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How Does Successful Coping Change Appraisal and User Responses?

Short Paper

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Abstract

Technostress research asserts that the use of information systems (IS) can be challenging or hindering. Previous literature has mostly focused on the challenge or hindrance subprocesses. However, research suggests that these subprocesses may interact with each other. Positive user responses can be derived from events that were originally perceived as hindering. The present research-in-progress paper focuses on this interaction. We investigate whether successful coping – the elimination of a stressful IS use situation – leads to positive user responses in the hindering subprocess. Therefore, we develop an online experiment, which emulates different IS use situations. A hindrance techno-stressor situation (HTS), a control situation without a techno-stressor (non-HTS), and one in which users can successfully cope with the hindrance techno-stressor (SC). The experiment allows us to analyze the interactions between the subprocesses. We expect to contribute to the literature on technostress and IS coping by focusing on the interaction between the two subprocesses.

Keywords: Successful Coping, Challenge and Hindrance Technostress, Eustress, Distress, Positive and Negative Emotions, Online Experiment

Introduction

Information systems (IS) use at work has increased dramatically over the last few years. Today, the use of digital technologies is omnipresent. IS enables vital pillars of modern work, such as flexibility in time and place (Forman et al. 2014). Despite its vast advantages for organizations and users, research on technostress has pointed toward several hindrance and challenge techno-stressors, various associated user responses, and organizational outcomes that may arise from the use of IS (Tarafdar et al. 2019). While hindrance techno-stressors often result in negative user responses, such as emotional exhaustion (Ayyagari et al. 2011; Maier et al. 2015), challenge techno-stressors may foster growth and performance (Califf et al. 2020; Tarafdar et al. 2019). In the past, many research contributions have shed light on the hindering side of technostress. Research on the challenging side of technostress is only starting to evolve. Mastering demanding IS use situations have been associated with positive psychological responses, such as positive affect (Benlian 2020; Califf et al. 2020). Previous research has also identified workable situations, the perception of control as antecedents of challenge stress and positive emotions (Salo et al. 2018).

However, research also suggested that positive user responses can be derived from events that are initially perceived as hindering – IS use situations that have the potential to thwart personal growth (Tarafdar et al. 2019). One reason is that successful coping efforts – affective, cognitive, and behavioral efforts that resolve or eliminate the stressful situation (Stephenson et al. 2016) – may lead to changes in appraisal and user responses. We draw on the framework of positive psychological states, which suggests that positive psychological responses result from the successful accomplishment of coping efforts (Edwards and Cooper 1988b). Accomplishment, in turn, is an antecedent of positive emotions and well-being (Jayawickreme et al. 2012). Previous research shows that appraisal – the user's perception of techno-stressors – is not

constant and changes over time due to coping efforts (Weinert et al. 2020a). Hindrance appraisal is associated with a low chance of coping. Thus, successful coping with hindrance techno-stressors may affect the user's appraisal of an IS use situation. To date, there is a lack of empirical accounts on how successful coping with hindrance situations results in positive user responses. Hence, we assume that users who overcome hindrance techno-stressors, which are initially appraised as thwarting personal growth, will be able to overcome them by successful coping. As a result, users change their appraisals and can achieve positive user responses (e.g., positive emotions) that exceed those of users who do not encounter stressful IS use situations. Thus, we pose the following research question:

> *How does successful coping change challenge and hindrance IS use appraisal, and user responses within a hindrance IS use situation?*

To answer the research question, we aim to conduct an online experiment in which individuals work on small tasks in an IS closely modeled after Microsoft (MS) Teams. There are three conditions: one with the hindrance techno-stressor (HTS) of unreliability, one without the hindrance techno-stressor (non-HTS), and one, in which users are given instructions on how to overcome the HTS through successful coping (SC).

