



Burnout or not? Assessing the effect of digital employee resilience and its effects on work stress

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ABSTRACT

Purpose - The purpose of the study was to theoretically and empirically assess digital employee resilience and shed light on its antecedents and effect on work stress.

Aims(s) - The study aimed to develop a conceptual framework for digital employee resilience. Furthermore, antecedents of both digital employee resilience and work stress were empirically analyzed, including the relationship between digital employee resilience and work stress.

Design/methodology/approach - A thorough literature research was carried out to create a conceptual framework and definition for digital employee resilience and to derive hypotheses. Next, an online survey was conducted with a sample of 454 individuals. Hypotheses were tested using structural equation modeling (SEM), and a multigroup analysis was performed.

Findings - The study found positive effects of positive affect, digital literacy, self-efficacy, and perceived organizational support (POS) on digital employee resilience. Moreover, a negative effect of digital employee resilience on work stress was found. Role conflict, role ambiguity, and work overload are positively related to work stress.

Limitations of the study - Limitations include the nature of the sample since only cross-sectional data on individuals from Germany was obtained. Moreover, digital employee resilience was measured in a particular context, e.g., working from home. Thus, exploring digital employee resilience using different samples and other contexts offers promising avenues for future research.

Practical implications - The study helps HRM practitioners nurture digital employee resilience and address causes of work stress in a targeted way.

Originality/value - This study is among the first to investigate digital employee resilience theoretically and empirically. It enriches the discourse on digital resilience by integrating various existing definitions and conceptualizations into a newly developed framework for digital employee resilience.

KEY WORDS

Digital employee resilience, digital resilience, employee resilience, resilience, work stress, job stress

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1 INTRODUCTION

1.1 PROBLEM DEFINITION AND RESEARCH OBJECTIVES

Resilience has gained increasing interest since its conceptual beginnings in the early 1970s. A substantial surge in academic interest and research in the last two decades was noted (Aburn et al., 2016, p. 980). This trend appears to be accelerating further (Ebscohost, 2024a). With the rise in academic interest, resilience has been further differentiated, resulting in many new research branches. Two outcomes of the conceptual development and differentiation are the emerging concepts of digital resilience (DR) and digital employee resilience (DER), narrowing the highly context-dependent concept (Southwick et al., 2014, p. 4) of resilience down to digital and technological contexts.

Based on a comprehensive analysis of what constitutes digital resilience (DR) in general and digital employee resilience (DER) in specific, various definitions and conceptualizations are integrated to formulate a clear definition of DER within a theoretical framework. This framework contains a core definition, conceptual elements to tailor DER to specific contexts, and links to relevant theories. Providing a clear definition is essential since there is an imbalance between the number of studies that use the term DR and those that contain a definition (Tim and Leidner, 2023, p. 1186). Furthermore, this study provides empirical evidence for hypothesized antecedents and effects of DER, thereby filling the empirical research gap in DR research (Heeks and Ospina, 2019, p. 73).

Moreover, this study deals with the research question of which factors influence DER. Although the relationship between resilience and stress was proven to be linear and negative (Smith et al., 2018, p. 3), it has been noted that there is insufficient research on the influence of resilience on work stress (Kermott et al., 2019, p. 2; Elfeddali et al., 2022, p. 231). Thus, this study investigates how DER influences work stress. Quantitative data is empirically gained through a survey to help organizations and employees adapt to work stress by leveraging DER and addressing various job demands. Theoretical contributions are made to how DER can be defined, conceptualized, and operationalized.

2 THEORETICAL BACKGROUND

2.1 RESILIENCE

Resilience has conceptual roots in the field of ecology, with a significant contribution made by Holling (1973): In his often-cited seminal paper "Resilience and stability of ecological systems" he developed the concepts of resilience and stability in an ecological context and defined them as distinct system properties. Resilience was defined as a systems capacity to "absorb changes", yet to persist (Holling, 1973, p. 7). Carpenter et al. (2001) differentiated the "persistence" aspect in Holling's (1973) definition into a system's ability to self-organize, adapt, and maintain control over its fundamental properties, e.g., its "structure and function" (Carpenter et al., 2001, p. 766). Most resilience definitions characterize adaptation as "positive adaptation" (Winwood et al., 2013, p. 1205). There is no final resilience definition or dominant measurement approach (Klesel et al., 2018, p. 2).

Resilience depends highly on specific contextual aspects (Southwick et al., 2014, p. 7; Linnenluecke, 2017, p. 15). Another relevant conceptual aspect is the nature of the change that resilience refers to. Reviewing resilience definitions in psychology, Fletcher and Sarkar (2013, p. 14) identified "adversity" as an essential theme, indicating that the change resilience relates to is typically negative. Thus, a positive adaptation process is typically preceded by a negative change.

Resilience can be analyzed on various levels (Boin and van Eeten, 2013, p. 431). Bento et al. (2021, p. 7) analyzed research papers on resilience in the energy industry, concluding three conceptual perspectives: resilience as a process, capability, or outcome. These three perspectives were also identified in a review of resilience measures for individual-level resilience conducted by Pangallo et al. (2015, p. 4). However, instead of "capability", "trait" and "state" were identified as more differentiated conceptual perspectives. (ibid.).

There is also considerable variation in resilience measurement with no "one size fits it all" measurement approach (Kohn, 2020b, p. 5). Multiple strings of criticism address how resilience is measured, particularly individual resilience. These criticisms revolve around three themes: difficulties in crafting a proper, operational resilience definition (Windle et al., 2011, p. 1) for subsequent measurement, insufficient distinction between measuring resilience itself and factors that contribute to resilient behavior (Smith et al., 2008, p. 199) and lacking consideration of contextual aspects, e.g., cultural differences (Southwick et al., 2014, p. 4). Resilience, in essence, can be defined as positive adaptation to changes while maintaining key system properties and functioning.

2.1.1 DIGITAL RESILIENCE

DR research is rooted in information technology and initially dealt with cybersecurity and closely related concepts such as cyber safety (Sun et al. 2022, p. 2; Eri et al. 2021, p. 3). Research on information

technology system resilience often focuses on system-specific attributes such as “fault tolerance” or “robustness,” as pointed out by Kohn (2023, p. 6431).

