TECHNOSTRESS

THEORETICAL FOUNDATION AND EMPIRICAL EVIDENCE

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Diese Arbeit hat der Fakultät Wirtschaftsinformatik und Angewandte Informatik der Otto-Friedrich-Universität als Dissertation vorgelegen

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Tag der Disputation: 14.10.2014

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Including a Foreword by Prof. Dr. Tim Weitzel

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FOREWORD BY PROF. DR. TIM WEITZEL

Technostress describes a set of constructs and relations between technology characteristics and human well-being that reflect a possible "dark side" of IT usage. Dr. Maier's dissertation thesis offers sophisticated, urgently needed theoretical and empirical insights into this phenomenon.

The overarching research question guiding this work is: **What are the causes and consequences of technostress?** In true information systems research fashion, the topic is highly relevant and the research approach bridges different scientific disciplines. Indications about the relevance of better understanding technostress abound and include observations such as Facebook fatigue or employee burnout and studies suggesting that one in ten employee sick days are probably technostress related.

Despite the potential relevance of the technostress phenomenon potentially affecting billions of individuals, though, there are three major challenges for technostress research: First, our evidence-based knowledge about IT-related stress is still quite immature. Second, any technostress researcher has to face the corresponding lack of established theoretical constructs and ready-to-use measurements models. And third, there are substantial differences in IT usage behavior on-the-job (mostly mandated usage of utilitarian IT, like ERP systems) and off-the-job (mostly optional use of hedonic IT, like Facebook) that make the well-established IT usage literature rather complex even without considering additional stressors and negative consequences.

Dr. Maier's thesis tackles these challenges and offers a striking piece of research that is extraordinary in scope, theoretical and methodical quality. Concerning scope, the dissertation substantiates drivers, types and consequences of technostress in both, corporate and private usage settings. The results are important, and they open avenues to promising areas of future research that include habitual and techno-addiction like usage behavior. Theoretically, the very proficient use of extant literature and theories helps develop a research program that precisely identifies and fills important knowledge gaps. Methodically, the combination of state-of-the-art empirical analyses (causal modeling) with innovative new qualitative approaches (like a Facebook hiatus with panel interviews and diaries) and experiments (among others to also gather objective data on psychophysiological reactions to techno-stressors with electrodermal scanning and eye-tracking technology) allows insights that are interesting and useful and that really further our understanding of the drivers and consequences of technostress.

Among the many highlights of this work of research is the distinction between work stress and technostress and the different consequences (e.g., IT professional are less prone to suffer from IT-related stress but more likely to perceive work-home conflicts), the identification of techno stressors (like complexity, invasion) different from social domain stressors (like social information overload, social communication overload) to reveal that, among others, online-only contacts on social networking sites are much more severe stressors than offline friends, and that, despite voluntary usage, stressed Facebook users don't easily quit the platform because of even stronger switching stressors.

Another indication of the outstanding quality of this dissertation is its immediate success in the scientific community. All of the ten papers in this cumulative thesis have already been published in top-ranked peer-reviewed outlets. All this is extraordinary, and I doubt there has been more than a handful similarly successful PhD theses in the German IS community in the past decades.

This book is a must-read for anyone interested in technostress.

Tim Weitzel

Dedicated to my parents

Hiltrud and Ernst

ACKNOWLEDGMENTS

This dissertation would not have been possible without the support of my supervisor, PhD committee, colleagues, friends, and family. I am deeply grateful for this support, far more than these words can express.

First, I want to thank my PhD supervisor, Prof. Dr. Tim Weitzel, for giving me the opportunity to write this dissertation. He offered an ideal working environment and inspired me to follow my passion in the field of information systems. His guidance throughout the last years has been invaluable. I would also like to thank Prof. Dr. Kai Fischbach and Prof. Dr. Ute Schmid for joining my PhD committee for their keen advice on, generous support for, and interest in my research.

I would also like to extend a special thanks to my colleagues and friends Dr. Sven Laumer and Dr. Andreas Eckhardt. Sven has become one of my best friends and has always proposed excellent solutions to the challenges I have faced at work and privately. It has been a pleasure to develop ideas for common research projects with him and to travel together in the USA, and I have always enjoyed our regular Wednesday meetings. I am very grateful to Andy for his support on every imaginable issue and I have particularly enjoyed the time we have shared together at his or my place. I treasure his optimism and his travel stories, and I have been able to count on him at every step.

In addition, I want to say thank you to my friends and colleagues Dr. Daniel Beimborn, Steffen Illig, Christian Jentsch, Dr. Nils Joachim, Janina Kettenbohrer, Bernhard Moos, Björn Münstermann, Diana Renner, André Schäfferling, Andreas Schilling, Frank Schlosser, Alexander von Stetten, Christoph Weinert, Dr. Anna Wiesinger, Udo Wild, Jakob Wirth, Thomas Wirtky, and Dr. Katja Zolper for their generous support.

Furthermore, I would also like to extend my thanks to the Trimberg Research Academy (TRAc) and particularly to Dr. Marion Hacke, who guided me through the application procedure for a PhD scholarship, and the Bayerische Eliteförderung for the financial support during my first three PhD years.

Last but certainly not least, I owe a debt of gratitude to my family. The unconditional love of my parents Ernst and Hiltrud, my sisters Carina and Celine, and my girlfriend Ellie gave me the strength to finish my PhD thesis. I am thankful for their emotional support and for the time and effort they made to help me down the road to success these past years.

Christian Maier

ZUSAMMENFASSUNG (GERMAN SUMMARY)

In den letzten Jahrzehnten wurden die Vorteile des Einsatzes von Informationstechnologien (IT) durch die Forschung im Bereich der Wirtschaftsinformatik umfassend dargelegt. Unter anderem konnte gezeigt werden, dass die Nutzung von IT in Unternehmen mit einer Produktivitätssteigerung der Mitarbeiter einhergeht (Brynjolfsson and Hitt 1996) sowie das Verwalten und Bereitstellen von unstrukturierten Informationen effektiver und effizienter gestaltet (Laumer et al. 2013). Gleichermaßen wird IT auch für private Zwecke eingesetzt. Unter anderem werden Smartphones und soziale Netzwerkplattformen verwendet, um mit Freunden in Kontakt zu bleiben oder sich zu verabreden (Khan und Jarvenpaa 2010).

Ungeachtet dieser Vorteile existieren erste Indizien, wonach IT für Endnutzer nicht uneingeschränkt positiv ist. Beispielsweise konnte Technostress als ein potentielles Problem der allgegenwärtigen IT-Nutzung für Endnutzer identifiziert werden (Ayyagari et al. 2011). Dies bedeutet, dass sich Personen von der IT-Nutzung gestresst fühlen (Ragu-Nathan et al. 2008). Eine Auseinandersetzung mit diesem Thema ist insbesondere vor dem Hintergrund, dass die IT-Nutzung in der öffentlichen Wahrnehmung als einer der Hauptgründe von Burnout dargestellt wird, von großer Relevanz. Aufgrund dieser Relevant ist Technostress Gegenstand dieser Dissertation und die Forschungsfrage lautet:

Was sind Ursachen und Konsequenzen von Technostress?

Für die Beantwortung dieser Forschungsfrage ist die Dissertation in fünf Kapitel gegliedert. Kapitel 1 analysiert Ursachen und Konsequenzen von Stress bei der Nutzung von IT für Arbeitszwecke. Anschließend untersucht Kapitel 2, welche Ursachen bei der Nutzung von IT im Privaten Technostress auslösen und welche Konsequenzen dies für den Nutzer hat. Kapitel 3 und 4 thematisieren den Einfluss von IT-Abhängigkeit und Persönlichkeitsmerkmalen auf Ursachen von und Reaktionen auf Technostress. Abschließend wird in Kapitel 5 eine Methode diskutiert, wie Stressreaktionen objektiv mittels Eyetracking-Technologie und elektrodermaler Aktivität erfasst werden können.

Die Ergebnisse der Dissertation zeigen, dass Technostress sowohl bei der IT-Nutzung in Unternehmen als auch im Privaten das Verhalten der Nutzer beeinflusst. Die Identifikation von Stressoren sowie die Reaktionen auf diese Stressoren sind ein zentraler Bestandteil der vorliegenden Dissertation, mit dem Ziel, Ursachen und Konsequenzen von Technostress aufzuzeigen. Im organisationalen Kontext werden Stressoren und Reaktionen sowohl bei der Nutzung von mehreren IT-Systemen, wie in bisherigen Forschungsarbeiten zum Thema Technostress üblich (Ayyagari et al. 2011), als auch für ein konkretes IT-System (SAP E-Recruiting 6.0 Enhancement Package 4) untersucht. Stressoren sind in diesem Kontext vor allem technologiebedingte Arbeitsstressoren und Technologiecharakteristika. Zu den Reaktionen auf diese Stressoren zählen unter anderem eine geringe Jobzufriedenheit und die Absicht, sich einen neuen Arbeitsplatz zu suchen. Im Kontext der privaten IT-Nutzung zeigen die Ergebnisse, dass neben Technologiecharakteristika insbesondere soziale Faktoren Stressreaktionen hervorrufen. Diese Stressursachen lösen eine generelle Unzufriedenheit mit der IT aus und veranlassen Personen dazu, die weiterführende Nutzung der IT kritisch zu überdenken. Darüber hinaus zeigen die Ergebnisse der Dissertation, dass die Nicht-Nutzung eines möglicherweise stressenden IT-Systems nicht zwangsläufig stressfreier ist, da notwendige Veränderungen und die Nutzung von alternativen Technologien ebenfalls Stress hervorrufen. Mit Hinblick auf aktuelle Forschungsergebnisse, welche die Bedeutung von Verhaltensabhängigkeit aufzeigen (Turel et al. 2011; Turel und Serenko 2012), beinhaltet die Dissertation eine Erklärung, weshalb Personen stressende IT-Systeme im privaten Umfeld weiter nutzen. Hier belegen Ergebnisse, dass

abhängige Personen Verhaltensintentionen unterschiedlich in Nicht-Nutzungsverhalten umwandeln, als dies nicht-abhängige IT-Nutzer tun. Um zu überprüfen, inwiefern IT-Nutzer mit unterschiedlichen Persönlichkeitsmerkmalen auf Stress reagieren, zeigen Ergebnisse, dass manche Persönlichkeitsmerkmale einen Einfluss auf Ursachen und Konsequenzen von Technostress haben. Abschließend zeigt die Dissertation, inwieweit objektive Methoden, wie die Verwendung der Eyetracking-Technologie und der Elektrodermalen Aktivität, im Rahmen der Technostressforschung eingesetzt werden können, um Verhaltensweisen erklärbar und nachvollziehbar zu machen.

Mit den im Rahmen dieser Dissertation erzielten Ergebnissen können entsprechende Erkenntnisgewinne für die Forschung und Praxis der Wirtschaftsinformatik abgeleitet werden. Die Identifikation von Stressoren bei der IT-Nutzung (Ayyagari et al. 2011) ermöglicht es, Reaktionen auf Stressoren detaillierter zu verstehen (Tarafdar et al. 2010). Insbesondere die Wichtigkeit des IT-Nutzungskontextes als Einflussfaktor auf zu untersuchende Stressfaktoren und Reaktionen ermöglicht das Analysieren von Technostress in verschiedenen Nutzungskontexten. Mit der Identifikation von Stressoren als stärkste Einflussfaktoren auf die individuelle Nutzungsabsicht trägt die vorliegende Dissertation zu verschiedensten Technologieakzeptanzmodellen (z. B. Davis 1989; Venkatesh und Davis 2000) bei, indem es diese um den Faktor Technostress erweitert. Darüber hinaus belegt die Arbeit, dass Stress bei IT-Veränderungen und -Implementierungen insbesondere durch Veränderungsstressoren ausgelöst wird. Dies kann beispielsweise als Antwort auf eine Arbeit von Morris und Venkatesh (2010) verstanden werden, in der die Autoren eine Untersuchung von Stress bei IT-Veränderungen fordern. Ferner zeigt der Einfluss von Persönlichkeitsmerkmalen im Themenbereich Technostress, dass Personen in Abhängigkeit ihrer Prädisposition ein unterschiedliches Stressempfinden verspüren sowie unterschiedlich auf Stressfaktoren reagieren. Abschließend bietet die Dissertation einen weiteren Ansatz zur objektiven Messung von Reaktionen auf Stress, wie dies unter anderem von Riedl et al. (2012) und Ayyagari et al. (2011) gefordert wurde.

Hinsichtlich der primären Motivation der Dissertation, Ursachen und Konsequenzen von Technostress zu erklären, kann abschließend festgehalten werden, dass die Stressoren vom jeweiligen Nutzungskontext abhängen und dieser die Reaktion der IT-Nutzer determiniert.

Introductory Paper

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1 INTRODUCTION

Information technology (IT) is a double-edged sword, creating benefits and challenges.

In organizations, IT has the power to catalyze organizational progress and social transformations. Even organizations in fields traditionally using no or little IT, such as waste management or agriculture, cannot currently compete with competitors without involving IT (Arebey et al. 2011; Suprem et al. 2013). The rationale for this is that using IT has tremendous advantages in terms of increasing productivity, efficiency, and effectiveness (Brynjolfsson and Hitt 1996). Employees use various technologies for work purposes, including communication and collaborative technologies, such as voicemails, instant messaging, and video conferencing, to simplify working with others around the world (Kolb et al. 2008) or enterprise and database technologies, such as enterprise resource planning (ERP) systems, to facilitate business process improvements (Hunton et al. 2003), to facilitate error-free access to information for decision making (Adam and O'Doherty 2000), and to automate work activities (Maier et al. 2013b). These examples specify that using IT in organizations also includes benefits for employees on the individual level to accomplish work-tasks efficiently. In private, individuals of all ages use a wide variety of IT to improve their quality of life (Niehaves and Plattfaut 2013). For example, many people frequently use IT to gain unlimited access to e-mails using mobile devices, or to social networking sites (SNS) to communicate with friends, have fun, or be connected to others (Khan and Jarvenpaa 2010; Maier et al. 2011b). In addition to using IT to shop or make financial transactions, even the refrigerator, heater, lighting and stovetop are often accessible remotely using IT (Helal et al. 2005). These examples indicate that people use IT as a tool to build and maintain social connections and organize their private lives more efficiently.

IT is often taken for granted and assumed to be unproblematic, but the advantages come along with costs (Orlikowski and Iacono 2001). Of course, acquiring IT involves investment (Morris and Venkatesh 2010) but there are also hidden costs. From the perspective of the user, using IT requires high physical, social, and cognitive skills (Ayyagari et al. 2011), potentially causing users to experience stress when using IT (Ragu-Nathan et al. 2008), and hence to perceive technostress as a particular downside of using IT. In organizations, using IT might cause technostress as users have to work with tight time schedules, are afraid of being replaced, and feel their personal life is invaded by IT (Tarafdar et al. 2010). These perceptions then cause users to feel exhausted, (Ayyagari et al. 2011), develop intentions to quit (Ragu-Nathan et al. 2008) or perform worse (Tarafdar et al. 2010). In private IT usage, one cause of technostress is high social connectivity (Kolb 2008) that pressures individuals to check their mobile devices at very short intervals or respond to emails even during the night (Mazmanian et al. 2013). These demands may cause users to feel exhausted (Maier et al. 2014b).

In summary, technologies such as enterprise systems, mobile devices, or emails, might be a cause of stress despite their benefits. The aim of this dissertation is to explain why some users perceive technostress and how they react to it. The dissertation analyzes technostress, its causes, and its consequences, posing the following central research question (RQ):

What are the causes and consequences of technostress?

In answering this research question, this dissertation distinguishes two contexts in which users might experience technostress. First, in the organizational usage context, IT is used for work-related tasks. Here, individuals have to use an array of technologies, such as mobile technologies, network technologies, communication technologies, enterprise and database technologies, generic application technologies and collaborative technologies (Ayyagari et al. 2011). As the usage of these technologies is often mandated, individuals have no option other than to use them, so any resulting technostress is an important phenomenon when using IT for work purposes (Ayyagari et al. 2011). In such a usage context, users are also frequently confronted with IT implementation projects causing health-related problems (Laumer et al. 2012a), as such projects pose a particular challenge to users (Morris and Venkatesh 2010), who have to become skillful at using new IT. Due to this, the public mind considers IT a main contributing factor for work stress and employee burnout (e.g., Der Spiegel 2011; Süddeutsche 2012) causing every tenth day of illness (Sicking 2011).

Second, in the private usage context, individuals use IT; mostly to perceive pleasure (van der Heijden 2004) but also due to its usefulness (Brown and Venkatesh 2005). The private usage context differs from using IT for work purposes as individuals can typically stop using a technology when they perceive technostress. Even though prior technostress research has not focused on technostress in this usage context, first practical observations (Gartner 2011) indicate that individuals also perceive stress when using IT privately. Despite these observations, the causes and consequences of these perceptions of stress have not yet been researched. That is, there is no scientific evidence to support statements about how IT usage in this context causes stress and how users react to stress in this usage context, such as by becoming dissatisfied, by stopping using IT continuously or by switching to alternatives.

To address both IT usage contexts and to provide further insights into the technostress phenomena, this cumulative dissertation consists of this introductory paper as well as ten papers (see Figure 1). The introductory paper provides a summary of theoretical foundations of the dissertation, the research methodologies conducted, the main findings of the ten papers, and highlights contributions to theory and practice. The introductory paper also includes a literature review of technostress to derive research gaps in this stream. These gaps are then answered in ten papers that are structured into five chapters. The first chapter focuses on technostress in work life and illustrates why users are stressed by using enterprise systems and how they react to stress. This chapter also discusses the role of technostress in IT implementation projects and how technostress influences work stress (**Papers I** and **II**). The second chapter then concentrates on technostress in the private usage context, when using IT privately. This chapter provides stressors and reactions to these stressors that go beyond the ones identified in the first chapter and hence argues that the context in which technostress is studied determines stressors and strain (**Papers III** to **VI**). As the intensity of IT usage might influence the causes and consequences of technostress, the third chapter concentrates on user addiction. Here, it is revealed that addiction particularly determines whether technostress-induced discontinuous usage intentions are translated into non-usage behavior (**Paper VII**). Due to the facts that a particular stimulus stresses some users and not others and that users react differently to technostress, chapter four reveals the influence of user personality on the causes and consequences of technostress (**Papers VIII** and **IX**). As most technostress research uses perceived data, chapter five uses a different procedure with objective data to reveal psychophysiological reactions to stress. A laboratory

experiment is conducted that uses eye-tracking technology and measures participants' skin conductance response (SCR or electrodermal activity) and contributes a new objective procedure to reveal and measure users' reactions to stress (**Paper X**).

