assert that remote workers with a strong IT identity, such as workers who use Zoom daily, or manage their days via Outlook, will feel more competent and empowered in their ability to interact with others while using the technology. As the technology becomes an integral part of individuals' IT identity, they will be more empowered to explore the technology features and actualize the technology affordances. We therefore hypothesize:

**Hypothesis 6: Remote workers' IT identity will positively influence their IT empowerment**

A person who is IT mindful – or attentive to, aware of, and open to a technology and its features – will more likely explore and interact with that technology (Thatcher et al., 2018b). Employees who have a high level of IT mindfulness focus on being creative with the technology and potentially discovering new and more efficient ways of using the technology (Chen et al., 2022). Over time, this may result in a higher level of comfort with and competence in one's ability to fully use the technology. Due to being present with technology, Chen, Wang, Benitez, Luo, and Li (2022) found that IT mindfulness alleviates negative behaviors toward IT, such as self-regulation impairment and deviant behavior. Also, increased IT mindfulness enables individuals to explore new and effective ways to use IT, increasing confidence toward IT and positive feelings about the ability to use IT to complete a task, based on an individual's role (Junglas et al. 2014). Thus, remote workers who exhibit IT mindfulness may utilize some of the advanced features of the technology (such as sharing files through Slack/Zoom instead of email), thereby building their sense of empowerment in their technology-related capabilities. Therefore, we hypothesize:

**Hypothesis 7: Remote workers' IT mindfulness will positively influence their IT empowerment**

### 3.3 Innovative Work Behaviors

Recall that innovative work behaviors are the activities of employees that generate, introduce, or apply innovative ideas (AlEssa & Durugbo, 2021). Empirical research has shown that IT identity is a determinant of IT-focused behaviors (Carter & Grover, 2015), such as the use of personal health devices (Esmaeilzadeh, 2021), artificial intelligence-enabled voice assistance (Malodia et al., 2022), disclosure on social networking sites (Mosafer et al., 2021), and the ability to produce novel technology-related ideas (Yuan & Woodman, 2010). Consistent with IT identity theory and in support of this connection, Ogbanufe and Gerhart (2020) found a significant positive relationship between an IT identity (e.g., smartwatch technology focused) and innovative personal performance (e.g., generation of novel ideas). We extend their finding and assert that individuals who view IT as fundamental to their sense of self (i.e., high level of IT identity) will relate more to the technology, irrespective of the type of technology. This personal connection to the IT may enable and inspire remote workers to explore new ideas and processes, thereby cultivating creativity and innovation. We therefore hypothesize:

**Hypothesis 8: Remote workers' IT identity will positively influence their innovative work behavior**

People with a heightened sense of IT mindfulness are present with, and more aware of, the technology as well as a technology's affordances and capabilities (Thatcher et al., 2018b). In addition, IT mindfulness increases individual satisfaction with technology (Rohwer et al., 2022) as well as productivity and creativity in learning (Shirish et al., 2021). The more individuals are curious about the technology, open to the possibilities of the technology, and aware of the features and affordances of the technology, the more likely they will look for new ways to accomplish tasks and goals (i.e., increase innovative work behavior) (e.g., Leroy et al., 2013; Khan et al., 2022). While Thatcher and colleagues (2018b) correlate IT mindfulness with trying to innovate (using the software application Excel), we use the broader concept - innovative work behavior, which is more generalizable. In terms of innovative work behavior, Ioannou and Papazafeiropoulou (2017) aptly state, "...an IT mindful individual is able to vary his response and shift perspectives depending on the context, create innovative solutions to resolve occurring problems and

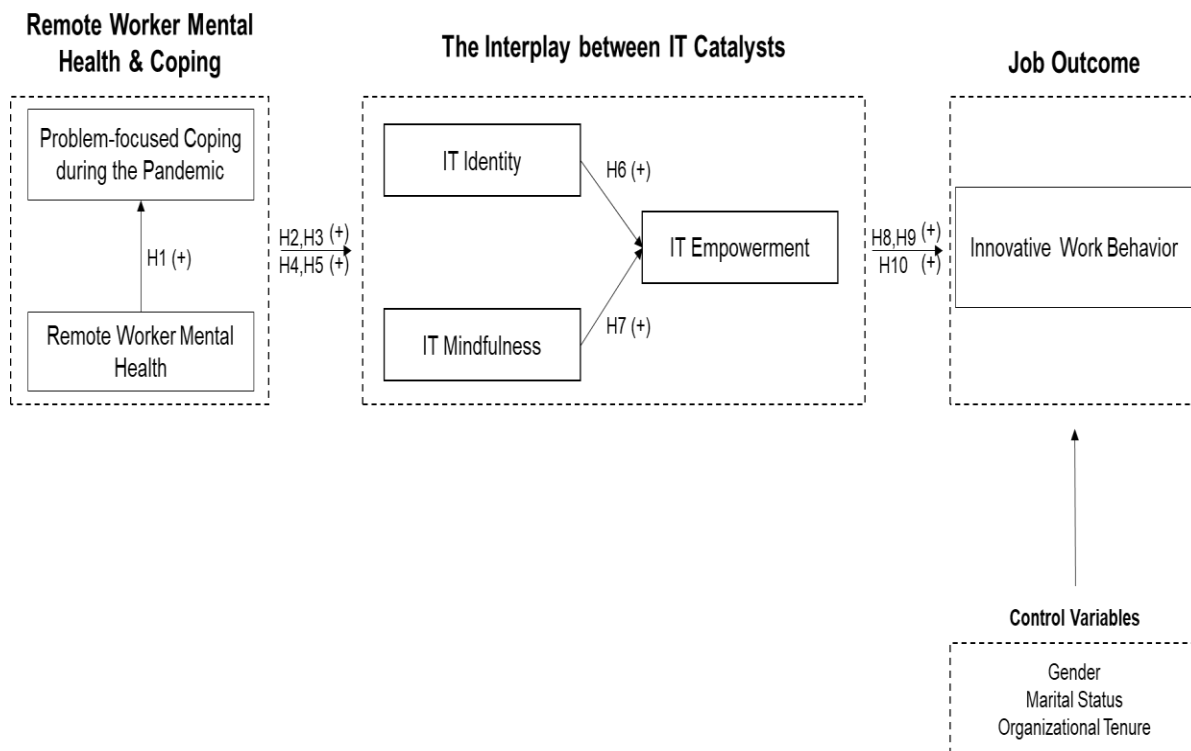
implement ‘workarounds’ in order to achieve a fit between the deployed technology and the task at hand.” For instance, a remote worker who has a higher level of IT mindfulness, e.g., is mindful of many of the OneDrive features for file sharing, may suggest using the technology and technology features to streamline the work processes throughout the organization, e.g., use OneDrive to share and back up all files within the organization. Therefore, we hypothesize:

**Hypothesis 9: Remote workers’ IT mindfulness will positively influence their innovative work behavior**

When employees generate or apply innovative ideas to the workplace, they are engaging in innovate work behaviors. Research has found that psychologically empowered individuals are more innovative (Doll & Deng, 2010; Spreitzer, 1995; Thomas & Velthouse, 1990). If individuals feel a sense of empowerment towards technology (e.g., IT empowerment), their comfort level with, and perceived control over the technology, in terms of the various features and affordances of the technology, may potentially lead to more innovative use of the technology. “IT empowerment takes into account an employee’s perceptions about himself in relation to his work, as well as in relation to the technology that is available to get the work done” (Junglas et al., 2019, p. 320). As Junglas et al. (2014, p. 329) state, “A newly found sense of IT savviness—manifested in personal consumer IT usage—turns employees into innovators.” For example, remote workers’ IT empowerment may manifest itself by increased IT usage (e.g., utilize the Zoom website search to seek answers to an audio echo problem), which leads to innovative work behaviors (e.g., propose a new organizational online meeting protocol that includes information the worker found during the online search). Therefore, we hypothesize:

**Hypothesis 10: Remote workers’ IT empowerment will positively influence their innovative work behavior**

We provide a graphical representation of our theoretical model in Figure 1.



**Figure 1. Theoretical Model**

## 4 Research Methodology

We collected data from an online panel service (Amazon Mechanical Turk) by adopting criteria-based sampling for selecting participants (Creswell, 2013). Our inclusion criteria consisted of full-time workers (not necessarily IT workers) based in the United States, who were required to work remotely due to the pandemic, and who use Zoom (a video-based collaboration platform/app) to complete work-related tasks since the pandemic. Participants who did not meet all of the inclusion criteria were screened out at the onset of the survey. As we did not request that only IT workers participate in our survey, we did not collect information on the participants' type of work. Participants were offered an incentive for taking the survey (less than \$5 per response). We collected data from 262 participants, with 54 removed due to missing values or failing the "attention check" questions, leaving 208 valid responses (representing 79% of our participants). We used G\*Power with the a priori power analysis type to compute the required sample size, given alpha, power, effect size, and the number of predictors. For the input parameters, we chose effect size  $f^2$  of 0.15, alpha value of 0.05, and the power of 0.95, number of predictors of 14 (mental health construct has the largest number of predictors). Our final sample size was deemed sufficient based on the G\*power recommendation of a minimum sample size of 194 respondents (Erdfelder, Faul, & Buchner, 1996). Our respondents' average age was 32 years and indicated that they only started using Zoom when working from home due to the pandemic. See Table 1 for the descriptive statistics of our participants.

**Table 1. Descriptive Statistics**

Demographic Variable	Count	Percent	Demographic Variable	Count	Percent
<b>Age</b>			<b>Gender</b>		
Between 18 and 29	71	34.0	Woman	67	32.0
Between 30 and 39	126	60.6	Man	133	64.0
Between 40 and 49	7	3.4	Transgender	1	0.5
Between 50 and 59	3	1.5	Other	2	1.0
60 and above	1	0.5	Prefer not to answer	4	2.0
			No Answer	1	0.5
<b>Education</b>			<b>Marital Status</b>		
High-school graduate	7	3.3	Married	90	43.3
Some college	13	6.3	Not Married	109	52.4
2-year degree	17	8.2	Prefer not to answer	9	4.3
4-year degree	118	56.7			
Professional degree	11	5.3			
Graduate degree	36	17.3			
Prefer not to answer	6	2.9			
<b>Organization Tenure</b>			<b>Industry</b>		
<1 year	5	2.4	Education	17	8.2
1-3	56	26.9	Government	11	5.3
4-6	90	43.3	Healthcare	11	5.3
7-9	35	16.8	IT Services/Software	126	60.6
10-12	15	7.2	Manufacturing	11	5.3
13-15	3	1.4	Retail	10	4.8
16-20	2	1.0	Insurance	6	2.9
> 20	2	1.0	Other	16	7.8

We used well-established, validated measurement scales in our study where possible. All constructs were modeled as first-order reflective constructs except for IT identity (see Carter & Grover, 2015), IT

empowerment (see Junglas et al., 2014), and IT mindfulness (see Thatcher et al., 2018b), which we modeled as second-order reflective constructs. Also, we developed the problem-focused coping measure as a formative construct entailing one measurement item (i.e., formative indicator) from each of the five conventional problem-focused coping mechanisms (Carver et al., 1989; Edwards & Bagozzi, 2000). As Petter, Straub, and Rai (2007, p. 627) state, “one measurement item is used for each dimension or subconstruct, which, in turn, has a formative relationship with the construct.” All measures used Likert scales, ranging from 1 (strongly disagree) to 7 (strongly agree). The measurement scales, sources, and items are shown in Appendix B, Table B1. Control variables commonly associated with innovative work behavior were included, as shown in Figure 1.