Over time, new levels of analysis emerged that emphasized the human factor in DR (Kohn, 2020a, p. 6432). Research on DR is at an early stage and has gained considerable academic momentum in the previous five years (Ebscohost, 2024b). However, empirical research on DR remains rare (Kohn, 2023, p. 6431). At the same time, there are gaps in the theoretical understanding of DR. For instance, DR has been insufficiently differentiated from more specific resilience concepts like information system resilience (Kohn, 2023, p. 6432). In addition, there is little knowledge of how DR can be fostered (Tim and Leidner, 2023, p. 1192). Currently, there is no universal definition for DR that successfully covers or integrates the whole conceptual complexity.

The role of technology in DR varies considerably. In a literature review, Dupin et al. (2022, p. 3) derived two perspectives on DR, e.g., “resilience to digital” and “resilience through digital,” with the latter being used in the majority of DR definitions (*ibid.*). Furthermore, DR can be analyzed on different levels (Heeks and Ospina, 2019, p. 72): DR can refer to an information system input system, an information system itself, or an information system outcome system (*ibid.*). Overall, DR conceptualizations differ considerably, as does its operationalization, including measurement (Kohn, 2023, pp. 6431–6432). There is no dominating approach for measuring DR, with many scales and tools being used (Sun et al., 2022, p. 10). At its core, DR can be defined as technology-related, positive adaptation to changes while maintaining key system properties and functioning.

2.1.2 EMPLOYEE RESILIENCE

Employee resilience is gaining interest from academia and companies because it is increasingly considered strategically valuable in organizations (Näswall et al., 2019, p. 353). Employee resilience benefits a company directly and indirectly, e.g., by enhancing employee engagement (Malik and Garg, 2020, p. 2). Most employee resilience definitions stress three aspects: The employee as the level of analysis (Näswall and Kuntz, 2015, p. 1), adverse changes in the form of various adversities in workplace settings (Näswall et al., 2019, pp. 353–354), and the conceptualization of employee resilience as capacity and resilience as capability (*ibid.*).

Although employee resilience is closely related to individual-level resilience, empirical evidence supports treating employee resilience as a distinct construct (Näswall and Kuntz, 2015, p. 1). Employee resilience can be developed through factors rooted within the employee and in the organizational environment (Kuntz et al., 2016, p. 459). This demonstrates that resilience is based on interactions between systems and the overarching environments in which these systems are embedded and with whom they interact (Rutter, 2006, p. 4).

Hartmann et al. (2020, p. 11) highlighted that the positive effect of employee resilience on job performance has been described in multiple studies. In addition, the positive effects of employee resilience on mental illnesses such as depression and burnout were described (McLarnon and Rothstein, 2013, p. 70; Barends et al., 2021, p. 5). This strengthens the argument that employee resilience is highly relevant for various stakeholders, e.g., employees, managers, and the organization.

Employee resilience can be defined as an employee’s positive adaptation to changes while maintaining personal wellbeing and functioning.

2.1.3 DIGITAL EMPLOYEE RESILIENCE

DER is a novel concept that is under-researched in terms of theoretical elaboration and empirical analysis. Yet, there are signs that DER is gaining momentum in academia. Several recently published conference proceedings and papers (Kohn, 2020a, 2020b; Kohn et al., 2023) show that DER is increasingly recognized as a distinct concept. Digital security resilience, e.g., persisting employee performance in the face of “adverse cyber events” (Kohn, 2020a, p. 3), can be considered a conceptual starting point, as employee resilience was contextualized in a digital environment. Here, the perspective of resilience to digital technology was used. In the same year, Kohn (2020b) published a paper on the DER, where technology is treated as an adaption enhancer (Kohn, 2020b, p. 5). An employee’s technology-based, successful

adaptation to work is considered “digitally resilient” (Kohn, 2020b, p. 6), which aligns with the perspective of resilience through digital technology. However, there is no consensus on the role of digital technology, as demonstrated by a paper that states a mixed perspective (Kohn et al., 2023, p. 2). Since all perspectives encompass relevant situations, DER can be understood as technology-related, positive adaptation.

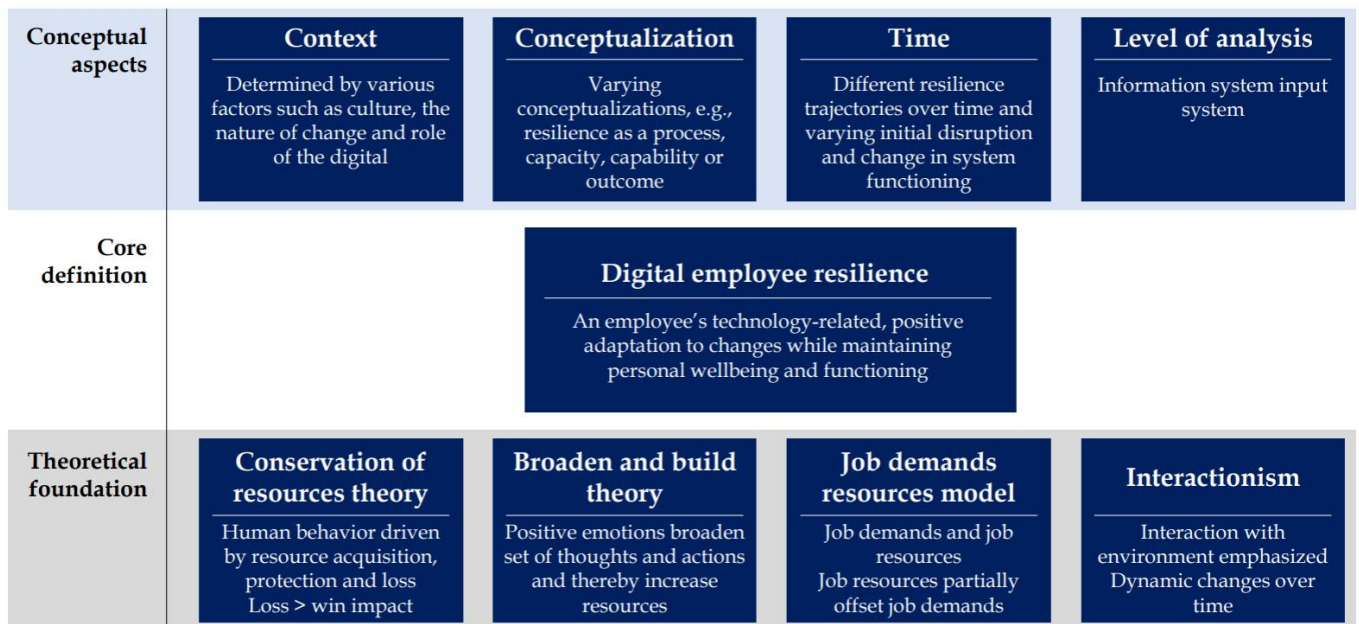
DER focuses on employees as information system input systems since employees are systems that provide input to digital technology. Hence, DER is conceptualized as an employee’s capacity and capability. In contrast to DR, where maintaining key system properties and functioning is at the core of the concept, DER emphasizes personal well-being and functioning. By highlighting employee well-being and functioning, DER is linked to tangible and intangible aspects such as job satisfaction and employee productivity. To conclude, DER can be defined as an employee’s technology-related, positive adaptation to changes while maintaining personal wellbeing and functioning.