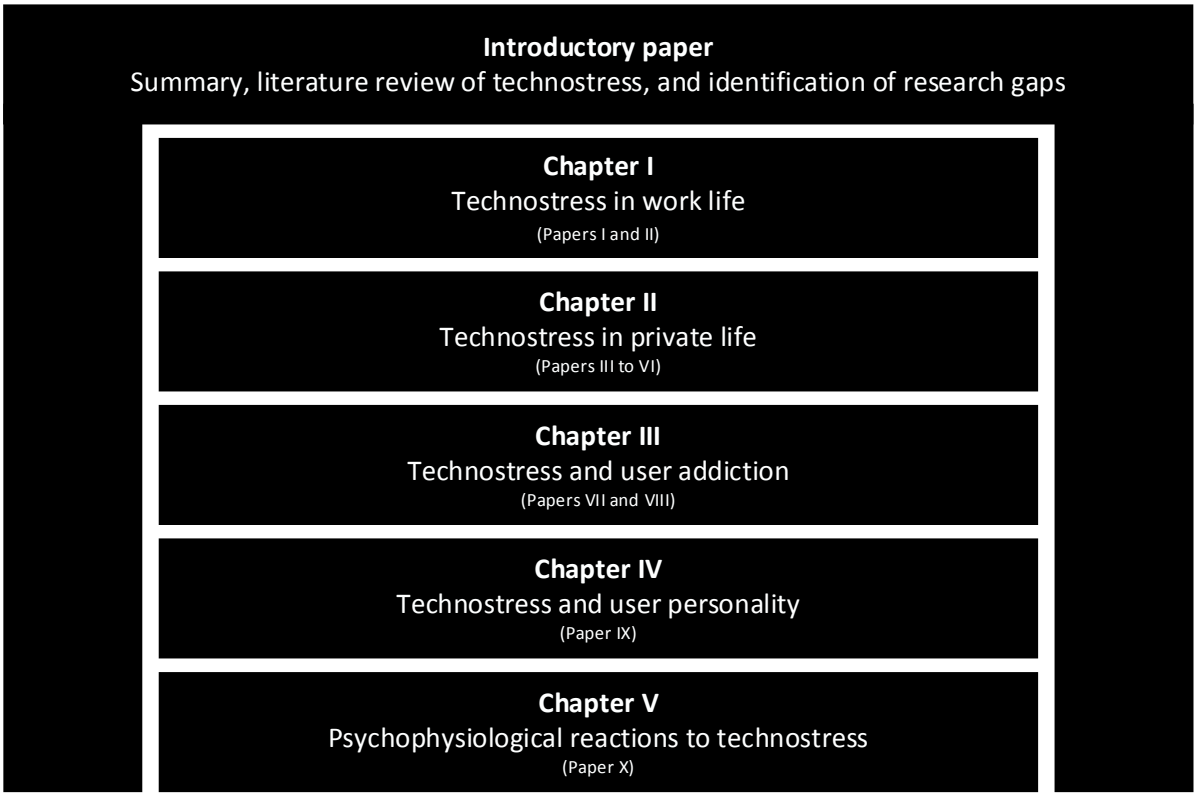


Figure 1: Dissertation structure

To begin, the introductory paper is structured as follows. In the next section the theoretical background of this dissertation is presented. As the dissertation applies quantitative and qualitative research methods, such as interviews, surveys, and lab experiments as well as literature reviews, these are described afterwards. Then the results of the ten papers included in this cumulative dissertation are presented briefly. Based on the research results of these ten papers, the main contributions and implications from this dissertation are provided. After discussing limitations and future research directions, this introductory paper draws some conclusions.

2 THEORETICAL FOUNDATION AND RELATED RESEARCH

This dissertation studies the causes of technostress as well as the consequences of technostress on individuals' behavior. The papers included in the cumulative dissertation rely on theories studying human behavior rooted in social psychology research, such as the Theory of Reasoned Action (TRA) (Ajzen and Fishbein 1980) and its extension, the Theory of Planned Behavior (TPB) (Ajzen 1991), and on models and theories of IT acceptance and continuance research introduced in the following sections.

2.1 THEORY OF REASONED ACTION AND THEORY OF PLANNED BEHAVIOR

IS research uses a large number of theories and models to explain individuals' intentions and behavior, most of them are rooted in social psychological research (Williams et al. 2009). Two of the most popular theories are the Theory of Reasoned Action (TRA) (Ajzen and Fishbein 1980) and its extension, the Theory of Planned Behavior (TPB) (Ajzen 1991, see Figure 2).

The theories have the common objective to explain an individual's behavior and assert behavioral intentions as the most important determinant. Behavioral intentions reflect the subjective willingness of an individual to perform a behavior (Fishbein and Ajzen 1975). In the first instance, TRA considers behavioral intentions as a function of attitude towards the behavior and subjective norms surrounding the behavior. Attitude is defined as the "*degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question"* (Ajzen 1991, p.188) and subjective norm reflects the *"assessment of the extent that referent others would desire the performance or non-performance of the behavior*" (Ajzen 1991). In a second instance, TPB extends TRA by positing perceived behavioral control, defined as the ease or difficulty of performing a behavior, as third influencing factor for behavioral intentions. In general, TPB posits that a positive attitude, a highly subjective norm, and great perceived behavioral control cause high behavioral intentions and consequently a high probability to perform a certain behavior.

The three factors attitude, subjective norm, and behavioral control are determined by behavioral, normative, and control beliefs. Behavioral beliefs focus on an individual's belief about the consequences of a behavior as they reflect the subjective likelihood that performing the behavior will produce a certain outcome. Normative beliefs focus on social normative pressures or beliefs of referent others about whether or not one should perform the behavior. Control beliefs reflect an individual's belief about whether the presence of factors facilitates or impedes performing the behavior.

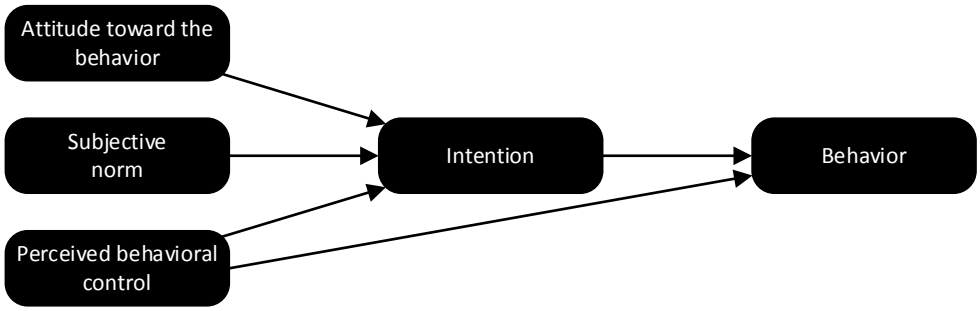


Figure 2: Theory of planned behavior (Ajzen 1991)

The presented social psychological theories are the theoretical foundation for IS research models and theories used to study user behavior. These are presented in the next section.

2.2 TECHNOLOGY ACCEPTANCE AND CONTINUANCE RESEARCH

In order to explain why and how individuals adopt and use technologies, information systems (IS) research relies on theories of social psychological research, such as TRA and TPB. Notably, as an individual's decision to initially adopt a technology is made on a different basis than the decision to continue to use a technology (Karahanna et al. 1999), research differs between the streams of technology acceptance research and technology continuance research. The rationale for this is that IT acceptance and continuance are theoretically and temporally distinct behaviors (Bhattacherjee and Lin 2014); IT acceptance focuses on why individuals adopt a technology, which is studied in the stream of technology acceptance research, and IT continuance focuses on why individuals use a technology continuously, which is investigated in technology continuance research. Thereby, continuance can follow only after an individual has accepted and used a technology for the first time. In the following, models and theories of both research streams are presented.

2.2.1 Technology acceptance research

The Technology Acceptance Model (TAM, Davis 1989) aims to explain why individuals adopt IT. It extends the proposed social psychological theories by introducing two technological characteristic based attitudinal beliefs (Figure 3). These are an individual's perceived usefulness, which is defined as "*the degree to which a person believes that using a system would enhance his/her job performance*" and perceived ease of use that refers to "*the degree to which a person believes that using a system would be free of effort*" (Davis 1989, p. 320). As a consequence, TAM posits perceived usefulness and perceived ease of use as determinants of behavioral intention. Aligned with TRA and TPB, TAM asserts behavioral intentions as cause for usage behavior.

Figure 3: Technology acceptance model (Davis 1989)

Although this parsimonious model is the most frequently used model in technology usage research (Williams et al. 2009), a tremendous amount of research extends, modifies, and replicates the original TAM (e.g., Venkatesh and Davis 2000; 2003; 2008). Among others, van der Heijden (2004) claims that although the two perceptual beliefs usefulness and ease of use are important in explaining whether individuals adopt a utilitarian IT, these beliefs do not likewise explain why individuals adopt hedonic IT. As a consequence of that, van der Heijden (2004) theorizes perceived enjoyment, defined as "*the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated*" (Davis et al. 1992, p.1113) as additional perceptual belief that has to be studied while studying user adoption of hedonic IT.

Another example is provided by Venkatesh and Brown (2001), whose objective is to explain why individuals adopt IT in their private lives. As TAM is mostly used to explain IT acceptance at the workplace, they propose the Model of Adoption of Technology in Households (MATH) to reveal perceptual beliefs influencing whether individuals develop behavioral intentions to use IT privately. Therefore MATH uses a tripartite belief structure. First, attitudinal beliefs are defined as the positive or negative evaluation of the outcomes of the behavior. Attitudinal beliefs subsume utilitarian outcomes, which reflect the degree of effectiveness and utility, hedonic outcomes, which reflect the degree of fun and pleasure, and social outcomes, which reflect the degree of power, status and knowledge resulting from using a technology (Venkatesh and Brown 2001). Second, normative beliefs focus on the influence of friends, family, and acquaintances and are reflected in social influences (Eckhardt et al. 2009). Third, control beliefs are factors, which subsume beliefs that stand in the way of using IT (Venkatesh and Brown 2001), such as the perceived difficulty of use, fear of technological advances, or too high costs (Cenfetelli 2004; Sandmann and Maier 2008; Cenfetelli and Schwarz 2011; Maier et al. 2012c).

Finally, the Unified Theory of Acceptance and Use of Technology (UTAUT) unifies prior research approaches and suggests that effort expectancy, performance expectancy, facilitating conditions, and social influence are the four key direct determinants of behavioral intentions and usage behavior (Venkatesh et al. 2003). Effort expectancy reflects the degree of ease associated with the usage of a technology and performance expectancy is defined as the extent to which a user believes that using a technology increases the performance. Moreover, facilitating conditions refers to the extent to which an individual believes that support is available when using the technology and social influence is defined as extent to which an individual perceives that referent

others believe one should or should not use the technology. In addition to that, UTAUT posits that age, gender, experience, and voluntariness moderate the influence of the four constructs on behavioral intentions and usage behavior. Notably the moderating influence of voluntariness theorized in UTAUT posits that using IT voluntarily is determined differently than using IT mandatorily.

2.2.2 Technology continuance research

With the objective of explaining determinants of an individual's long-term IT usage over a period of time, which is called IT continuance (Bhattacherjee 2001), technology continuance research (Bhattacherjee 2001; Bhattacherjee and Premkumar 2004; Lankton and McKnight 2012) is based on different theories and models, such as the Expectation Disconfirmation Theory (EDT) (Oliver 1977; Oliver 1980). EDT posits expectations, disconfirmations and levels of performance as determinants of an individual's satisfaction, which is defined as the overall affective attitude towards the technology. This satisfaction is then the basis of whether an individual develops intentions to continue to use the IT. Ultimately, satisfaction and continuance intention are determinants of IT continuance behavior.

Recently, Bhattacherjee and Lin (2014) extended the research model described above by integrating additional perspectives (Figure 4). First, in alignment with TRA and TPB suggesting normative influences as antecedent of behavioral intentions, subjective norm is theorized as an additional determinant of continuance intention. Second, as continued IT usage is often performed habitually (e.g., Limayem and Hirt 2003; Limayem et al. 2007; Venkatesh et al. 2012), habit is considered a determinant of IT continuance behavior and as a moderator of the influence of continuance intention and continuance behavior. Here, habit refers to a "*well-learned action sequence, originally intentional that may be repeated as it was learned without conscious intention when triggered by environmental cues in a stable context*" (Ortiz de Guinea and Markus 2009, p. 437).

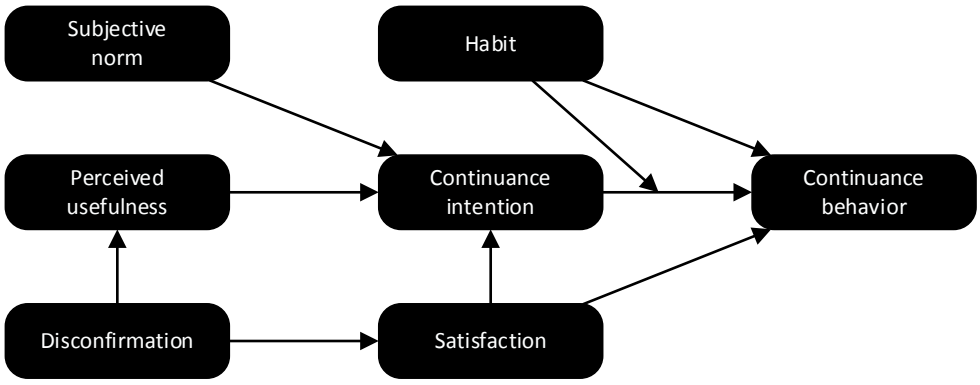


Figure 4: Unified model of IT continuance (Bhattacherjee and Lin 2014)

The Integrative Framework of Technology Use (IFTU) (Kim and Malhotra 2005; Kim 2009) extends research in the stream of IT continuance by investigating the dynamic interplay of beliefs, intentions, and continuance behaviors. Therefore, IFTU uses four well-known mechanisms; (1) technology acceptance model, (2) sequential updating mechanism, (3) feedback mechanism, and (4) repeated behavioral patterns (Figure 5).

IFTU proposes a two-wave panel model with TAM as the underlying reason-oriented action mechanism to explain how perceptual beliefs change over time (Kim and Malhotra 2005). It therefore posits the two perceptual beliefs of TAM, perceived usefulness and perceived ease of use, as determinants of behavioral intentions. As an intention-based model, it assumes behavioral intention as an influencing factor of usage behavior. In order to capture behavioral intentions and

usage behaviors at different points in time, IFTU posits that behavioral intentions of the first wave in t_1 determine the subsequent usage behavior in t_2.

In addition to the reason-oriented action mechanism, IFTU uses the sequential updating of judgments mechanism in terms of belief update theory to understand how beliefs are updated (Hogarth and Einhorn 1992; Bolton 1998). Belief Update Theory posits that beliefs do not arise out of nothing. Rather, beliefs are developed from prior beliefs. As a consequence, prior beliefs are considered anchors that are updated after receiving and processing new information. IFTU uses this theory to theorize that the two perceptual beliefs perceived usefulness and perceived ease of use as well as behavioral intention in t_1 determine the updated perceptual beliefs and behavioral intention in t_2.

IFTU also uses feedback mechanism in terms of self-perception theory (Bem 1972) to explain the influence of usage behavior on the formation of perceptual beliefs. Self-perception theory aims to explain inconsistencies in the widespread cognitive dissonance theory (Festinger 1957). Therefore, the theory contradicts the assumption that beliefs shape behavior. Instead, self-perception theory considers usage behavior the cause of perceptual beliefs, such that beliefs are based on prior and current behavior. The theory posits that individuals do not form beliefs about a behavior until they are asked to evaluate that behavior. Rather, perceptual beliefs are derived from observing the individual's own behavior, with the result that beliefs will be biased by the extent of usage behavior. Based on this mechanism, IFTU posits that usage behavior determines the two perceptual beliefs perceived usefulness and perceived ease of use as well as behavioral intentions.

Finally, IFTU uses the repeated behavioral patterns mechanism (e.g., Triandis 1977; Verplanken et al. 1997) to theorize the role of habit, which suggests that past usage determines future usage. Accordingly, IFTU theorizes that the behavioral usage of t_1 influences an individual's behavioral usage of t_2.

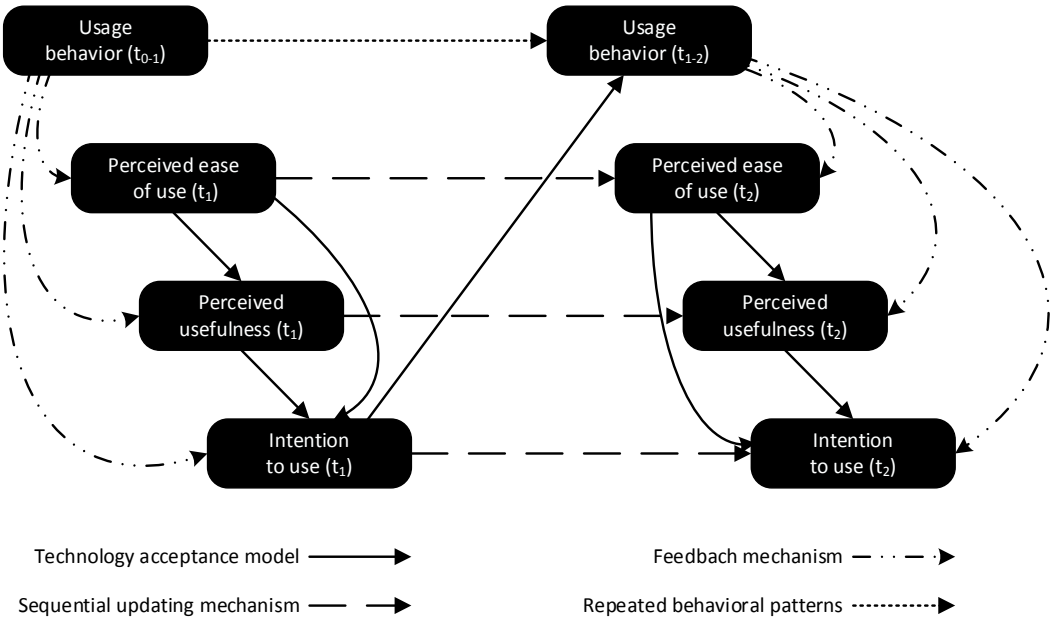


Figure 5: Integrative framework of technology use (Kim and Malhotra 2005; Kim 2009)

2.2.3 The technology usage context cube

As evidenced by the research models and theories presented, significant research has been done to understand whether and why individuals use or adopt a technology (for a review of

technologies examined see Table 8 in Williams et al. 2009). Traditionally, researchers have studied particularly the acceptance and continuance of utilitarian technology used mandatorily for work purposes (see Figure 6, the cube on the bottom on the right hand side in the front).

However, the overall scope of contexts of technology usage research includes three different dimensions. The first dimension is the IT usage area (Venkatesh and Brown 2001; Brown and Venkatesh 2005), i.e. IT can either be used for work purposes, such as an ECM system (Laumer et al. 2013a) or an e-recruiting system (Lang et al. 2011), or for private purposes, such as an online banking software (Campbell and Frei 2010). The second dimension is the degree of voluntariness, i.e. IT is either used mandatorily or voluntarily (Venkatesh et al. 2003). An example for a mandated technology is an enterprise resource planning system (Morris and Venkatesh 2010) and an example for a voluntary IT is a private Facebook account (Maier et al. 2012c; 2014b). Finally, the third dimension is the purpose of IT (Davis 1989; van der Heijden 2004). Here, research distinguishes between utilitarian IT, such as antivirus software (Liang and Xue 2009), and hedonic IT, such as on-line computer games (Hsu and Lu 2004). Research in the field of technology usage can be characterized along these three dimensions. Figure 6 summarizes and illustrates these dimensions in the technology usage context cube. Differentiating technology acceptance and continuance research along these three contextual dimensions helps classify IT according to usage behaviors. For example, when a technology is used privately, individuals can develop switching intentions and change providers or technologies, whereas when a technology is used for work purposes, individuals cannot decide on their own whether to change providers or technologies (Xu et al. 2014). Moreover the perceptual beliefs influencing user behavior also depend on the context, as users' perceptual beliefs and attitudes determine whether they use voluntary IT, but have less influence on whether they use mandated IT (Brown et al. 2002).