## 5 Analysis and Results

We analyzed our model using partial least squares structural equation modeling (PLS-SEM), a composite-based method. SmartPLS 3.3.3 (Ringle, Wende, & Becker, 2015) was used to analyze the data for three reasons. First, we tested our model from a prediction perspective, which the software is well suited to address (Hair et al., 2019). Second, the software package can test reflective (IT identity, IT mindfulness, and IT empowerment are second-order reflective constructs) and formative (problem-focused coping is a formative construct) constructs. Third, the software package can handle complex models (Hair, Howard, & Nitzl, 2020).

Since we collected all our data from a single source common method variance (CMV) might be an issue (Doty & Glick, 1998). We designed our survey using well-established scales, attention-check questions, and a correlational marker variable because “the best way is for the researcher to include a scale that is theoretically unrelated to at least one other scale in the questionnaire, so there is an a priori justification for predicting a zero correlation” (Lindell & Whitney, 2001, p. 115). For Richardson and colleagues (2009), “the best estimate of CMV in a data set is represented by the smallest observed positive correlation between a substantive variable and an a priori chosen ‘marker’ variable that is believed to be theoretically unrelated to at least one substantive variable, but susceptible to the same causes of CMV” (p. 767-768). The marker variable used in this study is the integrity scale (McKnight, Cummings, & Chervany, 1998) that included three items 1) In general, most folks keep their promises, 2) I think people generally try to back up their words with their actions, and 3) Most people are honest in their dealings with others. The smallest correlation between the marker and substantive variables was 0.06, which indicates negligible shared variance and that our dataset is not significantly affected by common method variance (Richardson et al., 2009).

For the measurement model assessment, we ran the bootstrapping procedure with 5000 subsamples (to ensure results stability). Using SmartPLS, we conducted a factor analysis and kept all items, even those loading below 0.7, to maintain content validity where appropriate (e.g., formative constructs). Following the guidelines of Chin (1998), we assessed the construct reliabilities and the model’s convergent and discriminant validities. All constructs met the cutoff criteria of 0.70 for internal composite reliability (ICR). We assessed convergent validity by obtaining the average variance extracted (AVE) and found that all the constructs have AVEs above the 0.5 threshold. Table 2 shows the mean, standard deviation (SD), reliabilities, AVEs, and loadings.

**Table 2. Mean, Standard Deviation (SD), Reliability, Average Variance Extracted (AVE), and Factor Loadings**

Construct	Mean	SD	CR	AVE	Item	Loading
Remote Worker Mental Health	5.14	0.24	0.96	0.66	MentalHealth_1	0.83
					MentalHealth_2	0.75
					MentalHealth_3	0.84
					MentalHealth_4	0.76
					MentalHealth_5	0.78
					MentalHealth_6	0.78
					MentalHealth_7	0.81
					MentalHealth_8	0.90
					MentalHealth_9	0.79
					MentalHealth_10	0.88

					MentalHealth_11	0.69
					MentalHealth_12	0.79
					MentalHealth_13	0.76
					MentalHealth_14	0.87
IT Identity	4.65	0.55	0.96	0.67	EmotionalEnergy_1	0.91
					EmotionalEnergy_2	0.85
					EmotionalEnergy_3	0.93
					EmotionalEnergy_4	0.93
					Relatedness_1	0.92
					Relatedness_2	0.88
					Relatedness_3	0.93
					Relatedness_4	0.93
					Dependence_1	0.88
					Dependence_2	0.93
					Dependence_3	0.95
					Dependence_4	0.92
Problem-focused Coping (FORMATIVE)	4.73	0.36	NA	NA	Cope_1	0.91
					Cope_2	0.84
					Cope_3	0.21^
					Cope_4	0.45^
					Cope_5	0.65^
IT Mindfulness	5.27	0.23	0.95	0.65	Alert_1	0.91
					Alert_2	0.93
					Alert_3	0.92
					Aware_1	0.94
					Aware_2	0.93
					Openness_1	0.92
					Openness_2	0.91
					Openness_3	0.93
					Orientation_1	0.89
					Orientation_2	0.89
					Orientation_3	0.89
IT Empowerment	5.35	0.41	0.93	0.60	ITDetermination_1	0.91
					ITDetermination_2	0.94
					ITDetermination_3	0.93
					ITImpact_1	0.87
					ITImpact_2	0.94
					ITImpact_3	0.89
					ITCompetence_1	0.90
					ITCompetence_2	0.85
					ITCompetence_3	0.87
					ITMeaning_1	0.93
					ITMeaning_2	0.94
					ITMeaning_3	0.93

Innovative Work Behavior	5.58	0.28	0.95	0.70	IWB_1	0.84
					IWB_2	0.80
					IWB_3	0.83
					IWB_4	0.78
					IWB_5	0.82
					IWB_6	0.86
					IWB_7	0.86
					IWB_8	0.86

Note: SD = standard deviation, CR = construct reliability, AVE = average variance extracted  
 ^ = We did not deem these loadings a concern due to the formative nature of the construct (MacKenzie, Podsakoff, & Jarvis, 2005; Petter, Straub & Rai, 2007).