Given the novelty of the concept, no agreement exists on DER operationalization. In previous papers, DER was operationalized in specific contexts, such as an employee facing a self-incurred organizational information security incident (Kohn, 2020a, p. 5) or working remotely (Kohn et al., 2023, p. 10). With the help of scenarios, contexts can be appropriately established in measurement, as Kohn (2020a) has done. Another approach, being theoretically grounded in the BnB theory, is to measure DER indirectly by analyzing positive sentiments towards a use case of digital technology, e.g., working from home (Kohn, 2020b, p. 7). Given the recent pervasiveness of working-from-home arrangements, this study specifies the work context and technology-related adaptation as leveraging technology to work from home.

The derived digital employee resilience framework comprises a core DER definition, four conceptual aspects, and four relevant theoretical underpinnings. By being open to conceptual specification, the framework is a versatile tool to investigate various forms of DER while agreeing on a core definition and overarching theoretical underpinnings. The DER framework is illustrated in Figure 1.

Fig 1. Digital employee resilience framework. Own illustration.

Digital employee resilience framework with core definition and four conceptual elements and theories



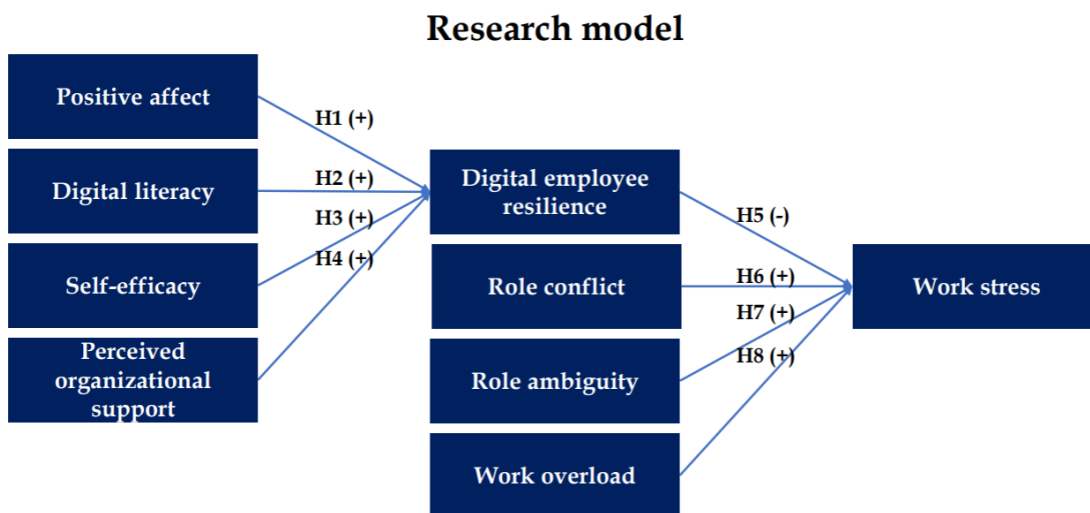
source: Own work

3 MODEL AND HYPOTHESIS DEVELOPMENT

3.1 MODEL DEVELOPMENT

Scientific literature, academic papers, conference submissions, and online resources were reviewed to keep up with the high momentum in DR and DER research. Figure 2 illustrates the proposed research model. Additionally, all hypotheses are shown in Table 1.

Fig 2. Research model with hypotheses, own illustration.



source: own illustration

Table 1. Investigated hypotheses

Nr.	Hypothesis
H1	Positive affect towards working from home is positively related to digital employee resilience
H2	Digital literacy is positively related to digital employee resilience
H3	Self-efficacy is positively related to digital employee resilience
H4	Perceived organizational support is positively related to digital employee resilience
H5	Digital employee resilience is negatively related to work stress
H6	Role conflict is positively related to work stress
H7	Role ambiguity is positively related to work stress
H8	Work overload is positively related to work stress

source: own work

3.2 HYPOTHESIS DEVELOPMENT

Based on the Broaden and Build (BnB) theory, it can be assumed that positive emotions increase the breadth of available resources (Fredrickson, 1998, pp. 300–303). An affect can be defined as state of mood that is either positive or negative (Watson et al., 1988, p. 1063). In contrast to short-lived emotions, affects are considered somewhat more stable (Naragon and Watson, 2009, p. 707) and therefore less volatile. Based on the Conservation of Resources (COR) theory and BnB theory, it can be hypothesized that a positive affect is related to gaining, protecting, and expanding resources such as resilience in a more long-term and stable way. A study on women in educational leadership positions in South Africa revealed a significant positive influence of positive affect on resilience ($c' = 0.36$, $p < 0.001$), even when controlling for indirect effects (Pillay et al., 2022, pp. 6–7). In a meta-study on various empirically investigated impact factors on resilience, a strong correlation (weighted $r = 0.59$, $p < 0.001$) between positive affect and resilience was found (Lee et al., 2013, pp. 273–274). Since the share of the working population in working-from-home arrangements rose substantially in Germany in recent years (Statistisches Bundesamt 7/11/2023), it is considered appropriate to use positive affect towards working from home as a foundation, following Kohn et al. (2023). It is hypothesized that positive affect towards working from home has a positive effect in DER.

H1: Positive affect towards working from home is positively related to digital employee resilience

Since DER is conceptualized as capacity and capability and DER is achieved by leveraging technology, being technologically able is assumed to be an essential antecedent to DER. There are thematic clusters around digital literacy concepts: Being able to practically use technology (Fischer et al., 2023, p. 816) and

creating digital artifacts (Ng, 2012, p. 1067), to critically cognitively apprehend technology, including data and information (Martin, 2005), and to understand socio-ethical aspects (García-Peñalvo, 2016, p. 1067). Based on theoretical considerations and a review of existing studies, Budak et al. (2021, pp. 8–9) suggest that digital literacy is likely positively related to resilience. Empirical research indicates a positive influence of digital literacy on resilience. A study among Vietnamese students found a positive relationship between digital literacy and DR (Tran et al., 2020, pp. 11–12). Based on the theoretical plausibility and empirical contributions, it is hypothesized that digital literacy is positively related to DER.