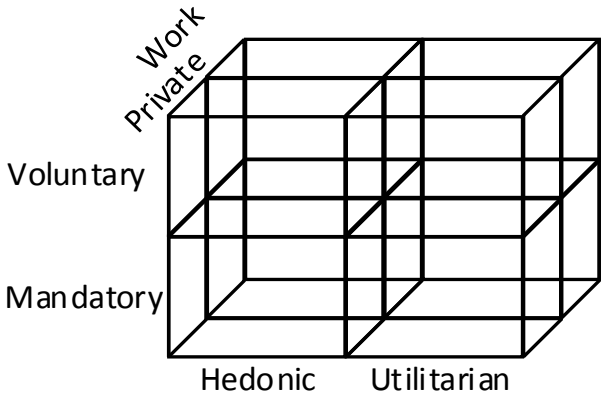


Figure 6: The technology usage context cube with three dimensions characterizing context

This cube illustrates the possible contexts in which technology acceptance and continuance can be studied and can also be used to classify prior technostress research (e.g., Table 1), to summarize research results (e.g., Table 10), and to outline contributions (e.g., Table 12).

2.2.4 Summary

In summary, technology acceptance and continuance research has been studied in different contexts. However, reviews of literature in this stream (Petter et al. 2007; Williams et al. 2009) indicate that most of the perceptual beliefs in focus can be classified as enablers (Cenfetelli 2004). These enablers can be defined as "*external beliefs regarding the design and functionality of a system that either encourage or discourage usage, dependent on valence"* (Cenfetelli 2004, p.475) and are widely used to study technology acceptance and continuance. As a consequence, research neglects the influence of other perceptual beliefs that inhibit continuous usage. These inhibitors are defined as *"perceptions held by a user about a system's attributes with consequent effects on a decision to use a system. They*

act solely to discourage use" (Cenfetelli 2004, p.475). Such an inhibiting influence on usage behavior might be exerted when an individual experiences technostress, and lead to a worsening of user performance or a decision not to use a technology (Cenfetelli and Schwarz 2011). The next section focuses on recent research in the field of technostress.

2.3 TECHNOSTRESS RESEARCH

Recently, technostress – a particularly dark side of technology usage – has been defined as an IT user's experience of stress when using technologies (Ragu-Nathan et al. 2008) and has been the focus of considerable IS research (Table 1).

From a general point of view, technostress research particularly studies how and which techno-stressors cause psychological and behavioral strain. In this process, stressors are stimuli, events or demands perceived by an individual, so techno-stressors are technology-induced stimuli, events or demands (Ragu-Nathan et al. 2008; Ayyagari et al. 2011). Such techno-stressors cause reactions among individuals, which are commonly called strain (Tarafdar et al. 2010; Ayyagari et al. 2011). On the one hand, an individual might react psychologically to a techno-stressor by reducing one's level of satisfaction or by feeling exhausted (Ragu-Nathan et al. 2008; Ayyagari et al. 2011). This emotional response is called psychological strain (Tarafdar et al. 2010). On the other hand, techno-stressors might also cause individuals to react behaviorally, which is called behavioral strain (Tarafdar et al. 2010). An example of a behavioral response is when an individual performs poorly or quits his or her job due to technology-induced stressful stimuli (Ragu-Nathan et al. 2008; Tarafdar et al. 2010). Notably, recent research posits that psychological strain is one major influencing factor of behavioral strain (Ragu-Nathan et al. 2008; Tarafdar et al. 2010). In addition, the focus on the stressor-strain relationship, the findings of technostress research reveal that the perceptions of techno-stressors are determined by the user her-/himself and her/his usage environment. First, the technology that is used by an individual determines whether techno-stressors are perceived (Ayyagari et al. 2011). This means that technological characteristics determine whether users perceive techno-stressors. Second, individual differences with regard to age, gender, experience as well as user personality might influence whether users perceive techno-stressors (Ragu-Nathan et al. 2008; Bakker et al. 2010). This means that individual differences and users' personality might determine the perception of techno-stressors, so that users are predisposed to be more or less susceptible to perceiving techno-stressors. Third, the organizational environment in which IT is used facilitates or hinders that user's perceive techno-stressors (Wang et al. 2008; Tarafdar et al. 2010). Among others, individuals receiving organizational support or working in less centralized environments perceive techno-stressors much less frequently than individuals working in more centralized environments. Figure 7 illustrates this tendency in current technostress research.

Figure 7: Status quo of technostress research (see Table 1 for a detailed overview)

The following sections present the findings of articles focusing on technostress in detail. The articles are limited to those published in IS journals considered "major" (Lowry et al. 2013). The research contexts of as well as the constructs studied in these articles are summarized in Table 1.

Ragu-Nathan et al. (2008) conceptually developed and empirically validated an instrument to reveal why employees react with strain when using IT and identified five techno-stressors. First,

techno-overload reflects the demand that employees work faster and longer because they use a certain IT. Second, techno-invasion identifies IT as a source of blurring boundaries between the work and private domains. Third, techno-complexity means that employees feel unable to use IT due to a lack of skills. Fourth, techno-insecurity describes situations in which employees are afraid of losing their job due to IT. Fifth, techno-uncertainty describes the situation that IT is the source of many changes in the organization that cause uncertainty. Using this instrument, researchers in this field have identified individual differences as influencing factors of whether an individual perceives these five stressors. For example, studies indicate that men experience more technostress than women and that technostress decreases with increasing age, education and computer confidence (Ragu-Nathan et al. 2008). While focusing on individual reactions to these stressors, they identify techno-stressors as a source of low job satisfaction, low organizational commitment, low user satisfaction, poor user productivity, poor user innovation and increasing role stress in terms of role conflict and role overload (Tarafdar et al. 2007; 2010; 2011; Ragu-Nathan et al. 2008). In addition, scholars pursuing research in this field posit that there might be mechanisms that inhibit the influence of technostress on strain. Specifically, four mechanisms are identified: literacy support, technical support provision, technology involvement facilitation and involvement support, and provide empirical evidence that these influence psychological and behavioral strain significantly (e.g., Tarafdar et al. 2011).

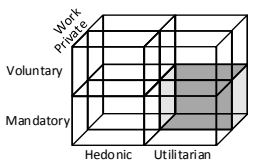
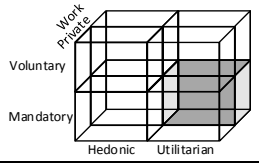
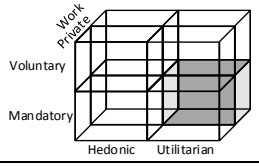
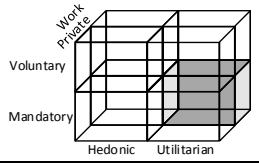
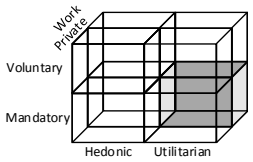
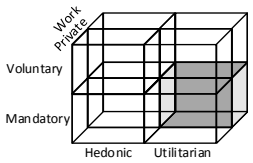
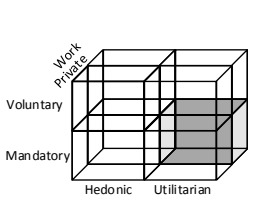
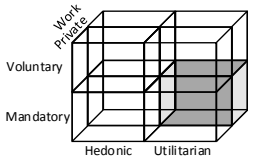
Alongside this stream of research, Tu et al. (2005) argue that culture might influence the stressor-strain relation, indicating that the five overall technology-induced stressors do not influence user productivity in general in China. Rather, only the three techno-stressors overload, insecurity and invasion significantly impact productivity. Moreover, they identify sources of technostress focusing on individual differences, organizational characteristics and technology-related perceptions. With regard to individual differences, their findings are in line with the results of Ragu-Nathan et al. (2008) that younger employees perceive technostress to a higher extent. Wang et al.'s (2008) research also indicates that working in a more centralized organization or in a highly innovative one causes high levels of technostress. This group of researchers also reveals that the higher the technology dependence of an employee or the lower the computer self-efficacy, the higher the technostress (Shu et al. 2011).

More recently, Ayyagari et al. (2011) theorize and validate that three categories of technology characteristics influence techno-stressors: usability, dynamic and intrusive features. The techno-stressors discussed in this research are adapted from the general stress literature to the technostress research domain and include work-home conflict, invasion of privacy, work overload, role ambiguity and job insecurity. Furthermore, the extent of technology usage is also identified as a cause of whether users perceive techno-stressors. Concerning consequences of these techno-stressors, Ayyagari et al. (2011) provide evidence that individuals react psychologically by showing high levels of psychological strain called techno-exhaustion and that this psychological reaction also depends on individual characteristics such as negative affectivity.

In parallel, Riedl et al. (2012) set up a laboratory experiment to test whether system breakdowns, a particular potential techno-stressor in performing a human-computer interaction task, increase a user's level of cortisol. In this experimental setting, it is postulated that techno-stressors have subjective as well as objective consequences measurable in terms of cortisol levels. Their study concludes that techno-stressors also cause psychophysiological reactions in IT users.

As a consequence of these research articles, it can be concluded that prior research has studied technostress only from an organizational perspective when individuals have to use IT for work-related tasks. By classifying these technostress articles in terms of the technology usage context cube illustrated in Figure 6, research has only studied technostress in the context of mandated usage of utilitarian IT for work. Notably, another commonality of prior technostress research is the understanding of IT as a collection of information, processing, storage, network,

and communication technologies for work-related tasks (e.g., mobile, network, communication, enterprise and database generic application and collaborative technologies). None of the research focuses on one concrete technology that might be a source of stress (e.g., social networking sites). To put this in a nutshell, Table 1 provides a detailed overview of prior technostress research.

Authors	Research context	Antecedents	Techno-stressors	Psychological & behavioral strain	Controls
Tu et al. 2005			Overload, invasion, complexity, insecurity, uncertainty	Productivity	Age, computer literacy, task complexity, reward
Tarafdar et al. 2007			Overload, invasion, complexity, insecurity, uncertainty	Productivity, role stress (role conflict, role overload)	
Ragu-Nathan et al. 2008		Individual characteristics (age, gender, education, computer confidence)	Overload, invasion, complexity, insecurity, uncertainty	Job satisfaction, organizational commitment[1], continuance commitment[1]	Inhibiting mechanisms
Wang et al. 2008		Individual characteristics (age, gender, education), organizational characteristics (centralization, innovation)	Overload, invasion, complexity, insecurity, uncertainty		
Tarafdar et al. 2010		Organizational characteristics (innovation support[1], involvement facilitation)	Overload, invasion, complexity, insecurity, uncertainty	End-user satisfaction, end-user performance	
Ayyagari et al. 2011		Technology characteristics (usability features, dynamic features, intrusive features)	Work-home conflict, invasion of privacy, work overload, role ambiguity, job insecurity	Emotional exhaustion	Technology usage, negative affectivity
Tarafdar et al. 2011		Individual characteristics (age, gender, education, computer efficacy and confidence, experience using computers), inhibiting mechanisms (technical support provision, technology involvement facilitation, innovation support)	Overload, invasion, complexity, insecurity, uncertainty	Job satisfaction, organizational commitment, role conflict, role overload, employee innovation, employee productivity, end-user satisfaction	
Shu et al. 2011		Organizational characteristics (technology dependency), individual characteristics (computer self-efficacy)	Overload, invasion, complexity, insecurity, uncertainty		Age, gender, education
Riedl et al. 2012	No classification possible, as the focus is not on usage of an application system in a specific context, but rather on basic machine reliability (i.e. computer system breakdown)		System breakdown		

[1] an indirect effect of the antecedent variable on the techno-stressor or of the techno-stressor on the strain variable is studied, but not a direct effect.

Table 1: Literature review of technostress research in major IS journals

In summary, nine articles focus on the causes and/or consequences of technostress. Some of these articles also study antecedents of stressors and the influence of control variables. Notably, all of these articles study technostress in the context of utilitarian and mandated IT usage for work purposes. Moreover, instead of focusing on one particular IT such as a cell phone, SAP, e-mail or word processing, the articles consider IT as a collection of different technologies (Ayyagari et al. 2011, p. A2). Based on this literature review that represents the current state-of-the-art in technostress research, the next section identifies research gaps in technostress research and develops eight detailed research questions.

2.4 RESEARCH QUESTIONS

This section uses the literature review of technostress to identify research gaps to derive concrete research questions. These questions contribute to the overall research objective of this dissertation.

The review of technostress research presented above reveals that prior research has studied predominantly the antecedents and consequences of well-known IT used for work purposes. In this context IT is considered as a "*collection of information, processing, storage, network, and communication technologies*" (Ayyagari et al. 2011, p. A2) that are regularly used by individuals to perform work processes. With the focus on a collection of IT, technostress research neglects identifying whether the usage of one particular IT or the implementation of new mandated IT also stresses users, as pointed out by Morris and Venkatesh (2010) as an important research gap. Moreover, technology usage research posits that the context of IT usage matters as it determines user behavior and its antecedents (Venkatesh and Brown 2001; Venkatesh et al. 2003). This implies that no research indicates whether other IT usage contexts, such as the private and voluntary usage of hedonic IT, might be perceived as stressful. It is important to understand whether technostress also matters in this type of usage. Thus, the research question is:

Research question 1: *In what other technology usage contexts – in addition to the mandated usage of well-known utilitarian IT for work purposes – do individuals experience technostress?*

In alignment with the findings of technology usage research, the context in which IT is used determines which and how strong perceptual beliefs influence user behavior. Among others, perceived enjoyment determines whether hedonic IT is used privately (e.g., van der Heijden 2004); but this perception is not discussed when studying IT usage behaviors for work purposes, which are mostly influenced by evaluating the utility of IT (Venkatesh et al. 2003). This implies for technostress research that the IT usage context might also determine stressors influencing user behavior, so that additional causes exist beyond the identified stressors when using IT for work, such as job insecurity (see Table 1).

In addition, the context might even determine whether users perceive other kinds of stressors. Many types of IT, such as SNS, are used in the private context in the framework of the social environment (Laumer et al. 2013c). This means that such IT is frequently used to communicate, inform friends about news, or ask others for social support. Consequently, users are more strongly connected to their private social environment through IT than while using IT for work purposes, which might be experienced as additional stressor of using such IT which has not been investigated in prior technostress research (see Table 1 and Figure 7). Thus, the research question is:

Research question 2: *What are additional context-specific causes of technostress (stressors) when using IT?*

In addition to causes, context also influences IT users' psychological and behavioral reactions to stressors. The rationale for this is that individuals can decide on their own to stop using private and voluntary IT, but have to use IT for work purposes continuously (Brown et al. 2002). For technostress research, this implies that mandated IT usage for work purposes may cause technostress and lead to decreasing job satisfaction, performance, or continuance commitment (see Table 1), but will still be used continuously. However, the psychological and behavioral reactions to technostress might go beyond these strain reactions, as users can decide to stop using a technology or switch to alternatives. As a consequence, the research question is:

Research question 3: *What are additional context-specific consequences of technostress (strain) when using IT?*

As discussed in section 2, there are several technology acceptance and continuance theories and models that consider many different perceptions to explain an IT user's behavior. However, even though technostress influences user perceptions and behaviors (Ragu-Nathan et al. 2008; Ayyagari et al. 2011), none of these models theorizes the role of technostress. In order to study whether it is useful to study technostress in such theories and models, research has to theorize the role of technostress and evaluate whether technostress enhances our understanding of IT user behavior, for example by determining the strength of effect of technostress and by comparing this with other perceptions included in existing theories and models. In response to this research gap, the research question is:

Research question 4: *What is the role of technostress in existing technology acceptance and continuance theories and models?*

Technostress research indicates that whether users perceive techno-stressors might depend on individual characteristics and differences such as age, gender or experience (e.g., Ragu-Nathan et al. 2008). However, users also differ in terms of personality traits. Prior IS research also reveals that these characteristics influence users' perceptions and behaviors (McElroy et al. 2007; Devaraj et al. 2008), but their influence on the perception of and reactions to technostress have not yet been studied. To close this gap and to study whether some users are predisposed to be more or less susceptible to technostress, it is necessary to study how personality traits influence the causes and consequences of technostress, so the research question is:

Research question 5: *What is the impact of user personality on the causes (stressors) and consequences (strain) of technostress?*

Recent research in the field of technology usage discusses the influence of user addiction, which is a particular type of behavioral, non-substance addiction (Turel et al. 2011). In doing so, addiction has been identified as cause of distorted perceptual beliefs, so that individuals having a pathological and compulsive need to use a technology continuously (referred to as "addicts" in this dissertation), consider the characteristics of a technology they are addicted to as more positive than non-addicts (Turel et al. 2011). The high usage intensity of addicts, however, also frequently confronts addicts with stressful stimuli caused by the technology. Typically, technostress causes users to change something about the current situation in which stress is perceived by changing their behavior (Lavee et al. 1987); however, there is not sufficient research on whether this is also the case when the user is addicted to the technology. To close this research gap, research is needed that investigates how technostress is related to the typical distorted psychological and behavioral patterns caused by user addiction. Based on this gap, the research question is:

Research question 6: *What is the influence of user addiction on the causes (stressors) and consequences (strain) of technostress?*

By focusing on individuals' IT usage for work purposes, prior technostress research deals with stress caused by IT. But this focus neglects that the work situation of individuals could also be stressful for many other reasons beyond technostress (see Ayyagari et al. 2011). This means that IT usage is only one stimulus that might be perceived as stressful. When focusing on the stressor work-home conflict, the usage of IT including laptops or smartphones might blur the boundaries between professional and private life (Ayyagari et al. 2011). However, not all causes of work-home conflict are grounded in IT usage. In contrast, working long hours, having managerial responsibility, having to support colleagues, being married, having children or dependents at home, or having to support a family might also cause individuals to perceive the stressor work-home conflict (Boyar et al. 2008). Due to this, this dissertation aims to study the role of technostress in an overall stress model including stressors that do not only focus on IT-induced stress (e.g., Moore 2000a; 2000b), so that the research question is:

Research question 7: *What is the impact of technostress on overall work stress?*

As presented in Table 1, technostress and its consequences are mostly studied using perceptual data. In more detail, eight out of nine articles use empirical studies to collect perceptual data about technostress, its causes and its consequences. The findings of Riedl et al. (2012) are the exception as they set up an experimental research and collect objective data. Based on salivary cortisol changes, the research posits that a system breakdown has significant influences on humans' major stress hormone. However, it is unclear what and how other psychophysiological reactions to stressors can be captured and whether stressors lead to different objective behavioral patterns, so that the research question is:

Research question 8: *What are objective psychophysiological reactions to stress when using IT and how can they be measured?*

2.5 SUMMARY

In order to understand the causes and consequences of technostress, this section reviews the fields of human behavior and technostress research. Based on a review of technostress research literature, research gaps and detailed research questions are derived, which will be answered the papers constituting this cumulative dissertation. As these papers use multiple methodologies, the following section provides an overview of these research methods before discussing the results of each paper.

3 METHODOLOGY

This dissertation includes literature reviews, qualitative studies, surveys, and experiments to address the research questions and the identified research gaps. This multi-method approach combines the strength of each method (e.g., high controllability in experiments) and allows explorative research to obtain first insights into new phenomena and positivist research to provide empirical evidence and generalizable results. The following sections explain the methodologies used in each paper, including literature review, qualitative research, and quantitative research.

3.1 LITERATURE REVIEW

The dissertation includes two literature reviews. The first one is included in this introductory paper and reviews technostress literature with the objective to reveal gaps in this research stream. The second one, in **Paper VIII**, reviews IS literature focusing on personality as a central theme.

The rationale for this literature review is that prior stress-research emphasizes the important role of personality (e.g., Bakker et al. 2010; Bakker et al. 2006). Based on the findings, the papers that constitute this dissertation either use personality traits as control variables (**Papers II**, **VI**, and **VII**) or study how personality traits influence the perception of technology characteristics and the causes of techno-stressors and strains (Ayyagari et al. 2011).