We used heterotrait-monotrait ratio of correlations (HTMT) (Henseler, Ringle, & Sarstedt, 2015) to confirm the discriminant validity of our measures and found that all constructs were below the cutoff of 0.85. As shown in Table 3, no items showed high cross-loadings.

**Table 3. Heterotrait-Monotrait Ratio of Correlations (HTMT)**

	IT Empowerment	IT Mindfulness	IT Identity	Innovative Work Behavior
IT Empowerment				
IT Mindfulness	0.73			
IT identity	0.75	0.72		
Innovative Work Behavior	0.67	0.76	0.65	
Mental Health	0.51	0.57	0.60	0.63

Note: Problem-focused coping is omitted from the table since it is a formative construct

Next, we assessed whether there were any collinearity issues for our data. As shown in Table 4, no collinearity issues were present since all the variance inflation factor (VIF) values are below the cutoff point of 3.0.

**Table 4. Variance Inflation Factor Values**

Construct	Coping	IT Empowerment	IT Mindfulness	IT identity	Innovative Work Behavior
Coping			1.25	1.25	
IT Empowerment					2.36
IT Mindfulness		1.89			2.23
IT identity		1.89			2.44
Innovative Work Behavior					
Mental Health	1.00		1.25	1.25	

As shown in Table 5, discriminant validity is established in this data based on the correlations between any two constructs were all less than the square root of their AVE (Fornell & Larcker, 1981).

**Table 5. Correlations Among Constructs**

Constructs	Age	Cop	Gen	ITE	ITM	ITI	IWB	MS	MH
Age	1.00								
Cop	0.03	NA							
Gen	-0.01	-0.02	1.00						
ITE	0.08	0.66	0.02	0.77					
ITM	0.08	0.74	-0.01	0.68	0.80				
ITI	0.14	0.73	0.03	0.71	0.68	0.82			

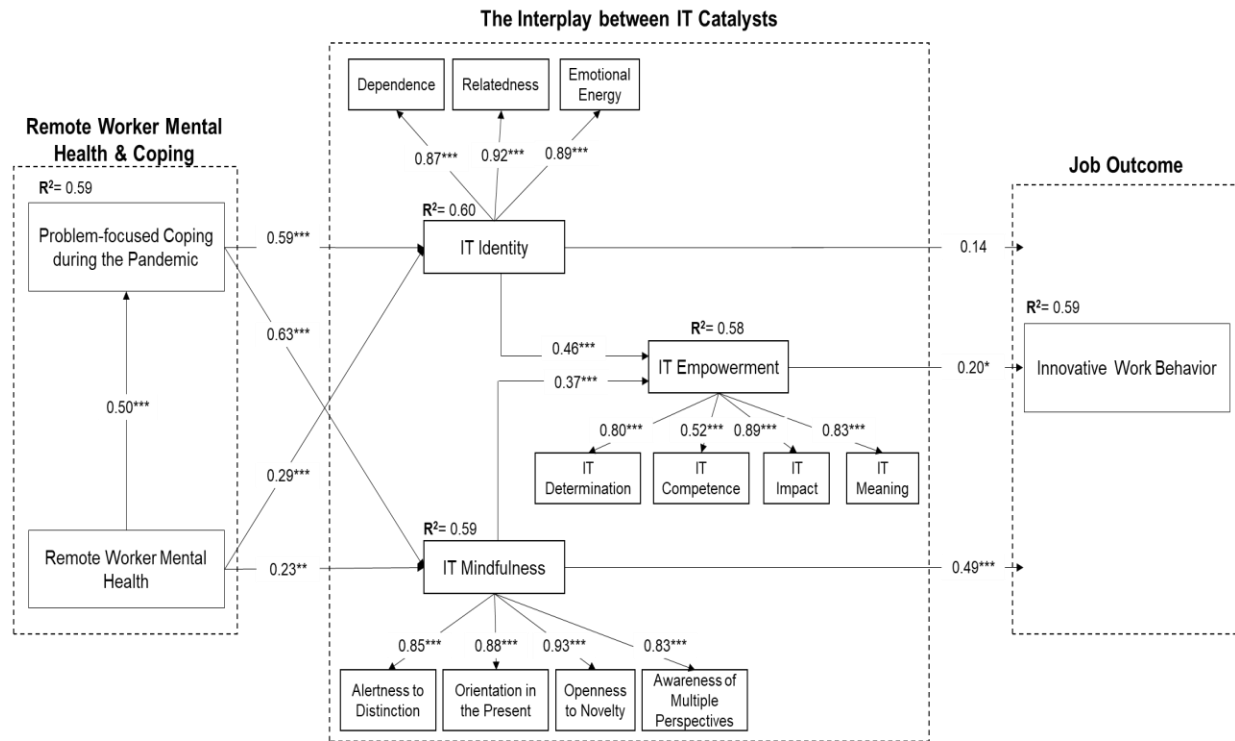
IWB	0.09	0.67	0.11	0.64	0.72	0.62	0.83		
MS	-0.28	0.10	0.17	0.06	0.08	0.05	0.14	1.00	
MH	0.05	0.50	0.04	0.49	0.54	0.58	0.60	0.05	0.80
OT	0.29	0.16	-0.16	0.15	0.15	0.17	0.06	-0.21	0.16

Note: The diagonal reports the square roots of the average variance extracted (AVE)  
 Legend: Cop=problem-focused coping; Gen=gender; ITE=IT empowerment; ITM=IT mindfulness; ITI=IT identity; IWB=innovative work behavior; MS=marital status; MH=mental health; OT=organizational tenure

To test our structural model, we used the PLS algorithm to obtain the results shown in Table 6 and Figure 2. The model explains just under 60% of the variance in innovative work behavior, and except for H8 (IT identity → innovative work behavior), we found support for all hypotheses. All control variables were nonsignificant.