H2: *Digital literacy is positively related to digital employee resilience*

Self-efficacy can be defined as an individual's perception and assessment of, and confidence in, one's capabilities and abilities to do something successfully or reach a goal (Schunk, 1991, p. 207; Lown, 2011, p. 55; Barends et al., 2021, p. 7). Based on the BnB theory, it can be hypothesized that self-efficacy broadens the available thought and action set and thus facilitates resource gain and protection, which enables resilience. A two-sample study by Li and Nishikawa (2012, p. 164) found a high correlation ($\beta = 0.45$ and $\beta = 0.55$) between self-efficacy and resilience. As summarized by Barends et al. (2021, p. 7), longitudinal studies on the influence of self-efficacy on resilience further support the hypothesized relationship. Operationalizing self-efficacy is challenging since it depends on specific contexts or situations (Hodges, 2008, p. 7). In this study, general self-efficacy in a work context is investigated. Based on these contemplations, self-efficacy is hypothesized to be positively related to DER.

H3: *Self-efficacy is positively related to digital employee resilience*

Perceived organizational support (POS) is given when an organization is perceived by an employee to be caring, valuing the employee, and overall showing interest in an employee's needs (Eisenberger et al., 1986, p. 501; Allen et al., 2008, p. 556). The perception of organizational support could lead to an employee's expectations that an organization will likely take actions that help employees protect and extend their resources, thus leading to higher employee resilience.

Zhang et al. (2021, p. 246) found a positive correlation between POS and resilience ($r = 0.384$, $p < 0.01$). A study conducted by Ahmed et al. (2022, p. 5) on professionals in the healthcare sector indicates a positive relationship ($r = 0.258$, $p < 0.001$) between POS and resilience. Empirical support for the positive relationship between POS and resilience also exists on the level of employee resilience ($b = 0.213$, $p < 0.05$), as shown by Haider (2017, p. 4). Hence, it is hypothesized that POS is positively related to DER.

H4: *Perceived organizational support is positively related to digital employee resilience*

It can be concluded that job resources help deal with job demands (Demerouti et al., 2001, p. 501). The high importance of job resources can be established by conceptualizing stress as a result of perceived resource loss or imbalance (Lazarus and Folkman, 1984, p. 21). Thus, work stress can be viewed as a phenomenon that depends on the availability of suitable job resources, such as resilience, to deal with job demands properly. A study on individual-level resilience and stress in the construction industry revealed a negative relationship ($\beta = -0.11$, $p < 0.01$) between resilience and stress symptoms (Chen et al., 2017, p. 7). Other studies support this negative link (Braun et al., 2017; Kermott et al., 2019). However, the body of empirical research is less rich and more focused on theoretical arguments when more specific resilience and stress concepts, e.g., employee resilience and work stress, are studied (Elfeddali et al., 2022, p. 231; Kermott et al., 2019, p. 2; Amir and Standen, 2019, p. 4). Based on empirical evidence and theoretical plausibility, DER is hypothesized to be negatively related to work stress.

H5: *Digital employee resilience is negatively related to work stress*

Role conflicts result when an employee faces incongruent, conflicting role expectations (Rizzo et al., 1970, p. 151). Role conflicts can arise both from within a job role and from the combination of roles (Schwartzberg and Dytell, 1996, p. 212), which is theoretically in line with Interactionism and shows the interrelated nature of stressors. From a job demands-resources (JD-R) model perspective, conflicting role

expectations can be considered more complex, as resolving role conflicts requires a broader set of job resources. Consequently, an imbalance of job demands and resources is more probable and can thus contribute to job stress (Rizwan et al., 2014, p. 190). As Moncrief et al. (1997, p. 789) pointed out, various studies identified a positive link between role conflict and stress on the job. Since role stress can be considered a part of work stress, these studies allow for generalization and suggest a potential relationship between role conflict and work stress. Thus, it is hypothesized that role conflict is positively related to work stress.

H6: Role conflict is positively related to work stress.

Role ambiguity is given when role expectations, authorities, and performance appraisals are not comprehensively outlined (Rizzo et al., 1970, p. 151). Based on the JD-R model, it can be assumed that role ambiguity is a job demand, as employees must invest additional efforts, e.g., resources, into performing their jobs. This, in turn, can result in inefficient resource allocation and increase the risk of an imbalance between job demands and job resources, resulting in stress. A meta-study on the influences of role ambiguity has revealed a positive relationship between role ambiguity ($r = 0.35, p < 0.01$; $r = 0.27, p < 0.01$) and negative emotions such as tension and emotional exhaustion (Örtqvist and Wincent, 2006, p. 409). Additionally, role ambiguity was proven to be correlated ($r = 0.42, p < 0.05$) with stress (Stout and Posner, 1984, p. 749). While a context-independent stress measure was used in the aforementioned study, there is also empirical proof of a positive relationship between role ambiguity and job stress (Rizwan et al., 2014, p. 218). Thus, it is hypothesized that role ambiguity is positively related to work stress.

H7: Role ambiguity is positively related to work stress

Work overload focuses explicitly on the imbalance between job demands and resources (Harvey et al., 2003, p. 206). Typically, the imbalance is due to overly high job demands. Hence, work overload can be defined as the “extent to which the job performance required in a job is excessive” (Iverson and Maguire, 2000, p. 814). This imbalance can lead to a negative spiral, as described by Fredrickson and Joiner (2002, p. 174), and consequently reinforce various adverse outcomes such as emotional exhaustion (Karatepe, 2013, p. 626) and work stress (Pluta and Rudawska, 2021, p. 591). Regarding empirical underpinnings, in a study by Naru and Rehman (2019, p. 320), a positive effect of work overload ($\beta = 0.249, p < 0.05$) on employee stress was discovered. This positive effect persists when the impact of chronic work overload on stress is investigated (Schulz et al., 1998, p. 94). Considering these arguments, it is hypothesized that work overload is positively related to work stress.