Both literature reviews use the two steps proposed by Webster and Watson (2002), including a procedure for searching for articles and a proposal for how to classify each article found. The first step spans the search scope, specifying what journals and what period of time will be analyzed. Due to the importance of the eight journals in the AIS Senior Basket (e.g., Lowry et al. 2013), articles published in these journals in the last 10 years are reviewed. Moreover, search terms are identified and refined using pre-tests. Then the identified terms are searched for in titles, abstracts, and author-supplied keywords. After reading the identified articles and verifying their thematic consistency with the objective, the citations used in each article are analyzed to search for articles that have not been identified in the initial search process. Finally, Web of Science and Google Scholar are used to search for articles citing the identified article and again it is analyzed whether these are consistent with the objective and have not been identified in the initial process. In the second step, classification matrixes (e.g., stressor-strain relationship, Theory of a Person) are used to classify the identified articles (Webster and Watson 2002).

3.2 QUALITATIVE RESEARCH

The literature review of technostress research, as shown in Table 1, reveals that the findings in this stream are relatively immature in some ways. In order to close this gap, a qualitative research approach is chosen to increase the understanding in this research field before setting up surveys.

Eisenhardt (1989, p. 534) defines qualitative case study research as "*a research strategy which focuses on understanding the dynamics present within single settings*" and Yin (2009, p. 4) underpins this by emphasizing that it allows "*to retain the holistic and meaningful characteristics of real-life events*". This means that using qualitative case study research particularly enables to answer "*how"* and "*why"* research questions and is most suitable when the relationship between context and phenomenon is unknown (Yin 2009). Six papers of this dissertation use this approach (**Papers I**, **III**, **IV**, **V**, **VI**, and **VIII**).

Paper I includes interviews that accompany the survey to pre-test the measurement items of the survey and to extend the understanding of the empirical results. Therefore, 22 interviews with 17 employees, which reflect 11.3% of the total number of employees, are conducted. **Paper VIII** also provides statements to motivate the importance of user personality. The statements are taken out from case studies of human resources professionals that have been performed over the last years (Table 2). Based on the recommendations of Eisenhardt (1989) and Yin (2009), the interviews followed semi-structured guidelines with open-ended questions to assure that each possible research direction has been examined.

Case studies	Company	Reported in …
Case study I	Sparkasse Coburg-Lichtenfels	Laumer et al. 2012a
Case study II	Bayer AG	von Stetten et al. 2012b
Case study III	msg systems AG	von Stetten et al. 2012b
Case study IV	Deutsche Bahn AG	von Stetten et al. 2012b
Case study V	Coinor AG	Maier et al. 2012f
Case study VI	Baloise AG	von Stetten et al. 2012a; Laumer et al. 2014
Case study VII	Allianz Österreich	Maier et al. 2012a
Case study VIII	adidas AG	von Stetten et al. 2013a
Case study IX	Allianz, Bertelsmann, Henkel, McKinsey & Company	von Stetten et al. 2013a
Case study X	SAP AG	von Stetten et al. 2013a
Case study XI	Verkehrsbetriebe Zürich	von Stetten et al. 2013a
Case study XII	hotel.de	von Stetten et al. 2013b
Case study XIII	A1 Telekom Austria	Weinert et al. 2013
Case study XIV	Krones AG	von Stetten et al. 2014
Case study XV	Otto GmbH & Cop KG	von Stetten et al. 2014
Case study XVI	VOITH GmbH Heidenheim	von Stetten et al. 2014
Case study XVII	Österreichische Post AG	Weinert et al. 2014
Case study XVIII	Bertelsmann SE & Co. KGaA	Eckhardt et al. 2014b

Table 2: Case studies (see Weitzel et al. 2012 for an overview)

In addition, **Papers III**, **IV**, and **V** use 23 interviews to identify why and how individuals use social networking sites (SNS) and to develop items for new scales proposed in these articles (Table 3). Moreover, **Paper VI** uses interviews of 37 individuals to provide meaningful statements about negative perceptions and experiences while refraining from using SNS (Table 3). The critical incident technique (Flanagan 1954) is used, first asking interviewees about critical incidents and then asking for their major positive and negative reactions to them.

Interviews	Research context	Interview objective	Participants	Reported in …
Interview I	SNS (Facebook)	Identifying reasons for and stressors when using SNS	12	**Paper III**, **Paper IV**, **Paper V**
Interview II	SNS (Facebook)	Redefining items for measuring social overload	11	**Paper IV**
Interview III	SNS (Facebook)	Identifying stressors when switching from using one IS to another and identifying stressors when refraining from using SNS	37	**Paper VI**

Table 3: Interviews

Each interview in the five papers was conducted by at least two researchers (Eisenhardt 1989). The interviews were recorded and lasted between 30 minutes and 3 hours. Finally each interview is transcribed and analyzed with MAXQDA. In some cases, complementary sources such as organizational documents or diary entries (Table 4) were used to gain additional insights (Yin 2009).

Diary entries	Research context	Interview objective	Participants	Reported in …
Diary entry I	SNS (Facebook)	Identifying stressors when switching from using one IS to another and identifying stressors when refraining from using SNS	12	**Paper VI**

Table 4: Diary entries

The findings of these qualitative analyses are used in multiple papers of this dissertation in order to interpret the findings from the quantitative analyses presented in the following section.

3.3 QUANTITATIVE RESEARCH

Except for **Paper VIII**, each paper of this dissertation uses a quantitative research approach using empirical data collected in multiple surveys and during experiments, which are explained in the following before the main quantitative research approaches of this dissertation are outlined.

3.3.1 Survey research

Most of the quantitative research results of this dissertation are grounded in data from survey research. This dissertation uses surveys to study IT usage for work and private purposes. To study IT usage for work purposes, the employees of the organization using a certain IT are surveyed. The rationale for this is that these users are the clearly defined population whose beliefs and behaviors are relevant for making statements about work-related IT usage. In order to survey how individuals use IT privately, a list of e-mail addresses of individuals willing to participate in studies set up over the last years was used. The e-mail addresses were collected in two different ways. First, individuals have the possibility to sign up on our institute's website to be informed about and participate in forthcoming surveys. Second, past studies on different issues such as computer personnel-related issues (Table 5) are used to pre-test measures and research models. In addition to the pre-tests, participants could give us permission to invite them to participate in future surveys.

Pre-studies	Participants	Reported in …
Pre-study I	11,481	Laumer et al. 2012b
Pre-study II	6,137	Laumer et al. 2013b
Pre-study III	10,050	Maier et al. 2014c
∑	27,668	

Table 5: Pre-test studies

The results of these pre-studies are then used to redefine measures or identify additional beliefs that are required to understand IT usage behavior of individuals for private purposes. After adapting measures or including beliefs, several studies are performed to investigate how individuals use IT privately.

Altogether, the papers of this dissertation use data from ten different studies, which were either performed in the work context (Studies I and II) or in the private context (Studies III to X). Some of the studies use data collected in one single survey, while others use longitudinal data collected in multiple surveys at different points in time.

Study I surveys an organization to collect data in the HR department of one of the world's leading automotive suppliers while implementing a new SAP e-recruiting system in 2010. Each of the 150 employees using the new system was surveyed and 106 employees (70.6 percent) returned questionnaires within two weeks. The survey was held online and was advertised by the organization during project meetings and training sessions.

Study II is a single survey of IT usage in organizations, focusing on office-job workers from different organizations. It theorizes and investigates the influence of technostress on employees' daily work stress. In order to reach employees of different organizations with diverse cultural backgrounds, an online survey was set up and individuals were invited via e-mails to take part in the study. The internal list of e-mail addresses was first pre-screened based on the answers given

in past research surveys to include only office-job workers and exclude pupils, students and pensioners, who are not included in the target group for this research. A sample of 1,000 individuals was invited via email and three shopping vouchers in the amount of € 200 each were raffled among the participants. In the end, 306 participants completed the survey without any missing values.

The following studies are realized in the context of IT usage for private purposes to investigate technostress in this research stream. As prior technostress research has neglected this IT usage context, Studies III, IV, V, and VI are used to develop and validate scales. Based on the internal e-mail list, data from 1,336 individuals were collected to validate new scales using, among others, Q-sort method, exploratory and confirmatory factor analysis.

Studies VII and VIII are two single surveys to evaluate research models, investigating how the new validated scales of techno-stressors influence usage behavior. The internal e-mail list was used to invite SNS users to participate. For Study VII, 500 invitations were sent out and 154 individuals completed the survey without missing values. 1,800 individuals are invited to participate in Study VIII and 571 individuals participated. Two papers of this dissertation evaluated a research model each based on these data.

Studies	Research context	Study objective	Participants	Reported in …
Study I	SAP E-recruiting	Evaluating the influence of technological characteristics during an IT implementation on work-related outcomes	106	**Paper I**
Study II	IT in general	Evaluating the role of technostress in work stress	306	**Paper II**
Study III	SNS (Facebook)	Developing and validating of the social stressor scale social overload	51	**Paper IV**
Study IV	SNS (Facebook)	Developing and validating of the techno-stressor and social stressor scales	57	**Paper III**, **Paper V**
Study V	SNS (Facebook)	Developing and validating of techno-stressor scales	571	**Paper III**
Study VI	SNS (Facebook)	Developing and validating of techno-stressor and social stressor scales	657	**Paper IV**, **Paper V**
Study VII	SNS (Facebook)	Evaluating the influence of technostress in continuance usage behavior	154	**Paper III**
Study VIII	SNS (Facebook)	Evaluating antecedents and consequences of the social stressor social overload and evaluating the influence of techno-stressors and social stressors on continuance usage behavior	571	**Paper IV**, **Paper V**
Study IX	SNS (Facebook)	Evaluating the influence of addiction and technostress in continuance usage behavior	490	**Paper VII**
Study X	SNS (Facebook)	Evaluating the influence of user personality on the formation and updating process of antecedents of techno-stress	145	**Paper IX**

Table 6: Study details and objectives

Finally, Studies IX and X are both longitudinal studies using two surveys each. In Study IX, 1,548 e-mail invitations were sent to individuals of the internal mailing list. The first survey was completed by 719 individuals, who then received a second survey six months later. This second survey was completed by 490 individuals. In order to motivate participants to fill out our surveys, a Google Nexus 7 was raffled among the participants in each survey round. In Study X, 500

individuals are selected from the internal mailing list and invited to participate in the study. Based on these invitations, 212 individuals complete the first study and 145 fill out both surveys without missing values. Again, we raffled off three iPads among the participants in each survey to increase the response rate. In both studies, data provided by the final 490 or 145 individuals are used to evaluate a research model.

In summary, Table 6 summarizes the studies conducted, the research context, their objectives, the number of participants and which paper uses the study to evaluate the research models. As the paper also performs experiments to collect data, these are presented in the next section.

3.3.2 Experimental research

The dissertation also uses experimental research twice to manipulate variables and make controlled statements about the influence of technostress on individual behavior.

The objective of Experiment I was to study individuals' chosen behavior when they were aware of the assets (such as usefulness and pleasure) and drawbacks (such as stressors) of using and not-using a particular IT. Based on this, the experiments evaluated to what degree multiple different stress and strain objects influence individual behavior. An experiment with 82 Facebook users is performed in which participants were not allowed to use the SNS for two weeks. Based on stress levels when using the SNS, stress levels when switching IT, and stress levels when refraining from using the SNS or using alternatives, the experiment studies which stress affected user behavior the most. To do so, data was collected in four surveys: the first before starting the experiment, the second during the change process in the first days after starting the experiment, the third at the end of the two weeks of the experiment, and the fourth after finishing the experiment to capture individual behavior. In addition to taking part in surveys, some participants additionally took part in interviews and kept diary entries.

Experiment II aimed to study the objective psychophysiological reactions of individuals while fulfilling IT-based tasks depending on their experience and whether they perceive the stressor pressure to perform. The experiment measured the neurophysiological mechanism skin conductance response (SCR or electrodermal activity), which is the temporary increase in electrical conductivity of the skin that rises when stressors are perceived (Dimoka et al. 2012). In addition to SCR, eye-tracking technology was used to observe participants' behavior and identify behavioral patterns for the two treatments pressure to perform and experience. The experiment was designed as a multifactorial between-subject experiment in the context of the application and enterprise contacting process (Eckhardt et al. 2012a). The 125 participants of the experiment had to perform three tasks of different levels of difficulty in the professional career network LinkedIn.com. In the course of this experiment, individuals also had to complete two surveys about perceptual beliefs and additional information; one before the experiment and one after performing the tasks.

Table 7 provides an overview of the two experiments performed in this dissertation. It contains the research context, their objectives, the number of participants in the experiment and which paper uses the study to evaluate the research models.

Experiments	Research context	Experiment objective	Participants	Method	Reported in …
Experiment I	SNS (Facebook)	To evaluate how different stain objects influence individuals behavior	82	Surveys, interviews, diary entries	**Paper VI**
Experiment II	SNS (LinkedIn)	To evaluate how experience and the stressor pressure to perform influence usage behavior	125	Surveys, SCR, eye-tracking	**Paper X**

Table 7: Experiments

3.3.3 Structural equation modeling

Most of the papers using a quantitative research approach use structural equation modeling (SEM), which is considered a second-generation technique, to test hypotheses empirically. SEM belongs to the class of multivariate techniques and combines different aspects of regression with aspects of factor analysis. One way SEM outperforms first-generation techniques of multivariate analysis such as regression-based analysis is that it allows the simultaneous estimation of models with multiple dependent variables and the interconnections between these variables (Gefen et al. 2011).

Another strength of SEM is the ability to use latent variables. These are variables that are of theoretical interest but which cannot be observed or measured directly. Instead they have to be inferred using observable indicators (measures). An example for a latent variable used in several papers that constitute this dissertation is techno-exhaustion. To observe techno-exhaustion, research uses four indicators, such as "I feel drained from activities that require me to use ICTs", which are rated by participants on a 7-point Likert scale from "never" to "daily" (e.g., Ayyagari et al. 2011; **Paper II**). SEM uses these indicators to evaluate relationships between unobservable latent variables. Depending on whether indicators reflect the latent variable or form the construct, indicators are specified as reflective or formative measurement model (Bagozzi 2011). In addition to such first-order constructs consisting of a latent variable with a reflective or formative measurement model, higher-order constructs are used to generate multidimensional constructs with high abstraction levels than its sub-dimension. Such higher-order constructs are considered a latent model in which its dimensions are indicators of the construct (Law and Mobley 1998) and measured with its own reflective or formative measurement model (Polites et al. 2012).

An SEM model consists of two parts: the measurement model and the structural model. The rationale for using two parts is that the "*proper specification of the measurement model is necessary before meaning can be assigned to the analysis of the structural model*" (Anderson and Gerbing 1982, p. 453). The measurement model specifies the direction of the relationship between latent variable and indicators and the structural model specifies relationships between latent variables in terms of hypothesized causal dependencies between endogenous and exogenous variables.

Both the measurement and structural model are validated and evaluated based on different criteria (see Table 8). For reflective measurement models, reliability and validity are assessed. The reliability of each indicator determines the rate of variance of an indicator that comes from the latent variables: more than 50 percent of a latent variable's variance should be explained by the indicators. This means that each indicator's absolute standardized loading should be at least 0.707 (Carmines and Zeller 2008). Moreover, construct reliability assessment focuses on composite reliability, which is a measure of internal consistency and should be higher than 0.70 (Nunnally and Bernstein 1994). Concerning the validity of reflective measurement models, convergent and discriminant validity need to be examined. The average variance extracted (AVE) is one possible criterion of convergent validity. AVE should be 0.5 or higher in order to ensure that a latent

variable is able to explain at least the half of the variance of its indicators on average (Henseler et al. 2009). For ensuring discriminant validity, literature provides two possibilities. First, the Fornell-Larcker (Fornell and Larcker 1981) criterion can be used, which is fulfilled when each latent variable is higher than the squared correlations with all other latent variables, so that the shared variance of each latent variable is higher with indicators of the same constructs than with indicators of belonging to other constructs. Second, cross-loading can be used to ensure discriminant validity, whereby each indicator should have the highest correlation with its latent variable and not with other latent variables.

Concerning formative measurement models, these evaluation criteria of reflective measurement models cannot be transferred one-to-one. For formative measurement models, the theoretic rationales as well as expert opinions are of significant importance (Rossiter 2002). In addition, some statistical criterion can be used to assess formative measurement models. Among others, the weights of formative measurement models should be significant and multicollinearity, which reflects that two or more variables are highly correlated, should not be given. A frequent method of detecting multicollinearity is to confirm that the variance inflation factor (VIF) is lower than 5 (Rogerson 2001).

The structural model can be evaluated using the coefficient of determination (R^2) and the significance level of each path coefficient (Chin 1998). R^2 is defined as the proportion of variability in the data that is explained by the statistical model and hence should be high to explain the endogenous latent variables' variance well. Chin (1998) provides some thresholds for R^2 values and describes R^2 values of 67%, 33%, and 19% as substantial, moderate, and weak, respectively. The path coefficients can be interpreted as standardized beta coefficients that are calculated in ordinary least squares regressions. Then, bootstrapping technique can be used to determine whether a path coefficient is significant as well as at which level a path is significance.

Measurement models	Reflective	**Indicator reliability**: Indicator loadings > 0.707
		Convergent validity: Average variance extracted (AVE) > 0.50
		Internal consistency reliability: Composite reliability > 0.70
		Discriminant validity: AVE > construct's highest squared correlation with another latent construct Indicator's loadings > all of its cross loadings
	Formative	Examining/reporting **indicators' weights** (relative importance) and **loadings** (absolute importance); using **bootstrapping** to determine significance
		Multicollinearity: Variance inflation factor (VIF) < 5
Structural model		**R^2-values**: R^2 > 19% = weak R^2 > 33% = moderate R^2 > 67% = substantial
		Level and significance of path coefficients (Bootstrapping to determine path coefficients' significance); t-values for a two-tailed test: 1.65 = 10% significance level 1.96 = 5% significance level 2.58 = 1% significance level 3.29 = 0.1% significance level

Table 8: Criteria for evaluating measurement and structural model (see among others Hair et al. 2014)

The two most common types of SEM in the stream of IS research are partial least squares (PLS) path modeling or covariance-based structural equation modeling (CBSEM) (Gefen et al. 2011). Nevertheless, both types differ widely in their philosophy. One difference is that PLS has fewer requirements on sample size or data distribution but these gains come at the cost that the measurement error variance is not modelled explicitly. Such error variances are explicit in CBSEM but this type of SEM can only be used with large data samples and normally distributed data. Moreover, PLS is prediction-oriented and is most suitable for exploratory research whereas CBSEM is parameter-oriented as it provides fit statistics to reveal the fit between empirical data and theoretical model, making it more suitable for confirmatory research. As a consequence, two papers use CBSEM to provide fit indexes while validating new scales and eight papers use PLS. The rationale for using PLS in the papers constituting this dissertation to evaluate the research models is that technostress is a negative perception of IT usage that produces skewed distributions (Turel et al. 2011).

To apply PLS path modeling in the papers constituting this dissertation, the software applications SmartPLS (Ringle et al. 2005) was used. In addition to evaluating the measurement models in terms of reliability and validity, SmartPLS is also used to examine common method bias and to determine whether mediation and moderation effects exist. These two uses are explained in the following sections.

3.3.3.1 Accounting for the possible impact of common method bias

When surveys are used to collect self-reporting data, the results are evaluated based on perceptual or subjective measures. Such measures are associated with the threat of method biases, especially common method bias, which is defined as the variance that is "*attributable to the measurement method rather than to the constructs the measures are assumed to represent*" (Podsakoff et al. 2003, p. 879).

In order to evaluate the influence of CMB, each paper with quantitative data uses two ex-post techniques to test for CMB: the Harman's Single-Factor Test (Podsakoff et al. 2003) and the Unmeasured Latent Marker Construct (ULMC) (Liang et al. 2007; Podsakoff et al. 2003). To perform the Single-Factor Test, each indicator is included in an exploratory factor analysis and the unrotated solution is examined. If CMB is present in the data, either a single factor will emerge from the factor analysis or one factor will account for the majority of the variance among the variables. The ULMC technique uses a latent variable in terms of an aggregate of each indicator included in the study to represent as well as partial out the CMB. If CMB is present, the method factor increases the R^2 significantly and has lots of significant path coefficients.