**Table 6. Structural Model Results**

Hypothesis	Description	Beta Coefficient	P Value	Supported
H1+	Mental Health -> Problem-focused Coping	0.45	<0.001	Y
H2+	Mental Health -> IT Identity	0.35	<0.001	Y
H3+	Problem-focused Coping -> IT Identity	0.51	<0.001	Y
H4+	Mental Health -> IT Mindfulness	0.28	<0.001	Y
H5+	Problem-focused Coping -> IT Mindfulness	0.58	<0.001	Y
H6+	IT Identity -> IT Empowerment	0.45	<0.001	Y
H7+	IT Mindfulness -> IT Empowerment	0.36	<0.001	Y
H8+	IT Identity -> IWB	0.13	0.05	N
H9+	IT Mindfulness -> IWB	0.49	<0.001	Y
H10+	IT Empowerment -> IWB	0.20	0.03	Y
Controls	Gender -> IWB	0.08	0.06	N
	Marital Status -> IWB	0.07	0.17	N
	Organizational Tenure -> IWB	-0.05	0.35	N



**Figure 2. Results of Model Testing**

Next, we report the effect size (f-square), where values of 0.02, 0.15, and 0.35 can be used to evaluate whether a predictor has a weak, medium, or large effect at the structural level (Henseler, Ringle, & Sinkovics, 2009). As shown in Table 7, remote worker's level of mental health has a stronger effect on problem-focused coping than that of IT identity and IT mindfulness. Problem-focused coping has the largest effect on IT mindfulness and IT Identity, respectively. IT identity has a higher medium effect on IT empowerment than that of IT mindfulness. IT mindfulness has a higher medium effect on innovative work behavior than that of IT empowerment and IT identity.

**Table 7. F Square**

Constructs	Age	Cop	Gen	ITE	ITM	ITI	MS	MH	OT
Cop								0.25	
ITE					0.16	0.26			
ITM		0.63						0.15	
ITI		0.47						0.21	
IWB	0.00		0.01	0.04	0.26	0.01	0.01		0.00

Note: Cop=problem-focused coping; Gen=gender; ITE=IT empowerment; ITM=IT mindfulness; ITI=IT identity; IWB=innovative work behavior; MS=marital status; MH=mental health; OT=organizational tenure

## 5.1 Post-hoc Analysis

To explore the nonsignificant relationship between IT identity and innovative work behavior (H8), we performed a post hoc analysis to evaluate whether IT empowerment mediates the relationship. As shown in Table 8, IT empowerment significantly mediates the relationship between IT identity and innovative work behavior.



**Table 8. Mediation Test Results**

Indirect Effect	Path Coefficient	T-Statistic	P-Value
IT identity → IT empowerment → innovative work behavior	0.10	2.10	0.04

## 6 Discussion

Our first research question addressed the impact of remote workers' level of mental health and coping on the IT catalysts. The findings of the study indicate that the level of mental health of remote workers is a significant driver of problem-focused coping, and that mental health and problem-focused coping positively influenced the IT catalysts under study. In addition, we see that problem-focused coping demonstrated a stronger influence on IT identity and IT mindfulness than remote workers' level of mental health (since problem-focused coping partially mediates the influence of mental health on IT identity and IT mindfulness). In addition, our second research question addressed the impact of the IT-catalysts on innovative work behavior. The findings indicate that IT empowerment and IT mindfulness have a direct, positive impact on innovative work behavior (see Figure 2 and Table 6). While IT identity did not directly influence innovative work behavior, our post hoc analysis reveals that IT empowerment mediates the effect of IT identity on innovative work behavior. We found that the temporary state of IT empowerment (confidence, determination, and fostering an understanding of the impact of the IT) can be enhanced by one's IT identity. By having a strong IT identity, workers may feel an emotional connection to the technology and positively perceive their technological competence (IT empowerment). We now identify the theoretical and practical implications associated with our study.

### 6.1 Theoretical Implications

Our study offers multiple theoretical implications. First, most importantly, we extend prior research by looking at the synergy among the three IT catalysts (IT identity, IT mindfulness, IT empowerment). In comparison to other studies, we found that when an individual is attentive, connected, and confident with a technology, this catalyzes or accelerates innovative work behavior. In addition, the interplay of the IT catalysts presents an interesting research opportunity. We provide the base model and encourage researchers to replicate this study, test the boundaries of the theory, and identify contextual factors (e.g., moderators). For instance, future research may investigate organizational culture as a moderator for the relationships among the IT catalysts and with innovative work behavior. In addition, while we explored innovative work behavior as the ultimate dependent variable, future research opportunities can explore other outcomes of these IT catalysts, such as task performance, IT satisfaction, and job/career satisfaction.

Second, problem-focused coping exhibited a stronger influence, far beyond the level of mental health, on both IT identity and IT mindfulness. While we built on the established research that individuals can be the source of innovation (e.g., Maruping & Magni, 2015), we showcased that researchers need to consider the distal factors (level of mental health and coping), to better understand workers' innovative work behavior variations, as well as other possible outcomes such as their job performance, their turnover, and even their turnaway.