H8: Work overload is positively related to work stress

4 METHODOLOGY

4.1 RESEARCH DESIGN, SAMPLE, AND DATA COLLECTION

A nonexperimental research design was chosen since this study focuses on statistically testing hypotheses with quantitative data (Patten and Newhart, 2018, p. 11). To collect the data, an online survey was developed and digitally implemented using the survey tool Google Forms for the two pre-tests and Unipark for the final survey. All surveys were distributed and accessible via the Internet for self-administration. Since this study primarily concentrates on DER antecedents and effects on work stress, the target group was narrowed down to individuals who have experience in working from home. Version one of the survey was distributed to 365 members of the Pforzheim University panel. The second version of the survey was distributed outside the panel simultaneously. Participants were financially incentivized by the option to participate in a 20 € gift card raffle upon survey completion.

4.2 MEASUREMENT

For measurement, a five-point Likert scale was chosen because of its simplicity (Dawes, 2008, pp. 1-2) and eligibility to measure attitudes, as summarized by Joshi et al. (2015, p. 397). The anchor points 1 and 5 were verbally labeled in German, e.g., “stimme überhaupt nicht zu” and “stimme voll und ganz zu”, while the remaining points were numerically presented, e.g., “2”, “3” and “4”. All used measurement scales are presented in Table 2.

Table 2. Used measurement scales

Construct	Scale	Items	Sources
Positive affect	I-PANAS-SF scale	Five items	Thompson (2007)
Digital literacy	Digital literacy scale	Ten items	Ng (2012)
Self-efficacy	GSE-6 scale	Six items	Romppel et al. (2013)
Perceived organizational support	POS scale	Five items	Rubel et al. (2022, p. 8)
Digital employee resilience	Adaption from EmpRes scale	Nine items	Näswall and Kuntz (2015) with adaptations from (Kohn et al., 2023)
Role conflict	Role conflict scale	Seven items	Rizzo et al. (1970, p. 160)
Role ambiguity	Role ambiguity scale	Six items	Rizzo et al. (1970, p. 160)
Work overload	Work overload scale	Three items	Price (2001) with adaptations from Karatepe (2013, p. 624)
Work stress	Job stress scale	Six items	Lait and Wallace (2002, p. 473)

source: own work

4.3 ITEM TRANSLATION AND PRE-TESTS

Because the survey was planned to be distributed among a German-speaking population, all English items were translated into German using the back-translation method (Brislin, 1970). Two bilingual English speakers were involved, the first in translating the items from English to German and the second in the back-translation process from German to English. In five cases, items have been adapted.

Two pre-tests were conducted after the backtranslation process and before the final survey was distributed. The primary goal was identifying redundant, hard-to-understand, or otherwise conspicuous items. Based on these changes, a second pre-test was conducted. Emphasis was put on recruiting participants who had not previously participated in pre-test one to prevent learning effects and recall bias. Five items were removed.

The final survey, with its two versions, was published and distributed on December 14th, 2023, and was active until December 31st, 2023.

5 DATA EVALUATION AND RESEARCH RESULTS

5.1 DATA PREPARATION

The data regarding the target group match was analyzed before performing statistical analyses. Moreover, data quality was assessed based on the time spent filling out the survey, total and construct-specific variance, and the answer to the control question.

Table 3. Data preparation and quality evaluation

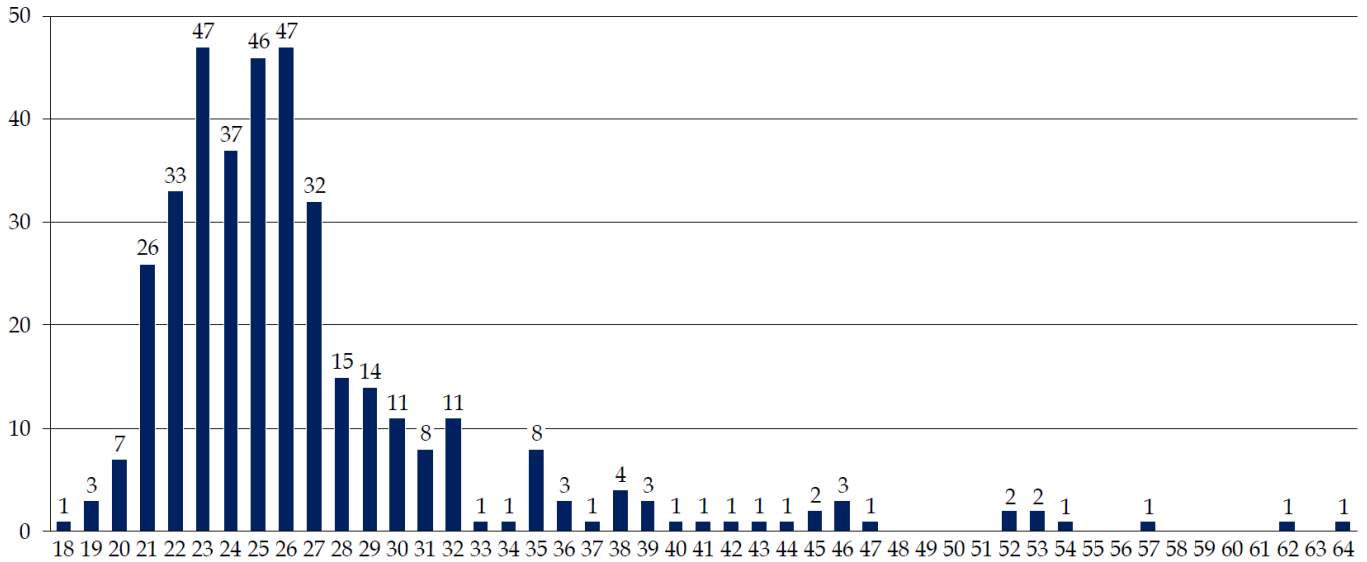
Sample size	Datasets that did not match the target group	Datasets that did not pass the quality check	Final sample size
454	54	22	378

source: own work

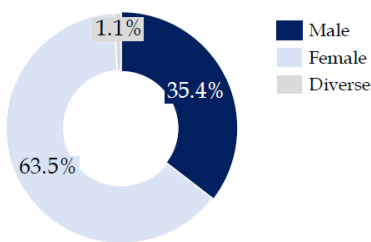
5.2 SAMPLE PROFILE

As shown in Figure 3, the sample mainly consisted of students between 20 and 30 with a maximum of ten years of work experience.