3.3.3.2 Mediation and moderation analysis

Relationships between variables are often more complex than just a simple direct influence of a variable X on another variable Y. Particularly, the influence of X to Y might depend on a third variable M, which is either called mediator or moderator (see Figure 8). As mediator and moderator models are studied in this dissertation, both models and techniques to validate mediating and moderating effects are explained in the following.

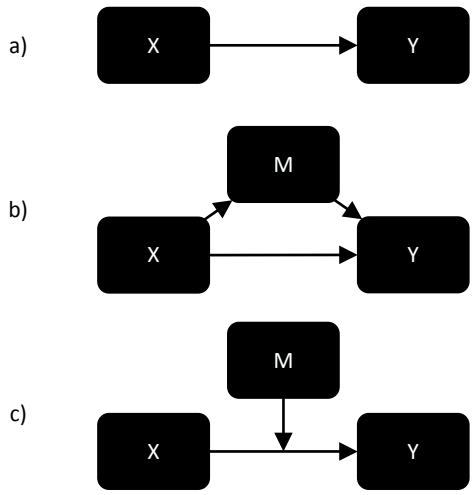


Figure 8: a) Direct model, b) mediator model, c) moderator model

The most basic mediation model is displayed as b) in Figure 8 and reflects a causal system of an antecedent variable X influencing an outcome variable X through an intervening mediator variable M. An existing mediation effect means that X causally influences M and Y, and M has also an impact on Y. Hence, the mediation model contains a pathway from X to Y, which is called the direct effect of X on Y and a pathway from X to Y through M, which is called the indirect effect of X on Y. To empirically validate whether a mediation effect exists, Baron and Kenny (1986) determine three requirements:

1) The independent variable X has to influence the dependent variable Y.

2) The independent variable X has to influence the mediator variable M.

3) The mediator variable M has to influence the dependent variable Y while controlling for the independent variable X.

In addition, the mediation is either full or partial. Full mediation means that the relationship of X on Y drops to zero after including the mediation variable. As this is rarely, it is mostly argued that the influence of X on Y becomes insignificant after entering the mediation variable M. A partial mediation reflects that the mediation variable M influences the dependent variable Y, but the relationship between the independent variable X and the dependent variable Y remains significant. To determine whether a full or a partial mediation exists, the Sobel test is the most frequent approach (Baron and Kenny 1986; Shrout and Bolger 2002). More recently, Preacher and Hayes (2004) provide a bootstrapping method to determine mediation effects. As this is a non-parametric test, this method avoids making assumptions of normality or sample sizes. The test calculates the indirect effect and generates a distribution based on repeatedly randomly sampling observations with replacement from the data. As the mean of the bootstrapped distribution is not equal to the indirect effect, a bias correction is performed. Then the distribution is used to provide a confidence interval, p value and standard error. Given that the computed confidence interval does not include zero, the indirect effect is different from zero and a mediating influence exists.

The most basic moderation model is presented next to c) in Figure 8 and supposes that no relationship between independent variable X and moderator variable M exists. However, the mediator variable M influences the impact of the independent variable X on the dependent variable Y. Henseler and Chin (2010) provide an overview of different approaches to empirically validate whether a moderation effect exists. In this dissertation moderated hierarchical regression

analyses and hierarchical binary logistic regression analyses are run. In both cases the independent, dependent, moderator variables and interaction term are centered first to remove multicollinearity (Cohen et al. 2002). After entering control variables, three steps are performed as the independent variable, the moderator variable, and the interaction term is entered into the model.

The two types of moderation analyses particularly differ when illustrating results. Results of moderated hierarchical regression analyses are illustrated using unstandardized regression coefficients of the independent, moderator, interaction and constant variable. In contrast, hierarchical binary logistic regression analyses, which are used when studying binary dependent variables, convert the logic scale into a probability scale to simplify the interpretation. Due to the nonlinearity of the probability scale, which is based on equation probability (adoption behavior) = $e^{\text{logit response function}} / (1+ e^{\text{logit response function}})$ (Hosmer and Lemeshow 2000), the resulting figure differs from traditional interaction plots. The β-values listed in the last step of the model including all variables as well as selected levels of the dependent variable and +/-0.5 standard derivations for the moderator are then used to generate a figure presenting results (Flom and Strauss 2003).

3.3.4 Q-sort method and factor analysis

As new constructs are developed in this dissertation, Q-sort method and factor analysis are used (Nahm et al. 2002; Straub et al. 2004) to assess reliability and construct validity.

Q-sort method is derived from Q-methodology (Stephenson 1953) and aims to study correlations between individuals (Brown 1997). Specifically, Q-methodology investigates the correlations between individuals across a given number of items in order to assess reliability and construct validity of items. Nahm et al. (2002) suggest a two-step approach to validate new items before using them in surveys. In a first step, individuals sort items to different constructs. Based on that, agreements between the answers of these individuals are calculated. In a second step, incorrectly classified answers are reworded or deleted. These two steps are then repeated continuously until a satisfactory level is reached.

Factor analysis is a technique either used to reduce the number of variables or to classify variables by detecting structure in the relationships between the variables. Based on a given number of variables, the technique produces smaller subsets of these variables, which are called factors. Those variables in these subsets are highly-correlated and variables in different subsets are not highly correlated (Bühl 2008).

The two different types of factor analysis are confirmatory factor analysis (CFA) and exploratory factor analysis (EFA). The most importance difference between both types is that EFA determines the number of factors using an algorithm and CFA runs with a fixed number of factors. This means for EFA no a priori assumption regarding the relationships between the factors is made. The factoring is mostly done by using principal component analysis (PCA) (Straub et al. 2004). Results of an EFA with PCA provide different statistics including Eigenvalues of each factor and a varimax rotations factor matrix. The Eigenvalue reflects the variance of each factor so that a high value stands for a high total variance caused by the factor. The Eigenvalues should be close to 1 or higher and the loadings should be higher than 0.4 to ensure construct validity (Straub et al. 2004). In contrast to that, CFA evaluates a priori hypotheses, so that this requires estimating the number of factors. Then CFA is performed with structural equation modeling software such as AMOS (see **Paper IV**), which provides many fit indices (Table 9). Indices used in this dissertation are χ^2/df, Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Normal Fit Index (NFI), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Incremental Fit Index (IFI), Tucker–Lewis Index (TLI), and Comparative Fit Index (CFI). In more detail, X^2/df

represents the minimum discrepancy divided by the degrees of freedom. GFI indicates the relative amount of variance and covariance that is explained by the model, and the AGFI adjusts GFI for the degrees of freedom. NFI and CFI indicate the percentage enhancement in fit over the baseline model. The RMSEA is a standardized estimation that is used to represent closeness of fit. SRMR represents the standardized difference between observed and predicted covariance. The IFI is used to address the issue of parsimony and sample size. The TLI adjusts NFI for the degrees of freedom and penalizes for model complexity. Each of these indices has a unique threshold that has to be exceeded to conclude that the model fit is acceptable (Table 9).

Criterion	Recommended cut-off criterion	Reference
χ^2/df	> 1 and < 5	Chin et al. 1997; Salisbury et al. 2002
GFI	> 0.90	Jöreskog and Sörbom 1989
AGFI	> 0.80	Jöreskog and Sörbom 1989
NFI	> 0.95	Salisbury et al. 2002
RMSEA	> 0.06	Hu and Bentler 1999
SRMR	> 0.08	Hu and Bentler 1999
IFI	> 0.95	Hu and Bentler 1999
TLI	> 0.95	Hu and Bentler 1999
CFI	> 0.90	Bentler and Bonett 1980; Salisbury et al. 2002

Table 9: Goodness-of-fit measures

These goodness-of-fit measures of Table 9 are among others used to investigate discriminant and convergent validity.

3.4 SUMMARY

The dissertation follows a multi-method approach and combines literature reviews as well as qualitative and quantitative research methods. Using these methods, results are evaluated to respond to the research questions. This is presented in the following section.

4 MAIN RESEARCH RESULTS

The cumulative dissertation includes ten papers that draw on technology usage research and current findings of the field of technostress. By using multiple methodologies, each paper responds to on one or more research questions. The following sections indicate which of the studies and experiments are included in which of the ten papers and particularly present the main research results. Each paper of this dissertation focuses on particular research questions. Table 10 presents a first overview about which paper focuses on what research question. The table also includes the core results of the papers.

	RQ 1: Stressful IT usage contexts	RQ 2: Causes of technostress	RQ 3: Conse-quences of technostress	RQ 4: Technostress in theories and models	RQ 5: Impact of user personality	RQ 6: Impact of user addiction	RQ 7: Technostress and work stress	RQ 8: Psycho-physiological reactions
Paper I	IT imple-mentation	Technology characteristics	Low job satisfaction; turnover intention		Dispositional resistance to change as determinant of PEOU and job satisfaction			
Paper II		Techno-induced job characteristics	Techno-exhaustion; work-exhaustion; low job satisfaction; low organizational commitment; turnover intention	Predictor in work stress models	Negative affectivity as determinant of techno- and work-exhaustion		Techno-influence work stressors; Techno-influence work-exhaustion; occupation determines influence of techno-exhaustion on work-related outcomes	
Paper III	Hedonic, voluntary, private	Technology characteristics; social relationships;	Low satisfaction; low continuous usage intention	Predictor in MATH				
Paper IV	Hedonic, voluntary, private	Social relationships	Exhaustion, low satisfaction, discontinuous usage intention					
Paper V	Hedonic, voluntary, private	Technology characteristics; social relationships	Techno-exhaustion, discontinuous usage intention	Predictor in MATH				
Paper VI	IT change	Technology characteristics: social relationships; adapting new behavior;	Techno-, switching-, alternative-exhaustion; intention to change, behavior change	Predictor in behavior change theory (TPB, TRA)	Extraversion influences behavior change			
Paper VII	Hedonic, voluntary, private				Neuroticism is a determinant of non-usage behavior;	User addiction influences discontinuous usage intention and moderates the impact of discontinuous usage intention on non-usage behavior		
Paper VIII					Literature review suggests personality as predictor of characteristic adaptations			
Paper IX					Dispositional resistance influences PEOU, PU, INT and moderates belief-belief, behavior-belief, and intention-behavior relation			
Paper X			Task fulfillment, user performing					Eye-tracking, skin conductance response

Table 10: The research questions and how they are addressed by the papers of this dissertation

4.1 PAPER I: ANALYZING THE IMPACT OF HRIS IMPLEMENTATIONS ON HR PERSONNEL'S JOB SATISFACTION AND TURNOVER INTENTION[1]

The first paper of this dissertation focuses on a newly implemented IT and theorizes that technology characteristics of this IT cause psychological and behavioral strain. It is assumed that poor technological characteristics might also be the source of low job satisfaction and high turnover intention. Using research on technology acceptance and work-related consequences, six hypotheses are developed.

By evaluating the research model with data from Study I, results of the proposed research model are displayed in Figure 9 and posit the two technological characteristics perceived usefulness and perceived ease of use as influencing factors of attitude. A poor attitude then causes low job satisfaction, which also influences high turnover intentions. Mediation analyses also reveal an indirect effect of attitude on turnover intention through job satisfaction. In addition, the personality trait dispositional resistance to change is included as control variable and significantly correlates with perceived ease of use and job satisfaction.

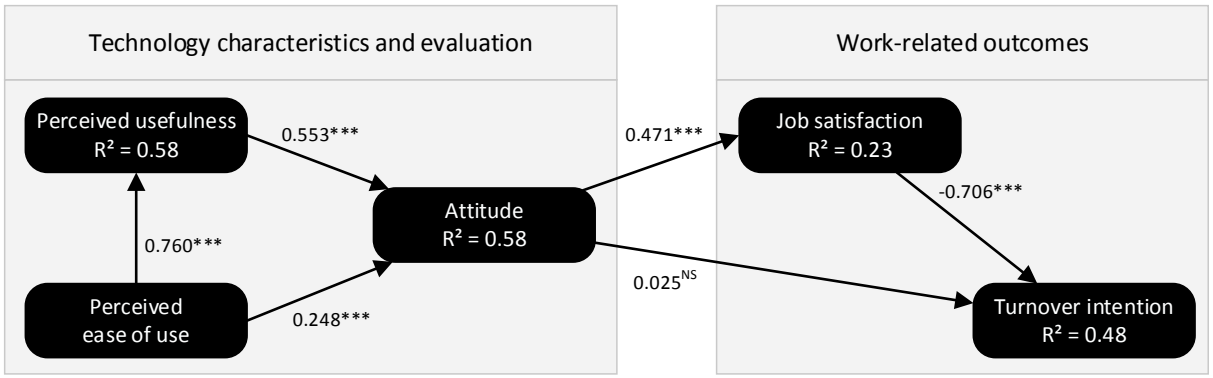


Figure 9: Research results of Paper I (N = 106; *** p < 0.001; NS p > 0.05)

In summary, the paper provides empirical evidence that a lack of system acceptance of a newly implemented IT leads to lower job satisfaction and ultimately even to higher fluctuation, thus responding to research questions 1, 2, 3, and 5. Specifically, **Paper I** identifies IT implementations as the context in which users might be stressed (RQ1). Technology characteristics of the new IT (perceived usefulness, perceived ease of use) are discussed as stressful stimuli (RQ2) and job satisfaction and turnover intention are highlighted as sources of psychological and behavioral strain (RQ3). Finally, the significant impact of dispositional resistance to change on the stressor perceived ease of use and the psychological reaction job satisfaction indicates that user personality is essential when studying the causes and consequences of technostress (RQ4).

[1] Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2013b. Analyzing the impact of HRIS implementations on HR personnel's job satisfaction and turnover intention, The Journal of Strategic Information Systems (22:3), pp. 193–207.

4.2 PAPER II: INFORMATION TECHNOLOGY AS DAILY STRESSOR: PINNING DOWN THE CAUSES OF BURNOUT[2]

Although the increasing diffusion and usage of IT is postmarked as major cause for employee's perception of work stress and burnout in the public perception, employees are also exposed to other non-IT related demands and processes causing stress, exhaustion, and burnout (e.g., Moore 2000b; 2000a; Ahuja et al. 2007; Bakker and Demerouti 2007; Podsakoff et al. 2007). Thus, **Paper II** aims to study how technostress and work stress are related and how employees react to these stressors. **Paper II** thus relies on well-studied IS work stress models (Ahuja et al. 2007; Moore 2000a; Rutner et al. 2008) and theorizes the impact of techno-stressors and -exhaustion. In addition, **Paper II** aims to examine the role of employees' occupations and hence whether technostress and its consequences are perceived differently.

In addition to the well-studied stressor-strain relationships, results of an empirical analysis with 306 participants (Study II) posit techno-stressors as a cause of work stressors and techno-exhaustion as influencing factor of work-exhaustion (Figure 10). The results also document that technostress and its consequences depend on employees' occupations, as they differ for IT professionals, for whom IT is the core of their working process (e.g., software developers, who design, implement, and test systems), and non-IT professionals, who only use IT as supporting instrument for their daily working process (e.g., recruiters in HR using Microsoft Excel or logisticians using SAP) in three ways:

1) IT professionals perceive work-home conflict stronger than non-IT professionals.

2) Non-IT professionals perceive techno-exhaustion significant stronger than IT professionals.

3) Non-IT professionals' techno-exhaustion causes low job satisfactions, low organizational commitment, and high turnover intentions directly; but, IT professionals' techno-exhaustion only indirectly influences work-related outcomes mediated by work-exhaustion.

In addition, **Paper II** is in line with prior technostress research emphasizing the important role of the personality trait negative affectivity (Ayyagari et al. 2011) and reveals that it influences techno-exhaustion and work-exhaustion significantly.

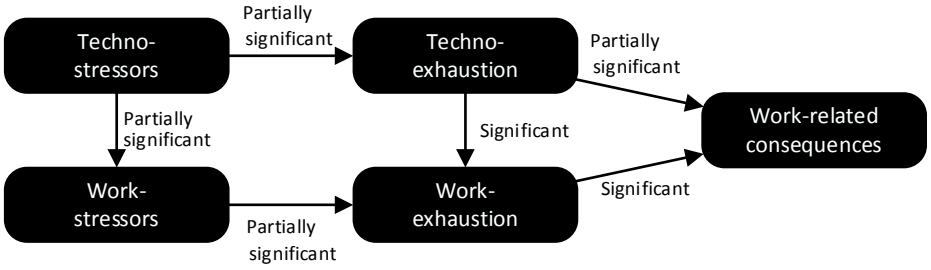


Figure 10: Research results of Paper II (N =306; each arrow stands for at least one hypotheses; partially significant means that at least one hypothesis is confirmed)

[2] Maier, C., Laumer, S., and Eckhardt, A. 2014a. Information technology as daily stressor: pinning down the causes of burnout, Journal of Business Economics; A prior version of this research has been presented and discussed at the "75. Wissenschaftlichen Jahrestagung des VHB" (Maier et al. (2013a)).

As a consequence, **Paper II** closes four of the identified research gaps of technostress research. Positing significant relationships of techno-stressors and -exhaustion to perceptions of well-studied work stress models (RQ4; Ahuja et al. 2007; Moore 2000a; Rutner et al. 2008), it can concluded that technostress is essential when intending to study work stress (RQ2). Among others, techno-exhaustion, work-exhaustion and work-related consequences are psychological and behavioral reaction of employees (RQ3). The results also posit that employees' personality influences technostress and its consequences (RQ5). Noteworthy, the influence of techno-exhaustion on work-related consequences depend on employees' occupations. For non-IT professionals, techno-exhaustion causes poor job satisfaction and organizational commitment and high turnover intentions directly, whereby the influence is only indirect mediated by work-exhaustion for IT professionals (RQ6).

4.3 PAPER III: ONLINE SOCIAL NETWORKS AS A SOURCE AND SYMBOL OF STRESS: AN EMPIRICAL ANALYSIS[3]

Following recent observations that social media such as social networking sites cause perceptions of fatigue, **Paper III** aims to meet two objectives. The first objective is to identify techno-stressors when using hedonic and voluntary technologies, such as SNS, and to develop and validate scales to measure them. The second objective is to theorize and validate the role of techno-stressors in continuance research and hence to make statements about how and to what extent techno-stressors inhibit IT usage.

Based on a review of SNS- and stress-related literature, interviews of twelve SNS users, and two surveys (Studies IV and V), **Paper III** identifies five SNS-specific techno-stressors and provides valid scales. The five techno-stressors are invasion, pattern, complexity, disclosure, and uncertainty. Pattern is perceived when individuals are forced to adapt their behavioral pattern to SNS. Invasion is perceived in situations in which SNS become an integral part of everyday life. Complexity is perceived when SNS are perceived as difficult to handle and an individual feels unable to use it easily. Uncertainty refers to situations in which applications, conditions or terms in SNS are changed frequently. Disclosure reflects that users are forced to disclose information about themselves as well as check the latest news about others in order to be up-to-date regarding their social status.

[3] Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2012c. Online Social Networks as a Source and Symbol of Stress: An Empirical Analysis, Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL).