Third, the nonsignificant relationship between IT identity and innovative work behavior may be due to the timing of our data collection (during the pandemic). We suggest IS researchers consider exploring the IT identity formation process to unpack its role within the remote work environment. As the IS domain expands its theoretical approaches to include process theory (Niederman, 2021) at the individual level, future research may consider investigating our findings using process theory to shed light on the interventions and potential bi-directional impacts of mental health and the IT catalysts. For instance, our study found that a heightened sense of IT mindfulness positively influences IT empowerment. But perhaps a heightened sense of IT empowerment will then influence IT mindfulness (i.e., feedback loop). Process theorizing may present a unique opportunity in this context to investigate not only the existence of connections, but the nature of the connections between IT catalysts. In addition, using process theory would allow scholars to perhaps capture the influence of temporal aspects (i.e., time dimension) on the process of identity emergence/formation.

Fourth, while our study examined remote workers' level of mental health broadly, IS researchers may consider applying more nuanced scales to investigate mental health conditions particularly relevant to the IT field. For instance, discriminatory stigma and harassment may cause apprehensions about disclosing a

diagnosed mental disorder or illness. Examining the prevalence of such occurrences and determining actionable interventions provides an interesting research opportunity (Milner et al., 2015). We urge future workforce-related research, particularly within the IT domain, to incorporate remote workers' mental health levels into stress and coping models and incorporate and further examine the IT catalysts identified here.

## 6.2 Practical Implications

Our study also offers multiple practical implications. It is important to note that the ideas presented are ones that organizations could test for themselves, made logical by how they address the underlying constructs rather than based on specific tests.

First, although the work environment may induce new or aggravate existing mental health issues, such conditions may also be pre-existing or non-work related. Regardless of the source, such issues tend to manifest in attitudes and behaviors that can negatively affect remote workers and their productivity/innovation. Therefore, organizations would benefit from performing interventions to “address mental health problems among working people regardless of cause” (LaMontagne et al., 2014, p. 1). However, LaMontagne, Martin, Page, Reavley, Noblet, Milner, Keegel, and Smith (2014) caution that improvements in remote workers' level of mental health will require organizational commitment, senior leadership support, and time.

While there are several psychological mechanisms that hinder the effective use of technology during remote work conditions and particularly remote work during a disruption/crisis, we find that the level of mental health is a distal but important precursor to innovative work behavior. Therefore, finding ways to combat Zoom fatigue, loneliness, and burnout are important. While some interventions have been identified in the literature, such as requiring at least one day in the office during the week (Moss, 2018), other interventions should also be explored as having a portfolio of options will allow flexibility and choice. One option could be a “no Zoom” day, perhaps bimonthly, on Fridays. Another option might be to have Zoom social gatherings or town hall meetings to share information informally. More exploration and testing are needed for interventions that are resilient to a variety of disruption/crisis conditions. Similarly, as the work environment is changing, the concept of remote work could appeal to different organizations/employees for a variety of personal and professional reasons. Implementing a configurational analysis (Ragin, 2009) based on different types of workers (i.e., preference to work from home, work in the office, or do a combination of the two) may allow insights into the data that identify different conditions that would achieve particular outcomes (Mattke et al., 2021; Pappas & Woodside, 2021).

Second, our findings suggest that organizations can take steps to help employees with coping, and more specifically, problem-focused coping during disruption/crises. For instance, organizations may develop a platform (e.g., enterprise social media) for employees to effectively communicate their questions and concerns about the technology they need to use to get their work tasks done. In addition, IT department personnel can create videos with different levels of detail/complexity on how to use a technology and the various features and affordances that can accommodate employee needs.

Third, IT mindfulness and IT empowerment were the most influential proximal precursors of innovative work behavior. This result benefits organizations looking for workers to maintain (or increase) innovation, as innovation is a key component of businesses' long-term success (Scott & Bruce, 1994). This finding informs human resource professionals and remote worker hiring managers about the potential benefits of seeking candidates who have a strong connection between the self and technology. During the hiring process, HR managers can screen for applicants who show propensities towards IT mindfulness and IT empowerment. Hiring such individuals into remote or hybrid work arrangements presents an opportunity for organizations, especially during crises.

## 7 Limitations

We purposefully conducted our data collection during the height of the COVID-19 pandemic. While this was an intentional research design decision, the data collection timeframe may limit our findings' generalizability. We believe that the findings of this study are generalizable as other crises may arise. In addition, as we come out of the pandemic, the future work environment may include both mandatory and voluntary remote work. Thus, we recommend that future research replicate our model under various conditions (e.g., post-pandemic, voluntary, and mandatory remote work) and contexts (e.g., outside of the United States). Also, due to the cross-sectional nature of this research, our findings should be interpreted

with caution. The direction of causality for a few of the hypotheses might be more complex than represented here (e.g., mental health affecting IT mindfulness, or the other way around, or a reciprocal relationship). Future research should conduct experiments and longitudinal studies to validate the nature of causality of these relationships.

IT identity did not directly influence innovative work behavior. Our post hoc analysis revealed that IT empowerment partially mediates the effect of IT identity on innovative work behavior. Alternately, the nonsignificant relationship between IT identity and innovative work behavior may be due to our study's target technology (Zoom), characteristics of our sample, or because our data collection occurred during the height of the pandemic. As identity formation processes can take an indeterminate amount of time, our unexpected finding may also be due to IT identity not being fully developed with our chosen technology, since Zoom was a relatively new technology for most of our participants. We suggest that IS researchers consider exploring the IT identity formation process to learn about its impact on the workforce and workforce theory.

While there are nuanced differences, we do not differentiate between pre-existing mental health issues exacerbated by the pandemic-induced work environment and those attributed to the pandemic-induced work environment context of our study. Our measurement scale explores self-reported mental health primarily through the elucidation of sub-clinical issues in a workplace setting. We acknowledge the importance of measuring the magnitude of clinical disorders in the workplace and developing rigorous strategies for accommodating and supporting individuals with mental disorders or psychosocial disabilities in the work environment. Furthermore, we urge researchers to ensure that the sometimes-overlooked adult population of affected individuals that are out-of-work, unemployed, or unable to work is not neglected (LaMontagne et al., 2014).