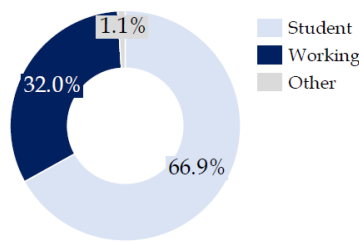
Fig 3. Sample profile
Age distribution



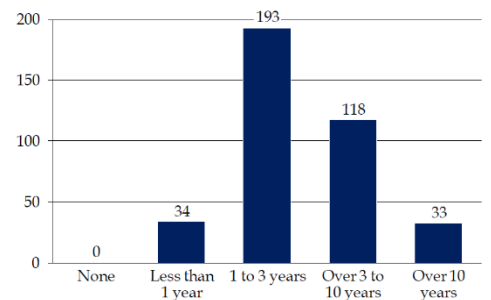
Gender distribution



Occupational status



Work experience



source: own illustration

5.3 APPROACH

Partial least squares structural equation modeling (PLS-SEM) was used to analyze the survey. Through non-parametric bootstrapping with the recommended subsample size $n = 10.000$ (Hair et al., 2022, p. 159), more robust estimates were obtained, and statements on statistical significance were enhanced (Hair et al., 2022, p. 182).

5.4 MEASUREMENT MODEL RESULTS

The content reliability of each indicator was analyzed to establish content validity. According to Hair et al. (2011, p. 146), indicators with outer loadings equal to or less than 0.4 should be removed. The remaining indicators with loadings above 0.4 and below 0.708 should be removed or retained based on internal consistency reliability and convergent validity analysis. If a corresponding construct scores below 0.7 in Cronbach's Alpha or below 0.5 in AVE, the indicator with the lowest loading can be removed (Hair et al., 2022, pp. 117–120). This is repeated until sufficient internal consistency, reliability, and convergent validity are established. A total of 5 indicators were removed. Table 4 presents data on the validity and reliability of the final constructs.

Table 4. Validity and reliability check

Construct	Cronbach's Alpha	Composite Reliability	Average variance extracted (AVE)
Digital literacy (DL)	0.819	0.822	0.524
Digital employee resilience (DER)	0.756	0.766	0.511
Perceived organizational support (POS)	0.831	0.867	0.597
Positive affect (PA)	0.782	0.791	0.535
Role ambiguity (RA)	0.820	0.836	0.534
Role conflict (RC)	0.762	0.778	0.511
Self-efficacy (SE)	0.806	0.828	0.511
Work overload (WO)	0.782	0.801	0.691
Work stress (WS)	0.819	0.836	0.529

source: own work

The Fornell-Larcker-Criterion for discriminant validity was fulfilled for each construct since the square root of the average variance extracted score exceeded the inter-construct correlations for each construct (Hair et al., 2022, p. 121). Additionally, the hererotrait-monotrait ratio was checked. Here, no value exceeded the critical threshold of 0.90 (Hair et al., 2022, p. 126).

5.5 STRUCTURAL MODEL RESULTS

One-tailed statistical tests with a significance level of 0.05 were performed. Collinearity was analyzed by considering the variance inflation factor VIF. Hair et al. (2022, p. 147) recommend treating a VIF equal to or higher than five as a sign of relevant collinearity issues. For no indicator, the VIF equaled or exceeded this threshold. Therefore, collinearity issues were ruled out.

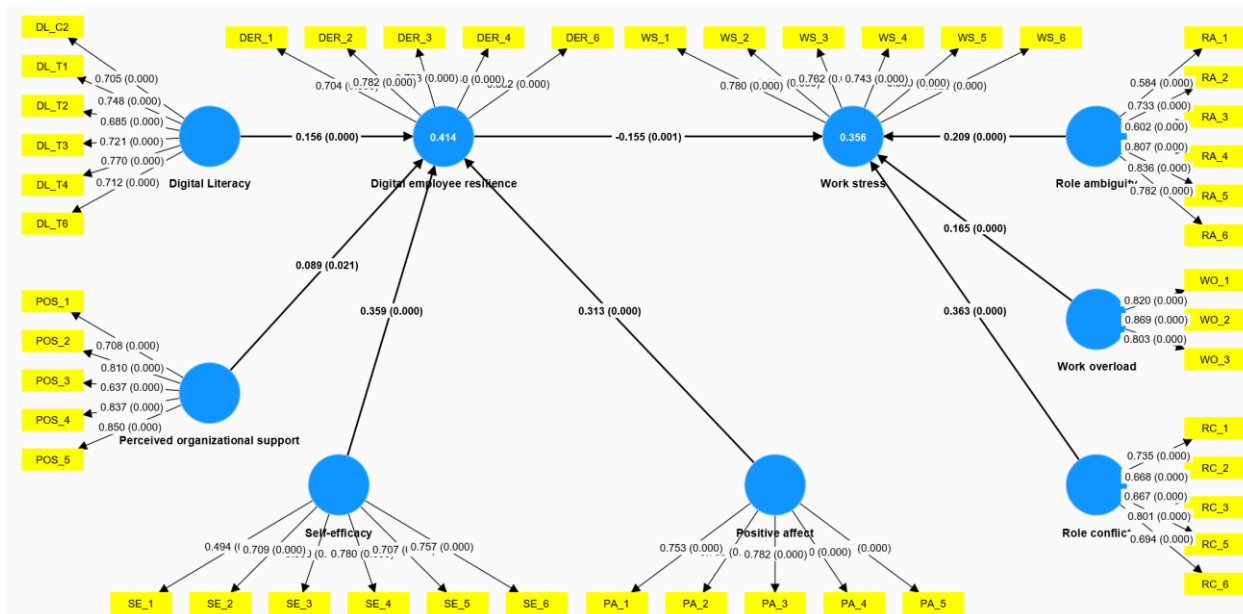
As shown in Table 5, all hypotheses H1 to H8 were confirmed.

Table 5. Result of direct effect test

Direct effect	Original Sample (O)	Sample Mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P Values
PA -> DER	0.313	0.314	0.043	7.359	0.000
DL -> DER	0.156	0.159	0.046	3.383	0.000
SE -> DER	0.359	0.360	0.046	7.748	0.000
POS -> DER	0.089	0.093	0.044	2.040	0.021
DER -> WS	-0.155	-0.155	0.050	3.120	0.001
RC -> WS	0.363	0.364	0.046	7.819	0.000
RA -> WS	0.209	0.213	0.050	4.194	0.000
WO -> WS	0.165	0.168	0.045	3.706	0.000

source: own work

Figure 4: Final structural model with R², indicator loadings, direct effect sizes, and p-values



source: own illustration

The model had good explanatory power, as seen in Table 6.