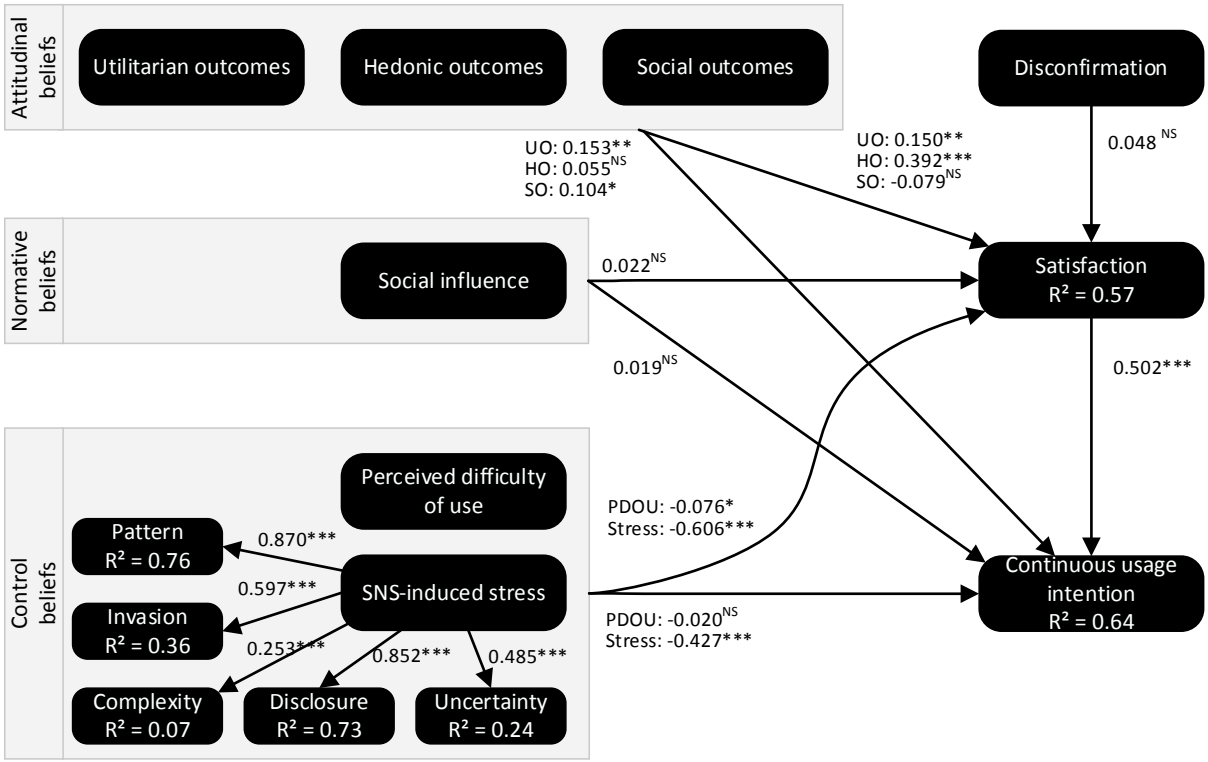


Figure 11: Research results of Paper III (N =154; *** p < 0.001; ** p < 0.01; * p < 0.05; NS p > 0.05)

Concerning the second objective, **Paper III** then bases on MATH (Venkatesh and Brown 2001) and theorizes that the five identified techno-stressors inhibit satisfaction and continuous usage intention. The evaluation of the proposed research models and data from Study VII reveals that the five techno-stressors, conceptualized as a reflective first-order, reflective second-order construct (e.g., Polites et al. 2012), influence satisfaction and continuous usage intention significantly (Figure 11). Notably, post-hoc analysis reveals that the identified techno-stressors have a higher strength of effect on satisfaction than other theoretical explanations, such as attitudinal or normative beliefs, which have been studied in prior research. This post-hoc analysis also identifies that the strength of effect of the five techno-stressors on continuous usage intention is comparable to the one of satisfaction, which has been identified as major influencing factor in IT continuance research (e.g., Lankton and McKnight 2012; Bhattacherjee and Lin 2014).

In summary, **Paper III** provides empirical evidence that in addition to the usage of IT for work, the usage of voluntary, hedonic technologies used privately, such as SNS, might be stressful (RQ1). By doing so, **Paper III** identifies five techno-stressors named invasion, pattern, complexity, disclosure, and uncertainty (RQ2). It also discusses satisfaction and continuous usage intention as suitable variables for studying psychological and behavioral strain in this context (RQ3), which are highly influenced by the five techno-stressors. This becomes visible by studying the techno-stressors in the renowned MATH (RQ4).

4.4 PAPER IV: GIVING TOO MUCH SOCIAL SUPPORT: SOCIAL OVERLOAD ON SOCIAL NETWORKING SITES[4]

Paper IV aims to introduce another type of stressor associated with using voluntary hedonic IT that goes beyond purely techno-stressors. Some types of hedonic IT used privately, such as SNS, confront users with an increasing number of social requests that require some form of reactions. To describe this stressful context, its antecedents and its consequences, **Paper IV** relies on social support theory (Caplan 1974; Cassel 1976; Cobb 1976) and introduces the concept of social overload.

Paper IV defines social overload as a negative perception when users receive too many social support requests and feel they are giving too much social support to other individuals in their virtual social network, resulting in a perception of social overload. The data was collected from interviews with twelve SNS users, nine of whom make statements that they have perceived social overload before. The paper concludes that social overload is a real issue when using SNS. In order to capture social overload, **Paper IV** uses multiple methodologies (literature review, qualitative interviews, quantitative methods such as Q-sort, EFA, CFA) and data sets (Studies III and VI) to develop and validate measurement items. One of the results of **Paper IV** is a scale consisting of six items that reflect perceptions of social overload. This scale is used to understand theoretical antecedents and consequences of social overload. Three groups of antecedents (individual characteristics, usage characteristics, and characteristics of relationships) are identified and psychological and behavioral strains are theorized as reactions to social overload, resulting in a total of twelve hypotheses.

The evaluation of the proposed research model with an empirical study of 571 SNS users (Study VIII) reveals that individual characteristics do not influence whether users perceive social overload but usage characteristics, such as the extent of usage and the number of friends, and relationship characteristics, such as type of relationship and subjective social support norm, have a significant influence (Figure 12). The results also posit social overload as a cause of psychological and behavioral strain, resulting in user exhaustion, decreased satisfaction and increased discontinuous usage intentions.

[4] Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2014b. Giving too much Social Support: Social Overload on Social Networking Sites, European Journal of Information Systems; A prior version was presented at "the 20th European Conference on Information System (ECIS)" (best paper nomination): Maier et al. (2012e)

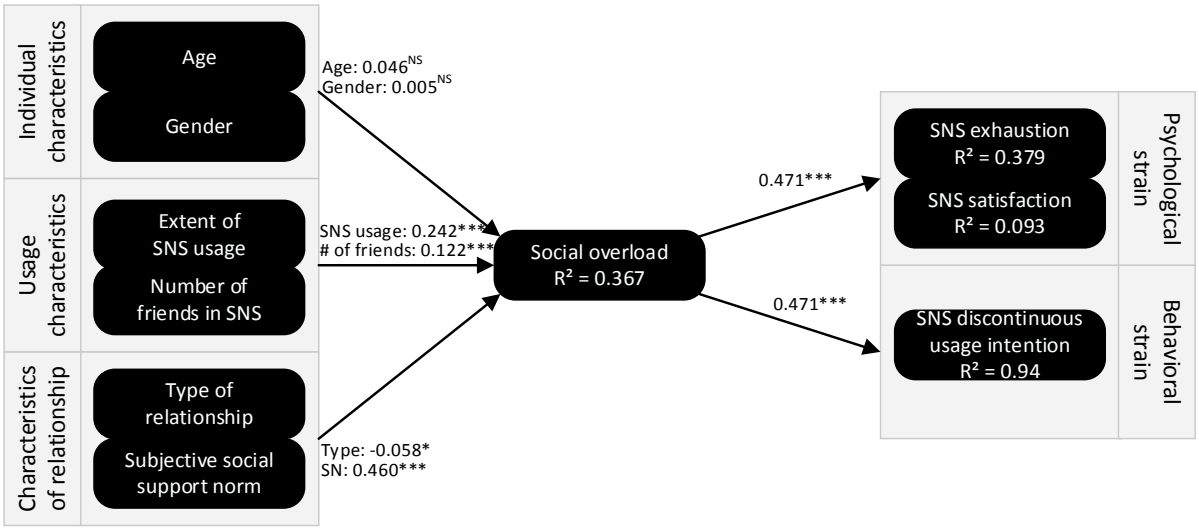


Figure 12: Research results of Paper IV (N =571; *** p < 0.001; ** p < 0.01; * p < 0.05; NS p > 0.05)

In summary, **Paper IV** provides a theoretical foundation and empirical evidence for the fact that voluntary, hedonic IT used for private purposes can be a source of stress (RQ1). This paper also provides theoretical and empirical evidence that some stressors are detached from technological characteristics (RQ2). Finally, the paper identifies psychological strain in terms of high exhaustion and low satisfaction and behavioral strain in terms of discontinuous usage intention as reactions to the stressor (RQ3).

4.5 PAPER V: EXPLAINING TECHNICAL AND SOCIAL STRESSORS IN TECHNO-SOCIAL SYSTEMS: THEORETICAL FOUNDATION AND EMPIRICAL EVIDENCE[5]

Paper V focuses on techno-social systems, which are technology-mediated forums for social interactions (e.g., Vespignani 2009; Fuchs et al. 2010), and studies how and why they cause psychological and behavioral strain. **Paper V** thus builds on the findings of **Paper III** positing techno-stressors and **Paper IV** positing social stressors as causes of strain. This paper identifies additional social-stressors and develops a scale for these to conclude whether techno- or social-stressors have stronger influences on strain.

After validating techno-stressors (e.g., complexity, uncertainty, invasion) and social stressors (e.g., social information, social communication, social action overload) using various methods (Studies IV and VI), **Paper V** draws on the well-known stressor-strain relationship to develop seven hypotheses. The paper also considers the impact of six control variables to respect alternative theoretical explanations.

The results of an empirical study with 571 users of a techno-social-system (Study VIII) show that the two techno-stressors complexity and invasion as well as the social-stressors social information, communication, and action overload cause the psychological strain exhaustion (Figure 13). Here, social information overload reflects a negative perception for users receiving more information from virtual friends than desired. Social communication overload reflects a negative perception for users interacting in SNS with virtual friends more than desired. Finally, social action overload reflects a negative perception when users receive too many social support

[5] Maier, Christian; Laumer, Sven; Eckhardt, Andreas; Weitzel, Tim: "Explaining Technical and Social Stressors in Techno-Social-Systems: Theoretical Foundation and Empirical Evidence", submitted; A prior version was presented at the Pre-ICIS workshop of "*Special Interest Group on Adoption and Diffusion of Information Technology (DIGIT)*" (Maier et al. (2011c))

requests and feel they are giving too much social support to other individuals in their virtual social network. Regarding the strength of effect, the results posit that social stressors have a strong effect and techno-stressors have a weak effect on techno-exhaustion. Notably, techno-exhaustion is identified as the greatest contributing factor for discontinuous usage intention, even more powerful than perceptions studied in prior research, such as dissatisfaction, attitudinal beliefs or normative beliefs.

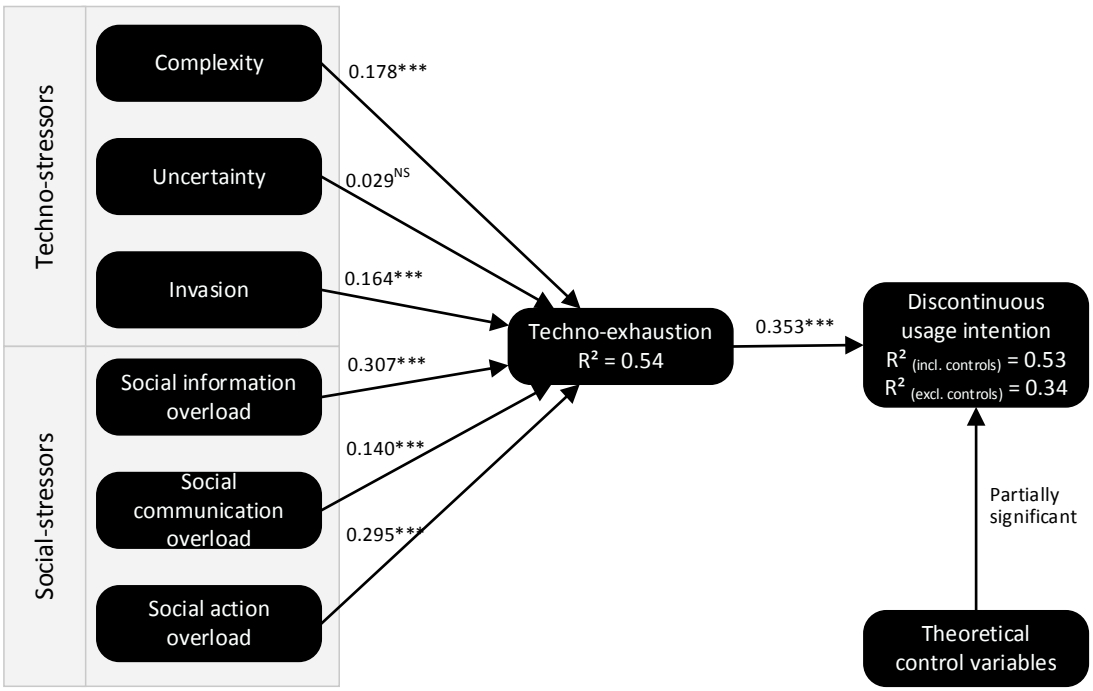


Figure 13: Research results of Paper V (N =571; *** p < 0.001; ** p < 0.01; * p < 0.05; NS p > 0.05)

In summary, **Paper V** posits that the usage of a techno-social system, such as SNS, might be perceived as stressful (RQ1). The reasons for this are not limited to technological characteristics such as complexity or uncertainty, but rather also grounded in social embeddedness, such as social information, communication and action overload (RQ2). These stressors are influencing factors of whether users develop intentions to reduce or even stop using an IT continuously (RQ3). The influence of how these stressors cause psychological and behavioral strain is examined in MATH as an underlying theory (RQ4).

4.6 PAPER VI: SHOULD I STAY OR SHOULD I GO? THEORIZING AND ANALYZING BEHAVIOR CHANGE IN TECHNOSTRESS RESEARCH[6]

After identifying technostress as a cause of user dissatisfaction and discontinuous usage intention, **Paper VI** investigates whether technostress can cause users to stop using an IT altogether. **Paper VI** assumes that users might switch to and use (non-) technological alternatives when they stop using a technology that fulfills a utilitarian and/or a hedonic purpose. However, as switching and using these (non-) technological alternatives may also be causes of stress, **Paper VI** aims to study how these different potential causes of stress influence the decision whether to use a stressful technology continuously.

[6] Maier, Christian; Laumer, Sven; Weinert, Christoph; Weitzel, Tim: "Should I Stay or Should I Go? Theorizing and Analyzing Behavior Change in Techno-Stress Research", submitted

Paper VI theorizes that three different causes of stress (technostress, switching-stress, and alternative-stress) influence whether individuals use a stressful technology continuously or switch to an alternative. The paper also considers further theoretical explanations and the influence of individual differences on intentions and behaviors.

To evaluate the research model, an experimental setting was set up to compare the influence of stress among individuals using a technology vis-à-vis stress levels when switching to and using alternatives (Experiment I). Based on an empirical analysis with four survey rounds, the results posit that techno-exhaustion result in users developing intentions to change their behavior, whereas switching- and alternative-exhaustion cause users to develop intentions to use the technology continuously (Figure 14). All three exhaustion variables have a much higher strength of effect on intention to change than all other theoretical explanations studied in prior research. Of the three, switching-exhaustion has the highest strength of effect. Finally, intention to change significantly influences behavior change. The results indicate that some individuals stop using the IT altogether and that most individuals reduce their usage extent significantly.

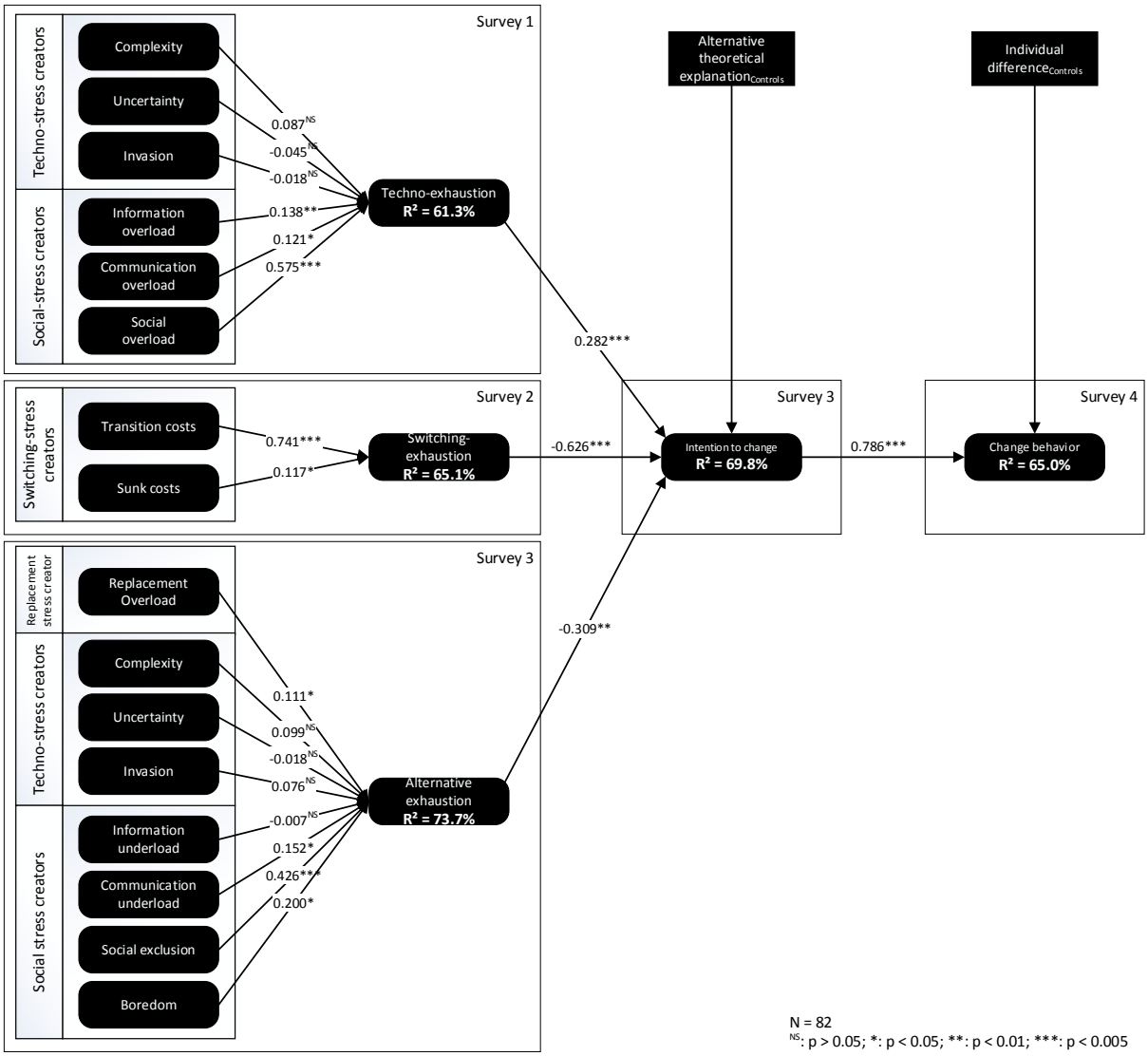


Figure 14: Longitudinal research results of Paper VI (N = 82; *** p < 0.005; ** p < 0.01; * p < 0.05; NS p > 0.05)

Using qualitative data from diary entries, **Paper IV** also reveals stressors influencing the three strain variables. The results are in alignment with **Paper V** and reveal social-stressors as the main contributing factor for techno-exhaustion, and techno-stressors as having no effect. The same

holds for alternative-exhaustion, which is influenced by replacement overload the three social-stressors communication underload, social exclusion, and boredom, but not by techno-stressors. Finally, switching-exhaustion is influenced by transition and sunk costs.