## 8 Conclusion

By undertaking this research, we respond to the call by Thatcher, Pu, and Pienta (2018a) that "[information systems (IS)] researchers need to actively consider theories and methods that let them probe IT's relationships with individuals and society" (p. 193). Our research establishes the importance of remote worker mental health and problem-focused coping on the interplay of the IT catalysts and how they may accelerate innovative work behavior during a disruptive event. The context of the pandemic provides a unique opportunity to examine how individuals cope with and respond to crises through the use of technology. After "surviving" the pandemic, we may find that flexible (including remote) working arrangements provide viable long-term options for organizations as future disruptions/crises will likely be increasingly technology-supported. Perhaps concerns about innovation and remote work may be inconsequential when organizations foster, reinforce, and enhance the IT catalysts in their workforce.

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## Appendix A: Literature Outline

**Table A1. Literature Review of IT Identity**

Article	Sample	IT Identity Focus	Dependent Variable	Relevant Finding
Carter, 2013	General population	Smartphones	IT identity	IT in comparison to other constructs (differences found)  Measure/dimension development of IT identity
Carter & Grover, 2015 (Conceptual)	N/A	N/A	Behaviors	Theoretical model development
Savoli & Bhatt, 2017 (Conceptual)	N/A	Patient centric tools	IT use	Proposed patients' IT identity affects IT emotions (+&- proposed) and IT use (+&- proposed)
Yim, Gomez, & Carter, 2017 (Conceptual)	N/A	Facebook's "free basics"	Social capital	Relating IT identity to social capital (+ proposed)
Carter, Petter, Grover, & Thatcher, 2020	Smartphone and MS Excel users	MS Excel Smartphones	N/A	IT identity is composed of emotional energy (+), relatedness, dependence)
Curley & Polites, 2020 (Conceptual)	Social media users	Social media	Exploratory use	IT identity as an antecedent of social media flow (+ proposed)  Group flow to exploratory use (+ proposed)
Ogbanufe & Gerhart, 2020	Smartwatch users	Smartwatches	Deep use Innovative individual performance	IT identity and deep use (+)  IT identity and innovative individual performance (+)
Esmailzadeh, 2021	Personal health device users	Personal health devices	Feature use Enhanced use	IT identity to feature use (+)  IT identity to enhanced use (+)
Hassandoust & Techatassanasoontorn, 2021	Employees	IT in work routines	IS infusion behaviors	IT identity influence on IS infusion behaviors (+)

**Table A2. Literature Review of IT Mindfulness**

Article	Sample	IT Identity Focus	Dependent Variable	Relevant Finding
Maier, Wirth, Laumer, & Weitzel, 2017 (conceptual)	N/A	User personality	Job burnout Job performance	IT mindfulness impacts technostress (- proposed)
Ioannou & Papazafeiropoulou, 2017	Working adults	ICT applications	Technostress satisfaction	IT mindfulness influences technostress (-) IT mindfulness influences user satisfaction (+)
Thatcher, Wright, Sun, Zagencyk, & Klein, 2018b	Working adults Market tools	N/A	N/A	Definition Scale development
Maier, Laumer, Wirth, & Weitzel, 2019	Employees mturk	User personality	Technostress perceptions	IT mindfulness influences technostress (-)
Esmailzadeh, 2020	Personal health device users	Personal health devices	Feature use Enhanced use	IT identity influences IT mindfulness (+) IT mindfulness influences use (+)
Oredo, 2020	Students	Cloud storage services	Adoption	IT mindfulness influences adoption (+) IT mindfulness influences trust (+)
Wei, Zhu, and Chen, 2020	Employees	Stressors in relation to daily work	Innovative use	IT mindfulness moderates stressors and innovative use
Eichner, 2021 (conceptual)	N/A	Smartphone	Compulsive use	IT mindfulness influences compulsive use (- proposed)
Jarvelainen, Sell, & Walden, 2021	Undergraduate students	Value chain experimental task	Task performance	IT mindfulness influences task performance (+)
Chen, et al., 2022	Employees	Technostress	Self-regulation impairment Deviant behavior	IT mindfulness influences self-regulation impairment and deviant behavior (-)

Ioannou, et al., 2022	Individuals from different backgrounds	Technostress	Job satisfaction End user performance	IT mindfulness influences end user satisfaction (+) and technostress (-)
Rower, et al., 2022	Employees and managers	Technostress	Health- and work-related outcomes	IT mindfulness influences technostress (-) and job burnout (-) and user satisfaction (+)

**Table A3. Literature Review of IT Empowerment**

Article	Sample	IT Identity Focus	Dependent Variable	Relevant Finding
Junglas, Goel, Ives, & Harris, 2014	Employees	IT tool	Level of consumer IT use	Definition Multi-faceted construct IT empowerment explains the degree of consumer IT use in the organization (+)
Junglas, Goel, Ives, & Harris, 2018	IT executives employees	Enterprise IT and consumer IT in workplace	Innovative work behavior	Definition Multi-faceted construct IT empowerment explains the degree of consumer IT use in the organization (+)  IT consumerization behavior affects innovative work behavior (+)
Zaza, & Junglas 2016	Amazon's mturk employees	Organizational technology	IT self-service engagement	IT empowerment explains IT self-service engagement (+)
Junglas, et al., 2022	Industry leaders, employees and executives	Consumer IT in the workplace	Perceived individual performance Perceived innovative work behavior	IT empowerment influences perceived innovative work behavior (+)  IT empowerment is increased in those that use consumer IT at work (+)