Table 6. Result of R² adjusted test

R ² adjusted	Original Sample (O)	Sample Mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P Values
DER	0.408	0.423	0.042	9.737	0.000
WS	0.349	0.364	0.041	8.457	0.000

source: own work

For all constructs, Q² predict was bigger than 0, indicating that the model had sound predictive power (Hair et al., 2022, p. 202). The estimated SRMR for the estimated model equaled 0.072 and thus was below the recommended threshold of 0.08 (Hu and Bentler, 1999, p. 1). Thereby, the model fit was proven.

To distill differences between groups, measurement variance was analyzed using the three-step process outlined by Hair et al. (2022, p. 294). For this, in SmartPLS, permutation multigroup analyses with n = 1000 permutations were conducted. If at least partial measurement invariance is given, bootstrap multigroup analysis was performed with n = 10.000 subsamples, a significance level of 0.05, and one-tailed statistical tests. Noteworthy differences were found regarding the influence of POS and DL on DER and DER, RA, and WO on WS, as shown in Table 7.

Table 7. Results of multigroup analysis

Direct effect	Status		Work experience		Demographic cohort		Original sample
	β Working	β Student	β 3-10 years	β 0 < x <= 3 years	β Generation Z	β Generation Y	
PA -> DER	0.199 ***	0.372 ***	0.297 ***	0.343 ***	0.351 ***	0.292 ***	0.313 ***
DL -> DER	0.261 ***	0.102 ***	0.264 ***	0.107 ***	0.033	0.228 ***	0.156 ***
SE -> DER	0.37 ***	0.36 ***	0.369 ***	0.338 ***	0.397 ***	0.354 ***	0.359 ***
POS -> DER	0.066	0.122 *	0.096	0.094 *	0.174 *	0.045	0.089 *
DER -> WS	-0.234 **	-0.103	-0.249 **	-0.124	-0.186 *	-0.133 *	-0.155 **
RC -> WS	0.424 ***	0.348 ***	0.335 ***	0.326 ***	0.458 ***	0.291 ***	0.363 ***
RA -> WS	0.168 *	0.243 ***	0.194 **	0.231 ***	0.122	0.281 ***	0.209 ***
WO -> WS	0.161 *	0.172 **	0.22 **	0.164 **	0.105	0.202 ***	0.165 ***

* significant at p < 0.05; ** significant at p < 0.01; *** significant at p < 0.001

source: own work

6 DISCUSSION

The digital employee resilience framework was developed by synthesizing the concepts of resilience, DR, and employee resilience. This framework creates a fruitful foundation for the novel research field of DER. The study addressed two research gaps: the lack of a clear understanding of DR and DER (Neumanova et al., 2023, p. 3) and the lack of supporting empirical work (Kohn, 2023, p. 6431). Although convenience sampling was conducted, the sample profile was diverse in occupational status, years of work experience, and, partially, age.

All eight hypotheses were supported, and thus, four relevant DER antecedents were found. When comparing the path coefficients, considerable differences can be noted in the strength of the relationships. While self-efficacy ($\beta = 0.359$) and positive affect ($\beta = 0.313$) are stronger related to DER, digital literacy and POS are considerably weaker related to DER ($\beta = 0.156$; $\beta = 0.089$).

Moreover, a significant positive relationship between DER and work stress was found ($\beta = -0.155$). Role conflict is a major antecedent of work stress ($\beta = 0.363$). While role ambiguity also has a considerable relationship to work stress ($\beta = 0.209$), the relationship between work overload and work stress is the weakest ($\beta = 0.165$). Based on this order of effects, measures targeted at reducing work stress can be prioritized.

The models successfully explained a considerable share of variance with an R^2 adjusted of 0.408 for DER and an R^2 adjusted of 0.349 for work stress. Given the conceptual novelty of DER and the overall lack of empirical data on DR, the DER model has good explanatory power.

Compared to the total sample, when analyzing the group of students in the sample, the relationship between DER and work stress lost its former statistical significance. Possibly, students are exposed to different demands at work, e.g., because of other volumes and types of work tasks. This could alter the nature of stress and render the relationship between DER and work stress less significant.

The analysis of demographic cohorts revealed that for Generation Z (GenZ) members, neither work overload nor role conflict was significantly related to work stress. This supports the argument that work demands differ considerably depending on specific contexts and circumstances.

As for the group of working respondents, the influence of POS on DER is no longer significant. One reason could be that POS as a concept overly stresses the perceptual role of organizational support and needs to account for tangible support resources. Since DER is the capacity and capability to leverage technology to adapt to changes, "hard" quantifiable resources such as the availability of technological tools could be more appropriate. However, since POS is statistically significantly related to DER overall, it is likely the interplay of tangible, more quantifiable support resources and subjectively perceived organizational support that is different between students and workers.

While students could primarily rely on overarching, interpersonal support structures to be digitally resilient, more tangible support resources like access to technology and technology education could foster DER in the group of working respondents. This is supported by the fact that only the relationship between digital literacy and DER differed significantly between these two groups. The considerably weaker relationship in students indicates that for students, DER is less about the technical and mental dimensions of technology use and more about socio-emotional and intangible aspects.

Interestingly, R^2 for DER in the group with a maximum of three years of work experience was considerably lower than in the group with more than three and a maximum of 10 years of work experience. The dividing line between these two groups was set deliberately to align with the COVID-19 pandemic. It can be hypothesized that cohort members with a maximum of 3 years of work experience have spent most of their careers working during the COVID-19 pandemic. During this time, working-from-home arrangements and digital collaboration tools gained relevance across organizations. Hence, the cohort likely started its career in these digital work arrangements and learned to use different resources to be digitally resilient.

Data from the multigroup analysis indicates that self-efficacy and positive affect in this cohort are substantially stronger related to DER than digital literacy. POS has a statistically insignificant effect, likely for the same reason as in the working group cohort. The difference in the strength of the relationship between digital literacy and DER is the biggest when comparing GenZ and Generation Y (GenY). This strengthens

the resource-based argument that GenZ grew up closely intertwined with technology; hence, digital literacy is an essential antecedent of DER.

7 IMPLICATIONS

7.1 THEORETICAL IMPLICATIONS

Since all four hypothesized DER antecedents were significantly related to DER, digital literacy, self-efficacy, positive affect, and POS can expand the set of resources under the CoR and JD-R theory umbrella. This study empirically argues that the strength of the CoR theory lies in the fact that the CoR theory covers a wide range of resources. Since resource-based mechanisms and behaviors can be analyzed across various contexts and situations with the help of the theory, the broadness of resources is valuable. This contrasts previous criticisms of the broadness made by Ganster and Rosen (2013, p. 1089).