In addition, **Paper VI** also focuses on the role of individual differences and user personality in technostress research. The results reveal that age, gender, and the two user personality traits dispositional resistance to change and neuroticism do not have any influence on user behavior; only the personality trait extraversion has a significant effect in that extraverts do not change their behavior.

In summary, the results of **Paper VI** show that using a hedonic, voluntary IT for private purposes can cause technostress (RQ1); but using (non-) technological alternatives and the switching process can also include stressors (RQ2) causing psychological strain (RQ3). Thus, depending on the individual stress levels, it may be more stressful to switch to and use (non-) technological alternatives to a stressful technology that fulfill a utilitarian and/or a hedonic purpose. By discussing technostress in terms of behavior change theories (RQ4), the results posit technostress as a cause for some users to change their behavior. When this is controlled for the influence of user personality, extraversion is the only significant influencing factor of behavior change (RQ5).

4.7 PAPER VII: THE DUALITY OF THE NEGATIVE SIDE OF SOCIAL NETWORKING SITES: THEORIZING EXHAUSTION AND ADDICTION AS OPPOSING FACTORS INFLUENCING IT NON-USAGE[7]

Although results posit technostress as a cause of discontinuous usage intentions, these intentions are not necessarily transferred into non-usage behavior (see **Paper VI**). In order to explain this, **Paper VII** aims to provide theoretical and empirical evidence for why individuals still continue using the stressful technology. It focuses on user addiction, which is theorized as a source of augmented beliefs causing addicts to consider technologies more useful and enjoyable (Turel et al. 2011) and feel more satisfied and less inclined to stop using the technology continuously. In addition to this distorting influence, **Paper VII** theorizes addiction as a moderator of the effect of discontinuous usage intention on non-usage behavior, such that addicts transfer a certain level of discontinuous usage intentions into non-usage behavior less often than non-addicts.

The results of a two-wave research panel with 490 individuals from the longitudinal Study IX are illustrated in Figure 15 and contradict recent findings that addiction distorts perceptual beliefs (Turel et al. 2011). Moreover, the results show that satisfaction is not influenced by addiction. However, addicts have lower discontinuous usage intentions and, notably, addiction moderates the influence of discontinuous usage intention on non-usage behavior, i.e. addicts are less likely to transfer discontinuous usage intentions into non-usage behavior. Concerning the influence of techno-exhaustion, the results reveal a significant impact on satisfaction and discontinuous usage intentions. Finally, the results posit that neuroticism influences non-usage behavior and extraversion does not.

[7] Maier, Christian; Laumer, Sven; Weitzel, Tim: "The duality of the negative side of social networking sites: Theorizing exhaustion and addiction as opposing factors influencing IT non-usage"; A prior version has been presented and discussed at "the 34th International Conference on Information Systems (ICIS)": Maier et al. (2013b)

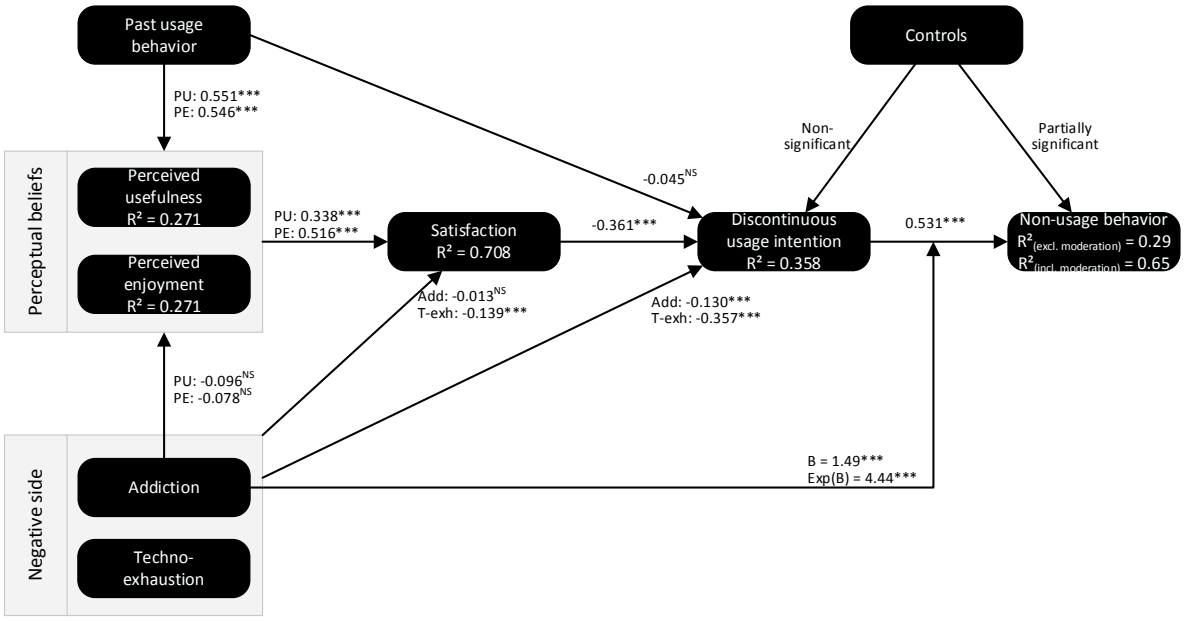


Figure 15: Longitudinal research results of Paper VII (N = 490; *** p < 0.001; ** p < 0.01; * p < 0.05; NS p > 0.05)

In summary, **Paper VII** again posits that using hedonic voluntary IT for private purposes might be stressful (RQ1). Notably, the results show that this might not necessarily impact whether individuals use IT continuously because addicts do not transfer discontinuous usage intentions caused by, for example, techno-exhaustion into non-usage behavior (RQ6). The results also indicate that neuroticism, but not extraversion, influences non-usage behavior significantly (RQ5). Hence, results of the two-wave research panel enable the conclusion to be drawn that some individuals stop using IT after being stressed while others do not because they are addicted.

4.8 PAPER VIII: PERSONALITY WITHIN INFORMATION SYSTEMS RESEARCH: A LITERATURE ANALYSIS[8]

Although general stress-research has discussed the role of personality (Bakker et al. 2010), IS research in general and technostress research in particular has mostly neglected considering the role of user personality. As a consequence, Devaraj et al. (2008, p.93) state that "*several streams of IS research may benefit by incorporating [personality] into theoretical models*". **Paper VIII** reviews prior research discussing personality published in the eight journals included in the AIS Senior Scholars' Basket with the objective to identify how future research in the stream of general IS research and technostress research might benefit from integrating user personality.

This literature review identifies 30 articles discussing user personality in IS research on different hierarchical levels (Figure 16), 17 of which discuss traits on the highest hierarchical level (e.g., big five), nine discuss narrow traits (e.g., optimism), and eight articles focus on IT-specific narrow traits (e.g., computer anxiety). By classifying the identified personality traits in the Theory of a Person, **Paper VIII** explains how these traits might be used to understand the development of beliefs, which are parts of characteristic adaptations, and user behaviors, which are included in objective biography (see Figure 16). As technostress research considers perceptual beliefs about technological characteristics as stressors (e.g., complexity or uncertainty in Ragu-Nathan et al. 2008) and user behaviors as strain (e.g., productivity in Tarafdar et al. 2010 or non-usage behavior

[8] Maier, C. 2012. Personality within Information Systems Research: A Literature Analysis, Proceedings of the 20th European Conference on Information System (ECIS).

in **Paper VII**), **Paper VIII** explains theoretically that user personality determines whether users perceive stressors and strains.

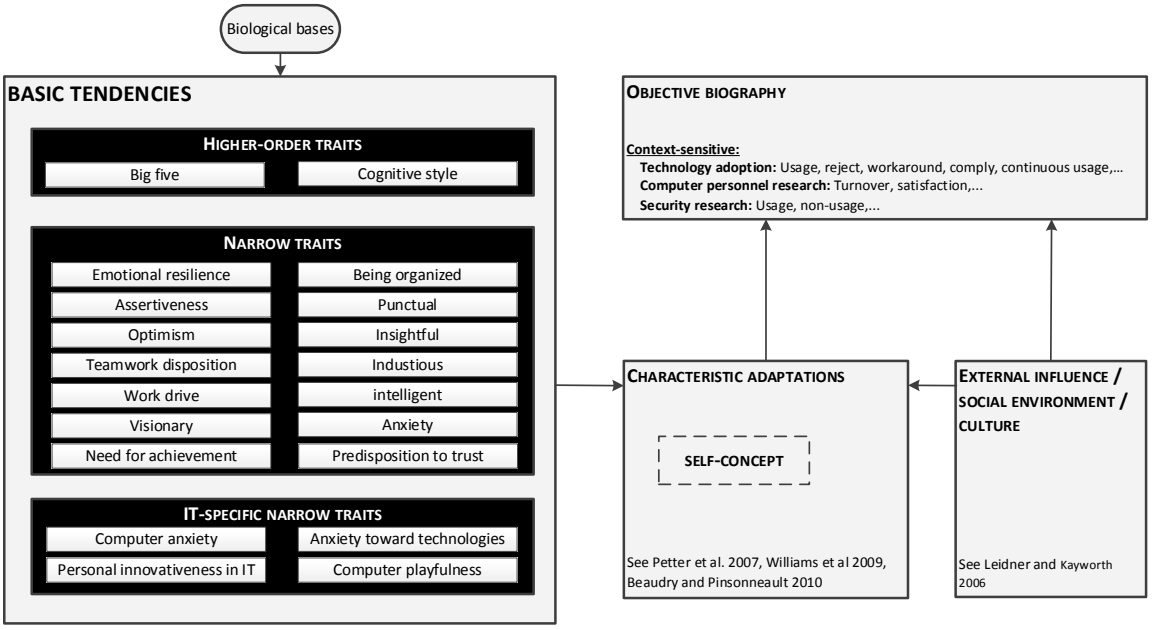


Figure 16: Research results of Paper VIII

In summary, **Paper VIII** provides a literature review about user personality in IS research (RQ5) and posits that personality determine whether users perceive stressors and whether or how they react to them.

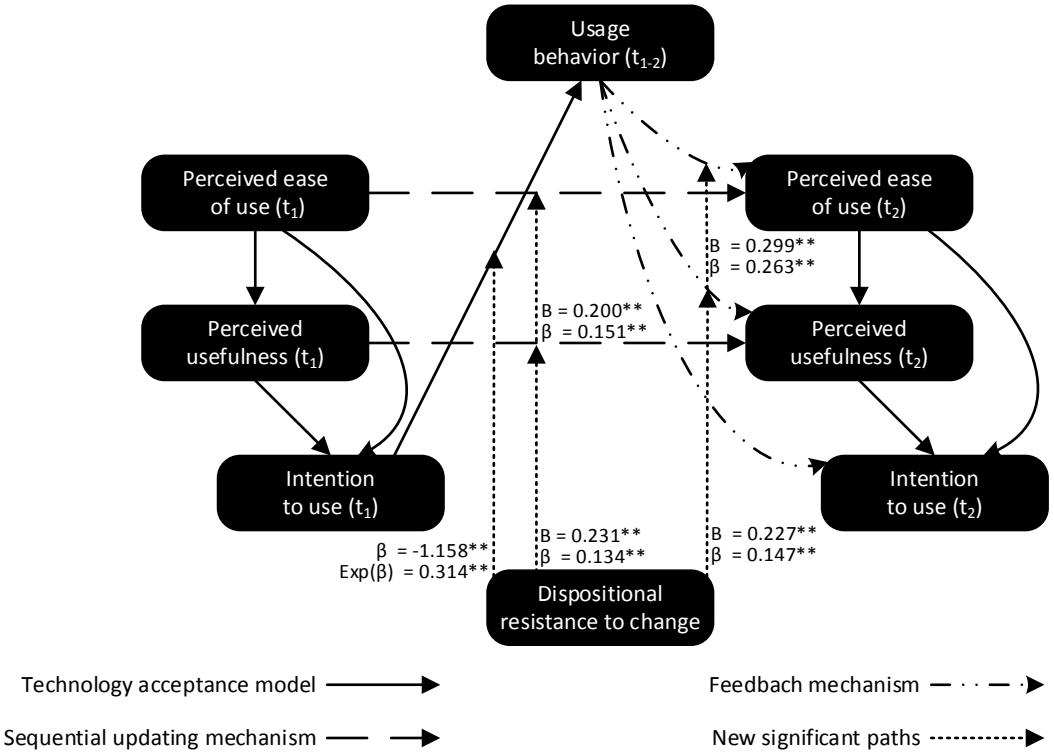
4.9 PAPER IX: USING USER PERSONALITY TO EXPLAIN THE INTENTION-BEHAVIOR GAP AND CHANGES IN BELIEFS: A LONGITUDINAL ANALYSIS[9]

Recent research identifies perceptual beliefs about technological characteristics as a breeding ground of technostress (Ayyagari et al. 2011; Tarafdar et al. 2010). In line with the findings of **Paper VIII**, these beliefs depend on users' personality traits. Hence, **Paper IX** aims to theorize and evaluate how user personality influences stressors, in terms of beliefs about technological characteristics, and strain, in terms of user behavior. **Paper IX** relies on IFTU (Kim 2009) and theorizes that individuals (a) update their perceptual beliefs, (b) form their perceptual beliefs, and (c) transfer intentions into behaviors differently according to their personality.

The results of a two-wave research panel with 145 participants (Study X) indicate that the personality trait dispositional resistance moderates (a) the updating of perceptual beliefs about technological characteristics, (b) the formation of these perceptual beliefs, and (c) the transformation of intentions into usage behavior (Figure 17). This means that resistant individuals update their beliefs less frequently than less resistant individuals. Moreover, resistant individuals using a technology seldom evaluate the characteristics of a technology poorer compared to less resistant individuals using a technology seldom; but the evaluation of an IT's characteristic does not depend on whether individuals are predisposed to be resistant when using the IT frequently. Finally, every individual has an individually threshold when behavioral

[9] Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2012d. Using User Personality to explain the Intention-Behavior Gap and Changes in Beliefs: A Longitudinal Analysis, International Conference on Information Systems.

intentions are transferred into forms of adoption behavior. Less resistant individuals transfer intentions into behavior more readily than resistant individuals, who have higher thresholds above which behavioral intentions are transferred.



Note:
Results of the hierarchical moderated binary logistic regression analysis are specified with β and Exp(β);
Results of the moderated hierarchical regression analyses are specified with B and β

Figure 17: Longitudinal research results of Paper IX ($p < 0.05$; * $p < 0.10$; ^{NS} $p > 0.1$)**

In summary, this research emphasizes the importance of user personality when investigating the development and formation of perceptual beliefs, such as techno-stressors, that ultimately result in psychological and behavioral strain (RQ5). In particular, the results reveal that whether users stop using stressful IT depends on their personality, as people transfer intentions into behaviors differently depending on their personality.

4.10 PAPER X: OBJECTIVE MEASURES OF IS USAGE BEHAVIOR UNDER CONDITIONS OF EXPERIENCE AND PRESSURE USING EYE FIXATION DATA[10]

After using empirical data to understand the causes and consequences of technostress, **Paper X** aims to study psychophysiological reactions towards stress. **Paper X** considers pressure to perform as a specific stressor and observes users' eye movements and applies a new methodology based on the Gaussian mixture model (GMM). In addition, the consequences of the stressor

[10] Eckhardt, Andreas; Maier, Christian; Hsieh, J.J. Po-An; Chuk, Tim; Chan, Antoni B; Hsiao, Janet H.; Büttner, Ricardo: Objective measures of IS usage behavior under conditions of experience and pressure using eye fixation data; Thirty Fourth International Conference on Information Systems, Milan 2013, A prior version has been presented and discussed at "the 33rd International Conference on Information Systems (ICIS)" Eckhardt et al. (2012b)

pressure to perform are also studied by means of SCR in a prior version of this paper (Eckhardt et al. 2012b).

Using eye-tracking technology, the GMM identified seven ROIs, which are depicted in Figure 18. These ROIs are highlighted in different colors. The first ROI, which is highlighted in red, concentrates primarily on the search function of LinkedIn and a button used to add new contacts immediately. The second and third ROIs, which are highlighted in green and blue, include a window welcoming the user to the network and an empty text field that might be used to write status updates. The fourth ROI, which is highlighted in magenta, includes almost two thirds of the entire webpage. It covers the user's LinkedIn contacts' status updates, new connections, and recommendations for jobs or groups in the network they might be interested in. The fifth ROI, which is highlighted in cyan, includes links to the user's profile and one's contacts in the network. The sixth ROI, which is highlighted in yellow, focuses on functionalities on the toolbar linking to groups, mailbox, companies or the job market in LinkedIn. The last ROI, which is highlighted in brown, predominately includes users' eye fixations in the website area displaying other users they might know.

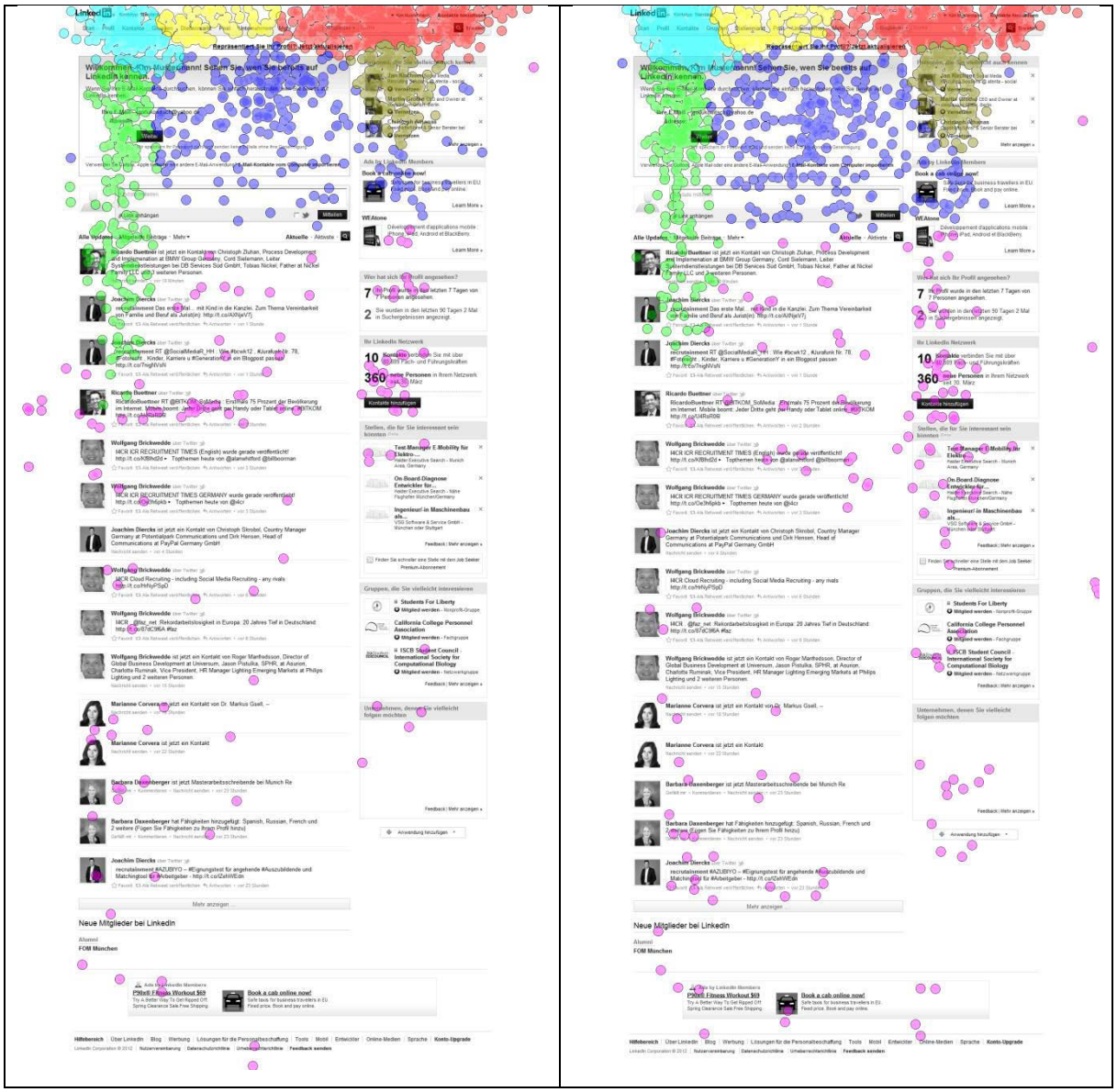


Figure 18: Research results of Paper X (left side: users with pressure to perform; right side: users without pressure to perform)

Based on these ROIs, the results of the multi-method laboratory experiment with 125 individuals (Experiment II) reveal that individuals behave differently when performing IT-related tasks while exposed to the stressor pressure to perform. Stressed users have only one dominant ROI, the search function highlighted in red. Non-stressed participants tend to use the functions contacts and profiles on the tool bar more (highlighted in cyan), so the conclusion can be drawn that stressed users behave in a more focused manner. Concerning user efficiency, stressed users have fewer views on average (20.0 fixations < 20.5 fixations) than non-stressed users. Consequently, results reveal that individuals perceiving the stressor are more efficient and focused while performing a task than individuals not perceiving the stressful stimulus. In addition, pressured users predominately focus on the search functions to look for information on how to fulfill a task. A possible explanation might be some sort of 'Google Bias' reflecting that individuals are used to employing a search engine to look for information before taking further steps to fulfill a task.