## Appendix B: Measures, Scales, and Sources

**Table B1. Measures, Scales, and Sources**

Construct (Source)	Dimensions	Items
<b>Mental Health</b> (Stewart-Brown & Janmohamed, 2008)		<ol style="list-style-type: none"> <li>1. I've been feeling optimistic about the future.</li> <li>2. I've been feeling useful</li> <li>3. I've been feeling relaxed.</li> <li>4. I've been feeling interested in other people.</li> <li>5. I've had energy to spare.</li> <li>6. I've been dealing with problems well.</li> <li>7. I've been thinking clearly.</li> <li>8. I've been feeling good about myself.</li> <li>9. I've been feeling close to other people.</li> <li>10. I've been feeling confident.</li> <li>11. I've been able to make up my own mind about things.</li> <li>12. I've been feeling loved.</li> <li>13. I've been interested in new things.</li> <li>14. I've been feeling cheerful.</li> </ol>
<b>IT Identity</b> (Carter et al., 2020)	Emotional Energy	Thinking about myself in relation to Zoom ... <ol style="list-style-type: none"> <li>1. I feel pumped up.</li> <li>2. I feel confident.</li> <li>3. I feel enthusiastic.</li> <li>4. I feel energized.</li> </ol>
	Relatedness	Thinking about myself in relation to Zoom ... <ol style="list-style-type: none"> <li>1. I am connected with Zoom.</li> <li>2. I am in coordination with Zoom.</li> <li>3. I am close with Zoom.</li> <li>4. I am linked with Zoom.</li> </ol>
	Dependence	Thinking about myself in relation to Zoom ... <ol style="list-style-type: none"> <li>1. I am needing Zoom.</li> <li>2. I am counting on Zoom.</li> <li>3. I am reliant on Zoom.</li> <li>4. I am dependent on Zoom.</li> </ol>
<b>Problem-focused Coping</b> (Carver et al., 1989)		<ol style="list-style-type: none"> <li>1. I take additional action to try to integrate Zoom to get my work done.</li> <li>2. I try to come up with a strategy about what to do to use Zoom to get my work done.</li> <li>3. I put aside other activities in order to concentrate on using Zoom to get my work done.</li> <li>4. I force myself to wait for the right time to do something with Zoom to get my work done.</li> <li>5. I ask people who have used Zoom to get their work done what they did.</li> </ol>
<b>IT Mindfulness</b> (Thatcher et al., 2018b)	Alertness to Distinction	<ol style="list-style-type: none"> <li>1. I find it easy to create new and effective ways of using Zoom.</li> <li>2. I am very creative when using Zoom.</li> <li>3. I make many novel contributions to my work-related tasks through the use of Zoom.</li> </ol>
	Awareness of Multiple Perspectives	<ol style="list-style-type: none"> <li>1. I am often open to learning new ways of using Zoom.</li> <li>2. I have an open mind about new ways of using Zoom.</li> </ol>
	Openness to Novelty	<ol style="list-style-type: none"> <li>1. I like to investigate different ways of using Zoom.</li> <li>2. I am very curious about different ways of using Zoom.</li> <li>3. I like to figure out different ways of using Zoom.</li> </ol>
	Orientation in the Present	<ol style="list-style-type: none"> <li>1. I often notice how other people are using Zoom.</li> <li>2. I attend to the 'big picture' of a project when using Zoom.</li> <li>3. I 'get involved' when using Zoom.</li> </ol>

<b>IT Empowerment</b> <i>(Junglas et al., 2014)</i>	IT Competence	<ol style="list-style-type: none"> <li>1. I am confident about my ability to use Zoom to do my job.</li> <li>2. I am self-assured about my capabilities to perform my work activities with the help of Zoom.</li> <li>3. I have mastered the skills necessary to use Zoom for my job.</li> </ol>
	IT Determination	<ol style="list-style-type: none"> <li>1. I have significant autonomy to use Zoom for my job.</li> <li>2. I can decide on my own to use Zoom to go about doing my work.</li> <li>3. I have considerable opportunity for independence and freedom to use Zoom for my job.</li> </ol>
	IT Impact	<ol style="list-style-type: none"> <li>1. My impact of deciding to use Zoom for getting work done in my department is large.</li> <li>2. I have a great deal of control deciding about using Zoom in my department.</li> <li>3. I have significant influence over IT decisions concerning Zoom that take place in my department.</li> </ol>
	IT Meaning	<ol style="list-style-type: none"> <li>1. Using Zoom to get my work done is very important to me.</li> <li>2. The fact that I use Zoom for my job activities is personally meaningful to me.</li> <li>3. The fact that I can use Zoom to get my work done is meaningful to me.</li> </ol>
<b>Innovative Work Behavior</b> <i>(De Jong &amp; Den Hartog, 2010)</i>		<ol style="list-style-type: none"> <li>1. I pay attention to issues that are part of my daily work.</li> <li>2. I wonder how things can be improved.</li> <li>3. I search out new working methods, techniques or Instruments.</li> <li>4. I generate original solutions for problems.</li> <li>5. I find new approaches to execute tasks.</li> <li>6. I make important organizational members enthusiastic about innovative ideas.</li> <li>7. I attempt to convince people to support an innovative idea.</li> <li>8. I systematically introduce innovative ideas to work practices.</li> <li>9. I contribute to the implementation of new ideas.</li> <li>10. I put effort into the development of new things.</li> </ol>

## About the Authors

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