The CoR model was also considered to investigate the relationships between various resources and work stress. The study's results indicate that exploring and explaining the phenomenon of work stress through the lens of the CoR model is a theoretically feasible approach. Interestingly, the strength of the relationship between role conflict and work stress is at similar levels in both groups with a maximum of 3 years of work experience and in groups with more than three up to 10 years of work experience. However, the strength of relationships between the other two demands, e.g., role ambiguity and work overload, is different when comparing both groups. This indicates more complexity to the nature of job demands. It can be assumed that role conflicts are more complex to resolve and require broader resources than role ambiguity and work overload.

Theoretically, the JD-R model can be refined by differentiating job demands based on complexity. This complexity may result from the variety of resources required to address the specific job demand. For example, role ambiguity can be primarily addressed through resources such as the ability to communicate effectively. This also applies to the construct of work overload, which overall had the weakest relationship to work stress. However, as for role conflicts, it can be hypothesized that the demands employees face are more complex: Apart from communication resources, role conflicts require more sophisticated resources such as the ability to effectively navigate through "office politics," balance ambiguous stakeholder interests and act in line with legal and ethical standards. Hence, by refining the JD-R model to consider the complexity of job resources, the predictive power regarding stress outcomes could be increased.

Moreover, the study's results indicate that the BnB theory is useful when exploring mechanisms contributing to an individual's resilience. It was empirically proven that the effects of self-efficacy and positive affect on DER were considerably stronger than those of POS and digital literacy on DER. Interestingly, the positive influence of positive affect on DER weakens with increasing work experience, while the positive influence of self-efficacy on DER remains relatively stable. This allows for further enhancement of the CoR model: While positive emotions are the foundation of resource obtainment, the resource self-efficacy is gained over time and gradually complements positive emotions in broadening thought and action patterns. It can be theorized that positive emotions are instrumental to obtaining more readily available resources, while self-efficacy is relevant for gaining more sophisticated, harder-obtainable resources.

7.2 PRACTICAL IMPLICATIONS

The results suggest that organizations can partially mitigate work stress by developing digitally resilient employees. Organizations can develop DER by fostering self-efficacy and a positive affect towards technology and digital solutions among employees. Moreover, enhancing employees' digital literacy and promoting perceived organizational support help build digital employee resilience.

Regarding how work stress can be mitigated in certain sociodemographic groups, DER plays only a subordinate role in students and members of GenZ cohorts. Therefore, to reduce stress in these groups, organizations must focus primarily on minimizing job demands by reducing situations characterized by role conflicts, role ambiguity, and work overload. As for the remaining groups, DER is more essential in dealing with work stress.

To help employees become digitally resilient, organizations must primarily focus on developing self-efficacy in employees. Previous research indicates that self-efficacy can be fostered (Heslin, 1999). Since self-efficacy is essential for every analyzed group, it lays the foundation for DER to emerge.

Once this foundation is laid, organizations must differentiate between sociodemographic groups and decide in which group DER should be built. Based on this decision, the three remaining DER building blocks are prioritized.

The survey results indicate that fostering a sense of POS in GenZ cohort members would have a more than a threefold stronger influence on DER than digital literacy. Such a supportive environment is essential for GenZ members since they likely have little work experience and thus tend to depend more strongly on external resources like POS. To increase positive affect, especially towards technology, organizations can focus on facilitating positive experiences related to using technology.

However, it is equally important not to overestimate the role of DER and fall into the fallacy that enhancing DER replaces addressing problematic job demands. Role conflict has the biggest effect on work stress across all groups and, thus, is the most complex source of work source. Analog to self-efficacy, measures towards mitigating role conflicts should be introduced regardless of an employee's work experience, age, or form of employment. Role conflicts should be addressed depending on the typical impact and frequency of role conflict on the job (Tidd and Friedman, 2002, p. 252).

Role ambiguity has a weaker effect on work stress overall yet is an essential contributor to stress in students, individuals with a maximum of years of work experience, and GenY members. Therefore, measures like increasing an employee's locus of control (Organ and Greene, 1974, p. 102), should focus primarily on these groups.

As for work overload, the influence on work stress was slightly higher in GenY members and individuals with more than three but less than ten years of work experience. Hence, managers should look for situations with unrealistic expectations and mismatches between the complexity of a task and an employee's capacities and capabilities to handle it. Since situations of work overload can be easily "swallowed" by an employee as opposed to being addressed and escalated, to reduce work overload, employees should be sensitized to the problematic nature of work overload. A differentiated approach to fostering DER and addressing work demands is proposed.

8 LIMITATIONS AND FUTURE RESEARCH

First, the survey design was based on a one-time, cross-sectional, self-administered survey. Additionally, all scales have been translated and, in some cases, adapted to better suit the survey. Although this was necessary given the German sample and analyzed context, it may explain the initial content and convergent validity issues. DER was only measured in terms of working-from-home experiences.

The hybrid approach to adapting the employee resilience scale by Näswall and Kuntz (2015) to a working-from-home context can be seen critically. In addition to instructing respondents to answer the questions based on their working-from-home experiences, a subset of two items was adapted to better fit the measure's purpose. This could have resulted in respondents treating these items differently.

Future research on DER could explore potential DER antecedents further, e.g., Big Five personality traits. A sizeable body of research indicates various positive and negative relationships between the Big Five dimensions and resilience (Oshio et al., 2018, p. 57). Moreover, the relationship between computer self-efficacy and DER could be explored (Howard, 2014). Also, further research could use different samples to help validate the generalizability of the findings. Another promising research path is to measure DER over multiple points in time, thereby gaining cross-sectional data and learning more about potential DER trajectories (Britt et al., 2016, p. 386).

Since DER is defined as an employee's technology-related capacity and capability for positive adaptation to changes, future research could differentiate between technology in various stages of adaption. Referring to Rogers' (2003) diffusion of innovations theory, differences in DER antecedents between the group of innovators and early adopters on one hand and early majority, late majority, and laggards on the other could be hypothesized. Overall, research on DER would benefit from investigating other technologies that employees can use for adaptation. For example, DER could be measured by focusing on GenAI, a technology that facilitates adaptation to changes. Finally, the influence of DER on more specialized stress

concepts could be investigated. For instance, one could hypothesize that DER has a stronger negative relationship to the construct of technostress (Hudiburg, 1989) than to other stress types.

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