Theoretical Background

Challenge and Hindrance Technostress

Technostress is "*stress that users experience as a result of their use of IS in the organizational context"* (Tarafdar et al. 2015, p. 103). It is considered a process, and encompasses techno-stressors, IS use appraisal, coping efforts, user responses (e.g. physiological and psychological), and organizational outcomes (Califf et al. 2020; Maier et al. 2021; Riedl et al. 2012; Riedl 2013; Tarafdar et al. 2019). Recent work on technostress has proposed that there are two subprocesses: The subprocess associated with *hindrance techno-stressors (HTS)* is considered the negative side of IS use (Califf et al. 2020). IS studies have identified numerous HTS (e.g., techno-complexity, unreliability) which are generally appraised as hindering. *Hindrance IS use appraisal* "refers to a user's subjective interpretation that IS use demands have the potential to affect them adversely in terms of loss, constraint or harm" (Maier et al. 2021, p. 1595). Seminal work on technostress has long focused on the hindrance subprocess. Such research have significantly advanced our knowledge of technostress through identifying HTS and their resulting negative user responses (Ayyagari et al. 2011; Ragu-Nathan et al. 2008). On the flip side, the challenge subprocess is often triggered by *challenge techno-stressors (CTS)*, which are appraised to have the potential to promote personal growth or gains. *Challenge IS use appraisal* "refers to a user's subjective interpretation that IS use demands have the potential to benefit them in terms of personal growth, development, reward, or learning" (Maier et al. 2021, p. 1595). Positive *user responses*, such as innovative IS use, may result from these techno-stressors if they are appraised as challenges (Maier et al. 2021). The conceptual model of technostress proposes that there may be interrelations between the two subprocesses (Tarafdar et al. 2019). We refer to Tarafdar et al. (2019) for an overview of existing IS research on the two subprocesses.

IS Coping

A user's coping efforts include "cognitive and behavioral efforts to manage (master, reduce, or tolerate) a troubled person-environment relationship" (Folkman and Lazarus 1985, p. 152). Coping efforts can affect three areas: they may affect or reduce techno-stressors themselves, provide a way to deal with existing techno-stressors, or alleviate the user responses that result from techno-stressors (Salo et al. 2017; Weinert et al. 2019). Coping strategies can generally be subsumed into different categories. A common distinction is between problem-focused and emotion-focused coping (Lazarus and Folkman 1984). Problem-focused coping aims at managing the underlying problem. Strategies that are associated with such coping efforts are information retrieval or problem-solving. Emotion-focused coping includes the user's adaptation to a given situation – for example, through emotional support or venting (see Weinert 2018 for an literature overview).

Coping is considered a dynamic mediating process of technostress that may involve iterations of multiple different coping strategies. Which coping-routes users take, depends on an interplay between how coping unfolds and the users' reappraisal of the situation (Salo et al. 2020; Weinert et al. 2020a). Within and beyond IS research, some indication suggests that the assessment that a situation can be overcome, is an

important determining factor for a positive perception of the technostress process (Salo et al. 2018; Weinert and El-Robrini 2021). One of those reasons might be successful coping efforts employed by the users (Salo et al. 2020). Successful coping is understood as "eliminating the stressful situation" (Stephenson et al. 2016, p. 361).

The Framework of Positive Psychological States

The framework of positive psychological states (Edwards and Cooper 1988b) explains three different avenues, which can be taken in the stress-coping process, to produce positive psychological responses: First, a situation itself may be appraised as inherently positive. For example, users might view a new IS as more than adequate for their work because the IS automates a lot of their work such that they can do other things. Second, a coping effort may be perceived as enjoyable and thus lead to positive responses that may not be associated with the initial stressor. For example, when users cope with stress in terms of training, the training itself leads to fun and joy. Third, positive psychological responses may result from the successful accomplishment of coping efforts (Edwards and Cooper 1988b). For example, users might aim to cope with an IT problem. By fixing the problem and hence successful coping, users may show positive emotions.

We concentrate on the last avenue where positive responses are elicited due to the successful accomplishment of coping efforts. Thereby, the accomplishment may result from achievement, success, mastery, or progress toward goals (Jayawickreme et al. 2012). In other words, individuals may derive positive responses as a result of successful coping efforts (Edwards and Cooper 1988b). Past literature points out that individuals, who successfully cope with demanding situations, may experience growth (Edwards and Cooper 1988a).

Hypotheses Development

Our research model (Figure 1) hypothesizes how SC changes appraisal and user responses between pre- and post-phase. We consider these phases to be able to investigate change. Besides, we distinguish three different conditions. First, the *HTS condition* simulates a technostress situation where we follow past literature and simulate a hindrance techno-stressor in terms of unreliability (Adam et al. 2017; Fischer et al. 2019; Fischer et al. 2021; Fischer and Riedl 2015; Weinert et al. 2020b). Unreliability has been shown to produce several negative outcomes, such as the release of stress hormones (Riedl et al. 2012). In this condition, users work with unreliable IS and are not able to apply SC during the pre- and post-phase. Second, the *SC condition* simulates a situation in which users get instructions on successfully eliminating the HTS through successful coping in the post-phase. Third, the *non-HTS condition* creates a situation in which no HTS is perceived. Users work with a reliable IS in the pre- and post-phase. We assume differences between the conditions regarding the change of challenge and hindrance IS use appraisal, as well as user responses between the pre- and post-phase. We follow previous literature and focus on positive and negative emotions. Emotions are a person's subjective short-term feelings (Beaudry and Pinsonneault 2010; Hibbeln et al. 2017; Stein et al. 2015). They can be negative, such as anger or anxiety, and positive, such as happiness or satisfaction (Beaudry and Pinsonneault 2010). Both co-evolve even in dire circumstances (Stein et al. 2015).

We assume that challenge IS use appraisal increases stronger when successfully coping with the HTS, rather than when the HTS remains during the whole IS use situation. Mastery, success, and achievement are primarily expected in challenging situations (LePine et al. 2016). Successfully overcoming situations initially appraised as hindering may result in the sense of accomplishment, potentially more so than situations that are perceived as workable. Some empirical evidence exists that task enjoyment may occur when individuals feel like they are doing well on a difficult task (Sales 1969)(H1a).

Challenge IS use appraisal increases more strongly when users successfully cope with the HTS, compared to situations where no HTS is perceived. Based on the framework of positive states (Edwards and Cooper 1988b), we assume that users appraise the IS use situation more positively when successfully coping with the hindering stimulus. Positive states can also be achieved by appraisal of the IS use situation as challenging. However, we assume that challenge IS use appraisal increases even stronger when users successfully cope with the HTS, compared to users, who initially appraise the IS use situation as challenging. One reason might be that successfully overcoming incidents may boost the challenge IS use appraisal

beyond the mere reestablishment of the working condition. Individuals may feel they have had success and learned something (H1b).

H1a: Challenge IS use appraisal increases more strongly in the SC condition compared to the HTS condition between pre- and post-phase.

H1b: Challenge IS use appraisal increases more strongly in the SC condition compared to the non-HTS condition between pre- and post-phase.

Successful coping with an HTS leads to a decrease in hindrance IS use appraisal compared to a situation where users cannot cope with HTS. Past literature indicates that coping efforts reduce negative appraisal over time (Weinert et al. 2020a). Users in the SC condition can successfully cope with the HTS, so they can eliminate the unreliability of the IS. Hence, they afterward work with a reliable IS, and do not perceive an HTS. In contrast, users in the HTS condition are not able to cope, such that they work in the pre- and post-phase with unreliable IS, and perceive the HTS. Past literature demonstrates that HTS lead to higher hindrance IS use appraisal (Maier et al. 2021)(H2a).

Past literature demonstrates that coping efforts lead to changes in appraisal over time (Weinert et al. 2020a). We assume that users, who perceive an HTS and can cope with it, show a stronger decrease in hindrance IS use appraisal than users who do not perceive an HTS. As users do not perceive an HTS, they do not appraise the IS use situation as hindering (Maier et al. 2021), such that only low changes between pre- and post-phase are assumed. Successful coping changes the IS use situation in the way that users perceive an HTS in the pre-phase but not perceiving the HTS in the post-phase, which leads to a reduction in hindrance IS use appraisal (H2b).

H2a: Hindrance IS use appraisal decreases more strongly in the SC condition compared to the HTS condition between pre- and post-phase.

H2b: Hindrance IS use appraisal decreases more strongly in the SC condition compared to the non-HTS condition between pre- and post-phase.

Previous literature demonstrates that HTS also leads to positive user responses (Tarafdar et al. 2019). Based on psychological literature (Edwards and Cooper 1988b), coping efforts are assumed to lead to positive user responses. Besides, the framework of positive psychological states (Edwards and Cooper 1988b) explains that individuals who accomplish coping efforts successfully, emit positive responses. Such a theoretical understanding is congruent with general work on the antecedents of individual well-being and positive emotions. For example, esteem needs are driven by accomplishment, and accomplishments may provide users with positive emotions and well-being (Jayawickreme et al. 2012) (H3a).

We assume that users who first perceive an HTS and can cope with the HTS successfully show more positive emotions than those who do not perceive an HTC in the pre- and post-phase. Based on the framework of positive psychological states (Edwards and Cooper 1988b), we assume that users without any stimulation do not take one of the three avenues leading to positive responses. In contrast, users who successfully accomplish a coping effort that eliminates the HTS perceive positive emotions. Past literature demonstrates that positive emotions and accomplishments are positively associated (Cohn et al. 2009). Technostress literature indicates that goal achievement facilitates positive emotions, such as satisfaction (Beaudry and Pinsonneault 2010). Accomplishments may provide users with positive emotions (Jayawickreme et al. 2012)(H3b).

H3a: Positive emotions increase more strongly in the SC condition compared to the HTS condition between pre- and post-phase.

H3b: Positive emotions increase more strongly in the SC condition compared to the non-HTS condition between pre- and post-phase.

Previous literature demonstrates that HTS leads to negative user responses (Benlian 2020; Califf et al. 2020). Negative emotions have been examined in the context of potentially upsetting or discrepant IS situations, such as the implementation of new IS (Beaudry and Pinsonneault 2010; Stein et al. 2015). We assume that users who can successfully cope with the HTS, reduce the negative emotions more strongly than those who work the whole time while perceiving the HTS. Recent literature indicates that the repetition of computer freezes amplifies negative psychological user responses (Weinert et al. 2022). Negative user

responses, such as negative emotions, resulting from the perception of HTS (Benlian 2020; Califf et al. 2020; Tarafdar et al. 2019). By successfully coping with the HTS, negative emotion reduces (H4a).

Besides, we assume that users, who successfully cope with the HTS, perceive a stronger decrease in negative emotions than those who work the whole time while perceiving no HTS. Past literature shows that negative emotions are perceived in discrepant IS use situations (Beaudry and Pinsonneault 2010; Stein et al. 2015). Users who work with the IS might perceive negative emotions through IS use situations. When users are able to successfully cope with the HTS, and perceive the accomplishment, negative emotions are reduced stronger than perceiving them in an IS use situation (H4b).

H4a: Negative emotions decrease more strongly in the SC condition compared to the HTS condition between pre- and post-phase.

H4b: Negative emotions decrease more strongly in the SC condition compared to the non-HTS condition between pre- and post-phase.

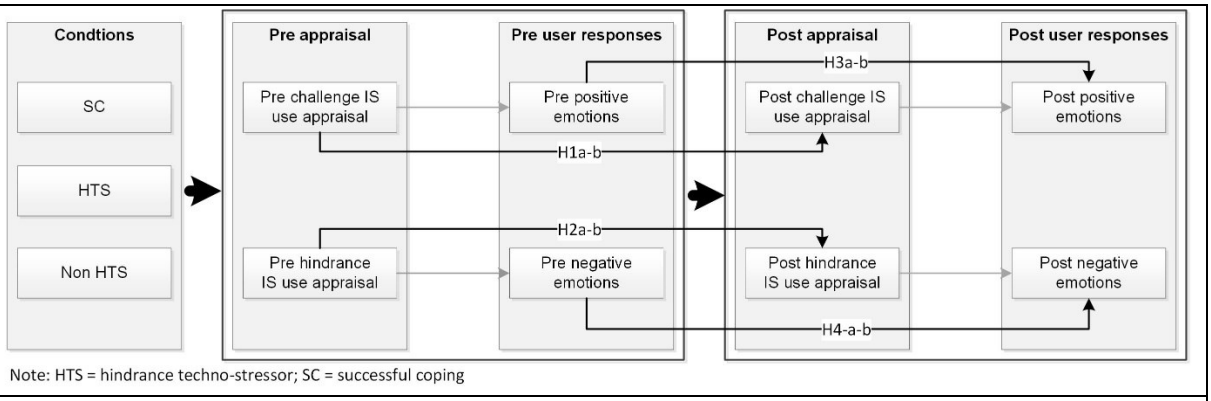

Figure 1: Research model

Methodology

We develop an online experiment to validate our research model. This section contains the experimental design and manipulation. Also, we explain the tasks and technology used in our experiment and give insights into the measurement, sampling and allocation, and the experimental procedure.

Experimental Design and Manipulation

The online experiment follows a 2x2 subject-between design. The first factor is the hindrance techno-stressor (HTS) with two factorial levels – HTS and non-HTS. The second factor is successful coping (SC) with two factorial levels – SC and non-coping. Both factors are intentionally manipulated.

The *HTS manipulation* focuses on the hassles or obstacles facet of HTS. IS use impedes task fulfillment through the lack of resources and system failures (Benlian 2020). We follow past literature by focusing on unreliability as a hindrance techno-stressor (Fischer et al. 2019; Fischer et al. 2021). We emulate a system freezes, where the IS does not respond to users' input (Weinert et al. 2020b). In detail, when clicking on different spots within the IS, the system will show a notification displaying that the data is loading. During that time, no input from the mouse or keyboard is possible. Hence, users are impaired.

The *SC manipulation* contains active efforts to eliminate stressful situations (Salo et al. 2020; Stephenson et al. 2016). We follow past literature (Weinert et al. 2020b) by providing the subjects with information on eliminating the computer freeze. After that, the subjects work with a reliable IS to fulfill the tasks. Hence, they work with a reliable IS, where no loading times and freezes are encountered, such that they eliminate the HTS.

Based on this manipulation, the experimental design results in three conditions. The first is the *SC condition*. The subjects are allowed to cope with the HTS and are instructed how to do so. Hence, after that, they can work with a reliable IS. The second is the *HTS condition*. Here, the subjects receive no instruction

on how to cope with the HTS, and work with the unreliable IS the whole time. The third is the *non-HTS condition*. The subjects are not exposed to an HTS. They work with a reliable IS for the whole time. Lastly, the condition in which subject encounter no HTS but are manipulated to cope is not applicable as subject cannot cope with a non-existing HTS.

Technology, Tasks, and Measurement

To emulate a real business situation, we develop a system that resembles MS Teams. To develop such an environment that allows us to include the different measurement techniques (e.g. objective, self-report), we use LabVanced.com. The developed system has two main views—one which shows the different tasks, and one which shows the data to work on several tasks. The subjects have to search for different information in the data. An example task would be: "Please find the item number of the product 'Package A2".

In the experiment, we measure challenge and hindrance IS use appraisals based on the scale by Maier et al. (2021). Besides, we measure different user responses in terms of positive and negative emotions (Beaudry and Pinsonneault 2010; Stein et al. 2015). Negative emotions are measured based on mouse movement tracking. Past literature provides evidence that mouse cursor distance and speed infer the level of negative emotions (Hibbeln et al. 2017). This objective measure enables us to capture negative emotions during the experiment. We use the PANAS scale to measure positive emotions (Califf et al. 2020; Watson et al. 1988).

To establish manipulation validation (Straub and Gefen 2004), we include several constructs. We measure HTS using the scale developed by Benlian (2020) to validate the first manipulation empirically. We also include the techno-unreliability scale by Ayyagari et al. (2011), to ensure that the system was perceived as unreliable. To validate the second manipulation, we included the COPE inventory by Carver et al. (1989) to control whether the subject applied the instructions to eliminate the computer freeze and to control how they otherwise coped in the situation.

Sampling and Allocation

To recruit an appropriate sample, we follow previous technostress literature (Maier et al. 2019; Pirkkalainen et al. 2019) using mTurk. We aim to focus on subjects who use work IT regularly in their job to increase the realism and external validity of the experiment. We conducted a power analysis to calculate the appropriate sample size. With an effect size of 0.25, an alpha level of 0.05, and a power of 0.8, an appropriate sample should at least comprise 269 subjects. After recruiting the sample, we will allocate the subjects randomly, using a block randomization strategy (Kang et al. 2008) to allocate the subjects to the conditions equally.

Procedure

The experiment's procedure is shown in Figure 2 and is divided into five phases. The first phase is the briefing, during which the subjects are introduced to the experiment. After that, we capture the appraisal and emotions of the subject at an unmanipulated stage and use this data as a baseline measure. In the pre-experimental phase, the HTS manipulation is applied. The two treatment groups are manipulated by encountering a computer freeze (see manipulation). While encountering this manipulation, subjects work on the first tasks. After working for five minutes on the first tasks, we measure the constructs of interest (see measurement). Subjects are not informed about any time limits. In the post-experimental phase, the SC manipulation is applied. For that. subjects receive the instructions on how to eliminate the computer freezes successfully. While encountering the second manipulation, subjects work for five minutes on the second set of tasks. We again measured the constructs of interest. The HTS condition encounters the first manipulation again and works on the tasks while encountering the computer freezes. The non-HTS condition acts as a control condition. Subjects in this condition are not manipulated, and work on the first and second tasks. During the debriefing phase of the experiment, the subjects fill out a third survey with demographical details, and they are debriefed about the real purposes of the experiment.

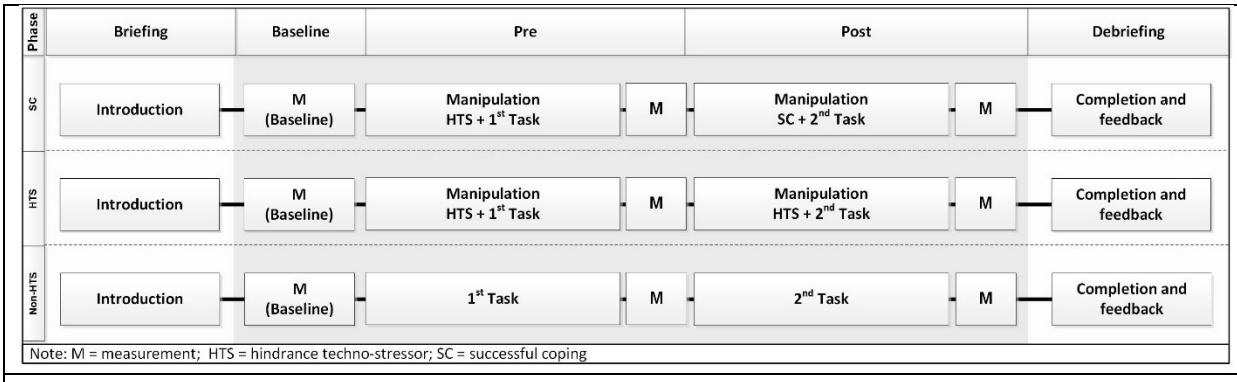

Figure 2: Experimental procedure

Analysis and Expected Results

We aim to conduct a difference-in-differences (DiD) analysis technique to validate the research model. The DiD controls for the confounding effects of unobserved individual heterogeneity. We thereby compare the change of appraisals and user response between the conditions during the pre- and post-phase. More specifically, we compare whether the change of appraisal and user responses between the pre- and post-phase conditions differ between the HTS, non-HTS, and SC. We expect to show the average treatment effect on the treated (ATET) of successful coping, and might reveal the changes in challenge and hindrance IS use appraisals, as well as positive and negative emotions between the pre- and post-phases.

Discussion, Expected Contributions, and Outlook

Previous technostress literature has focused mostly on the hindering and challenging subprocesses of technostress. However, the subprocesses also interact with each other. For example, positive user responses can be derived from events that are initially perceived as hindering. The present paper concentrates on these interactions by investigating the effect of SC in a hindering IS use situation. We draw upon the framework of positive psychological states to explain how positive user response can be derived in hindering IS use situations. By doing so, we expect to contribute to literature as follows.

First, past literature on technostress mostly focuses on the hindering or challenging subprocess (Benlian 2020; Califf et al. 2020; Maier et al. 2021; Tarafdar et al. 2019). We expect to contribute to the literature by concentrating on the interaction between the two subprocesses. Our results will explain how successful coping enables users to switch from the hindering to the challenging subprocess. We will extend prior knowledge by demonstrating that hindering IS use situations can result in positive user responses when successfully coping with the HTS.

Second, we expect to extend prior work regarding emotions by demonstrating that users might perceive more positive emotions when successfully coping with an HTS, than without the presence of HTS. Previous literature differentiates between achievement and loss emotions (Beaudry and Pinsonneault 2010). We expect to explain that SC constitutes one way to perceive achievement emotions rather than loss emotions within a hindering IS use situation.

Third, by focusing on SC, we expect to extend IS coping literature, which currently understands how coping efforts reduce user response (Pirkkalainen et al. 2019; Salo et al. 2022). Successful coping does overcome or eliminate the stressful IS use situation. For example, users can eliminate the HTS. By doing so, we extend prior literature by focusing on other coping efforts that eliminate techno-stressors themselves and investigating the changing user responses.

Our research has expected practical implications. In organizational contexts, techno-stressor reduction is often assumed to be a superior way of technostress mitigation (Pirkkalainen et al. 2017). Yet, our work aims to show that overcoming stressful situations may create a) positive emotions and b) a sense of achievement that has been associated with growth potential. Thus, our assertation is that organizations should not neglect the value of promoting IS coping skills, for example, through educating individuals in digital

literacy. In that regard, the findings of our experiment on techno-unreliability may also apply to other contexts and techno-stressors.

Conclusion

Technostress consists of a challenging and hindering subprocess. Instead of focusing on one of these subprocesses, as previous literature mostly does, the present paper concentrates on the interaction of both. We investigate whether successful coping in the hindering subprocess results in user responses, which are normally achieved in the challenge subprocess. We conduct an online experiment in which we emulate different IS use situations, which enable us to analyze change within the technostress subprocess. We expect to contribute to the technostress and IS coping literature by focusing on the interaction between the two processes and looking into the change in appraisal and user response.

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