In addition to the results visually depicted in Figure 18, statistically results of the distribution according to the Gaussian mixture model and the results for the Chi^2-test are represented in Table 11.

Group under performance pressure								
ROI	1 (Red)	2 (Green)	3 (Blue)	4 (Magenta)	5 (Cyan)	6 (Blue)	7 (Brown)	Total
Number of fixations	462	190	215	125	222	87	158	1459
Percentage	0.317	0.130	0.147	0.086	0.152	0.060	0.108	1.000
Group not under performance pressure								
ROI	1 (Red)	2 (Green)	3 (Blue)	4 (Magenta)	5 (Cyan)	6 (Blue)	7 (Brown)	Total
Number of fixations	382	202	252	150	379	103	130	1598
Percentage	0.239	0.126	0.158	0.094	0.237	0.064	0.081	1.000
Analysis								
Difference in percentage	**0.078**	0.004	-0.010	-0.008	**-0.085**	-0.005	0.027	
Average fixations	**Users under pressure = 20.0 fixations**				**Users not under pressure = 20.5 fixations**			
Chi^2 value	52.0247							
P-value	< 0.001							

Table 11: Gaussian mixture model and Chi^2-test for group under performance pressure and group not under performance pressure

In addition to capturing eye-tracking movement, skin conductance response of users was measured in Experiment II. First results indicate that stressed users show higher SCR values than non-stressed individuals (Eckhardt et al. 2012b: 16 μS > 14 μS). Two SCR-progresses are illustrated in Figure 19, which exemplary indicate that the progress of non-stressed participants is more linear than the wavelike progress of stressed participants.

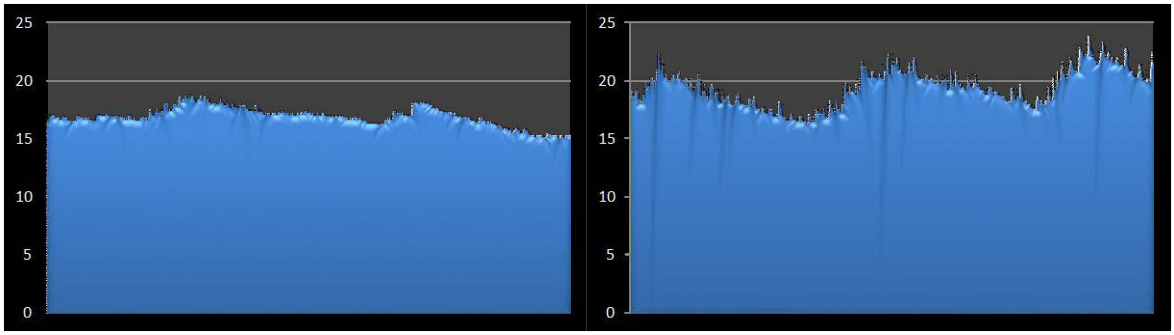


Figure 19: SCR-progress in µS for participants without (left) and with pressure to perform (right) (see Eckhardt et al. 2012b)

In summary, **Paper X** makes a methodological contribution by providing a statistical approach to analyzing eye-movement data with the Gaussian mixture model (RQ8). In addition, **Paper X** posits that individuals perceiving the stressor pressure to perform are more efficient and focused in performing tasks than people not perceiving this stressor (RQ3). Finally, the paper indicates that users experiencing a stressor have higher and more non-linear SCR values than non-stressed users (RQ8).

4.11 SUMMARY

This section presents the main research results of the ten papers included in this dissertation. These are used to respond to the research questions of this dissertation. Using multiple methodologies, the results provide an overview of the causes and consequences of technostress in different IS usage contexts and highlight how related factors such as user personality and addiction impact these. These results contribute to theory and practice in several ways, which will be discussed in the following section.

5 CONTRIBUTIONS AND IMPLICATIONS

The results of the ten papers of this cumulative dissertation (Table 10) provide multiple contributions to theory and implications for practice. These contributions and implications are summarized in the following sections.

5.1 CONTRIBUTION TO THEORY

This section is organized in line with the research questions presented in Section 2. First the context in which stress might be caused by IT is discussed. Then contributions to stressors and reactions to these stressors are focused on in two different subsections. After concentrating on the role of technostress in well-established theories and models, the influence of other variables such as user personality and addiction is discussed. Finally, contributions to work stress research and methodology are discussed.

5.1.1 IT-related contexts causing stress

Prior findings of technostress research reveal IT used for work purposes as a cause of stress. Such technostress research considers IT as a "*collection of information, processing, storage, network, and communication technologies*" (Ayyagari et al. 2011, p. A2). This collection includes mobile, network, communication, enterprise and database, generic application, collaboration, and other work-specific technologies (Ayyagari et al. 2011). Summing up, prior technostress findings are limited

to the context of a collection of utilitarian IT that has to be used by individuals for work purposes.

As management (Johns 2006) and IT usage research (e.g., Venkatesh and Brown 2001; Venkatesh et al. 2003; van der Heijden 2004) emphasize the importance of research context, this dissertation aims to identify contexts of IT usage causing technostress that go beyond mandated, utilitarian IT usage for work purposes. First, **Papers I** and **VI** identify the context of IT implementation and change as sources of stress, as **Paper I** identifies technology characteristics of a newly implemented IT as cause of adverse work-related outcomes and **Paper VI** reveals that the process of switching from a habitual IT to a (non-)technological alternative is stressful. Second, **Papers III** to **VII** challenge view of IT as a collection of different technologies and posit that even one particular IT can be considered a source of stress. The focus of **Papers III** to **VII** is on the usage context, in which individuals use voluntary hedonic technologies for private purposes (see black part of the cube in Table 12). Hence, it can be concluded that stress is also relevant in these fields of technology acceptance and continuance research.

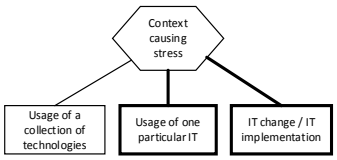
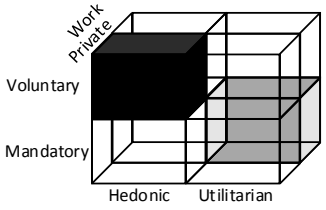
		This dissertation …
Stress is not only caused by using a collection of IS		• Identifies that the context in which stress is perceived is not limited to using a collection of technologies • Determines that even the usage of one particular technology is a stressful usage context. • Reveals the contexts of IT change and implementation as stressful
Stress while using hedonic, voluntary IS for private purposes		• Identifies that stress when using IS is not limited to using utilitarian IS mandatorily for work purposes, as discussed in prior research • Reveals users perceive stressful stimuli caused by hedonic IS used voluntarily for private purposes.

Table 12: Research question 1 – Research contribution concerning stress contexts

5.1.2 Identification of stressors

After identifying that technostress matters in different contexts of IT usage, this dissertation contributes by extending the current understanding of IS research assuming that the causes of stress are limited to the technology itself and its characteristics (Ayyagari et al. 2011; Ragu-Nathan et al. 2008; Tarafdar et al. 2010). As the newly identified stressors can be assigned to different contexts, this section differs among the contexts of a) hedonic, voluntary IT usage for private purposes, b) utilitarian, mandated IT usage for work purposes, and c) IT changes (Table 13).

In the IT usage context of voluntary, hedonic IT for private purposes, the results indicate that technological characteristics are perceived as stressors. Beyond that, social characteristics are perceived as stressful when using IS (**Papers IV** and **V**). The usage of such technology causes individuals to perceive that they are receiving too much irrelevant information, are overextended due to trivial messages, and are too often caring for their friends. These causes are identified as additional stressors and are named social overload, information overload, and communication overload.

When using mandated utilitarian IT for work purposes, the dissertation contributes that employees perceive two different kinds of stressors. First, the five techno-induced work stressors identified by Ayyagari et al. (2011) are discussed as stressful stimuli in **Paper II**. These stressors are techno-induced work-home conflict, invasion of privacy, work overload, role ambiguity, and job insecurity. In addition, beliefs about technological characteristics in terms of perceived

usefulness and perceived ease of use are discussed as two stressful stimuli. This means that technologies perceived as useless or difficult to use might be causes of stress (**Paper I**).

Finally, **Paper VI** focuses on a change process in which individuals switch from using one technology to other (non-) technological alternatives and discusses different stressors. These results respond to Morris and Venkatesh (2010), who call for research focusing on stressful stimuli during IT changes by identifying sunk costs and transition costs as two stressful stimuli influencing users' perceptions and behaviors. As change processes also include using one or more alternatives, **Paper VI** discusses the stressors perceived by users after changing their behavior. As **Paper VI** studies the change process in the context of SNS, users perceive techno-, replacement- and social stressors. Techno-stressors include complexity, uncertainty and invasion. The replacement-stressor includes that users perceive they have to use too many different (non-) technological alternatives to replace the functionalities of the incumbent technology. Noteworthy, the social stressors include that users perceive they receive too less information, are not involved in interactions, are not well-embedded in their social network and perceive a state of boredom when using alternatives to SNS (**Paper VI**).

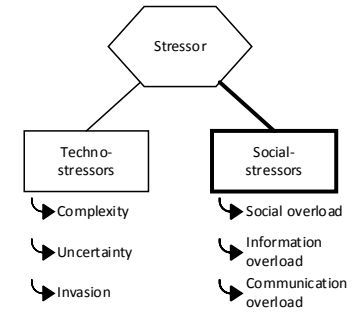
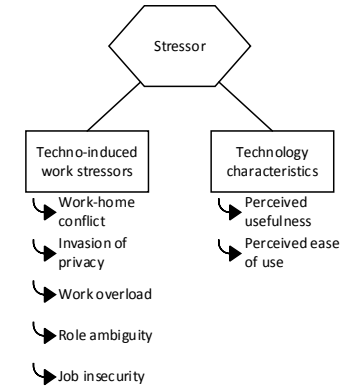
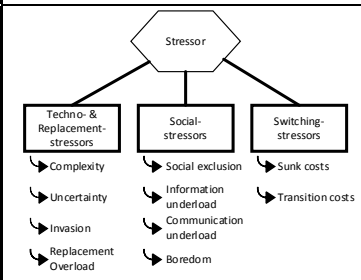
		This dissertation …
Enriched conceptualization of stressors when using voluntary hedonic IT for private purposes		• Reveals that stressful stimuli when using IS are caused by IS (techno-stressors); but also by social environment (social stressors) • Contextualizes social-stressors to IS usage • Develops and validates scales for the social-stressors using multiple methods and studies
Enriched conceptualization of stressors when using mandated utilitarian IT for work purposes		• Confirms that stressors are caused by techno-induced work stressors • Identifies technological characteristics as stressful stimuli
Identification of stressors during and after IT changes		• Reveals that switching from one to other alternatives includes the stressful stimuli sunk costs and transition costs • Identifies techno-, replacement-, and social stressors as stressful stimuli after IT changes. • Adapts and validates measures from IT change literature using an empirical study

Table 13: Research question 2 – Research contribution concerning causes of technostress

In summary, the dissertation contributes to IS stress research by identifying stressful stimuli beyond techno-stressors in multiple contexts. The next section studies user reactions to these stressors by differing between psychological and behavioral strain.

5.1.3 User reactions to stressors

Next to identifying new stressful stimuli, this dissertation also contributes that technostress determines multiple user reactions. Table 14 provides an overview of psychological and behavioral strain for three different contexts.

In the context of using voluntary IT privately, this dissertation contributes that users react to stressors with becoming exhausted from using the technology (**Papers IV, V** and **VII**). Moreover, results contribute that being dissatisfied with the IT is another psychological reaction (**Papers III** and **VII**). Particularly, the dissertation reveals multiple behavioral reactions including discontinuous usage intentions and non-usage behavior (**Papers IV, V** and **VII**). Considering that technostress has not been studied in this IT usage context so far, these psychological and behavioral reactions to stressors contribute that technostress has multiple adverse reactions in this usage context.

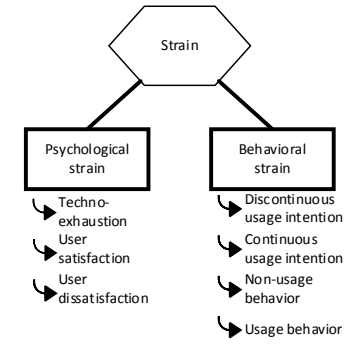
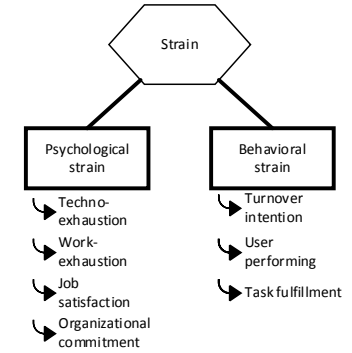
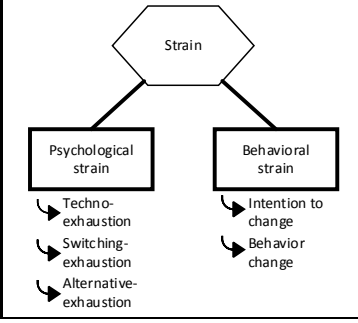
		This dissertation …
Enriched conceptualization of psychological and behavioral strain when using voluntary IT privately		• Identifies dissatisfaction as additional psychological reaction to stressors • Confirms techno-exhaustion and user satisfaction as psychological strain. • Reveals (dis-) continuous usage intentions and (non-) usage behavior as behavioral reactions to stressors • Adapts new measures for these behavioral reactions
Enriched conceptualization of psychological and behavioral strain when using mandated IT for work purposes		• Discusses techno-exhaustion, job satisfaction, and organizational commitment as psychological strain • Reveals work-exhaustion as a reaction to techno-stressors • Confirms turnover intention as a behavioral strain • Identifies user performance and task fulfillment as two behavioral reactions that can be observed objectively
Introduction of psychological and behavioral reactions during and after IT changes		• Reveals switching-exhaustion and alternative-exhaustion as psychological reactions during IT changes • Adapts measures for switching- and alternative-exhaustion • Identifies intention to change and behavior change as behavioral strain for IT change research

Table 14: Research question 3 – Research contributions with consequences for technostress research

Results of the dissertation also confirm techno-exhaustion, job satisfaction and organizational commitment as psychological strain and turnover intention as behavioral strain in the context of mandatory IT usage for work purposes (**Papers I** and **II**). Going beyond these, the dissertation reveals work-exhaustion as an additional psychological reaction and user performing and task fulfillment as two behavioral reactions (**Papers I** and **X**). This means that techno-stressors also influence whether employees are exhausted by their work (see section 5.2.7) and how efficiently

and effectively users perform and fulfill their work tasks. Particularly, user performance and task fulfillment are discussed to capture reactions objectively (see section 5.2.8).

Finally, the results identify psychological and behavioral strain during and after IT changes. **Paper VI** identifies techno-, switching-, and alternative-exhaustion as three psychological strain variables in change projects. Intention to change and change behavior are identified and verified as behavioral reactions in the context of IT changes (**Paper VI**).In summary, the dissertation contributes to current research by identifying psychological and behavioral reactions in different contexts, providing subjective or objective measures to capture the extent of these reactions.

5.1.4 Stressors and strain as major influencing factor in prior research models and theories

This section focuses on the role of the identified stressors and consequences in existing research models and theories and contributes in four distinct ways (Table 15).

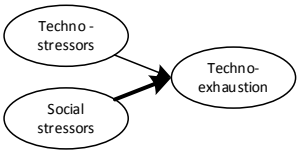
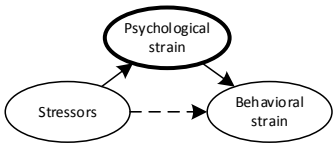
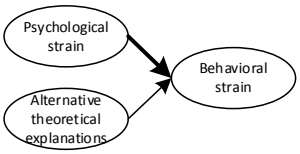
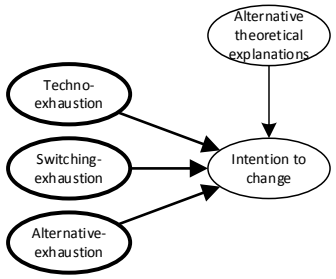
	This dissertation …	
Social stressors as major determinant of techno-exhaustion		• Indicates that social stressors have a strong effect on techno- and alternative-exhaustion • Reveals that social-stressors have a stronger positive impact on techno- and alternative-exhaustion than techno-stressors
Psychological strain as mediator of the stressor-behavioral strain relation		• Identifies the importance of psychological strain in technostress research, as it mediates the impact of stressors on behavioral strain • Extends theoretical argumentation in prior research by identifying psychological strain as an influencing factor for behavioral strain
Psychological strain as the main influencing factor for behavioral strain		• Reveals the importance of psychological strain in continuance research • Discovers that psychological strain has a stronger impact on behavioral strain than perceptions studied in prior research • Discovers that attitudinal and normative beliefs have no direct, significant impact on behavioral strain when considering psychological strain • Reveals psychological strain as an inhibitor
Multifaceted exhaustions as major determinant for intention to change		• Discovers multifaceted exhaustion variables influencing intention to change • Identifies that the three exhaustion variables have a higher effect size than prior theoretical explanations • Reveals switching-exhaustion as the most influencing determinant

Table 15: Research question 4 – Research contribution concerning embedding technostress in theories and models

Due to the limited focus on techno-stressors, prior research concentrates on the relationship between techno-stressors and techno-exhaustion (e.g., Ayyagari et al. 2011). After identifying social stressors as additional stressful stimuli, these are theorized as influencing factor of psychological strain in terms of techno-exhaustion. Notably, the results indicate that techno-stressors no longer influence techno-exhaustion once social stressors are introduced as additional antecedents, so that social stressors are the main contributing factor for techno-exhaustion (**Papers V** and **VI**). Based on this, forthcoming technostress research should broaden their scope of stressors to understand and explain psychological strain in detail.

Based on the stressor-strain relationship (Tarafdar et al. 2010), the dissertation reveals the causal mechanism of the cause-effect-chain from stressors through psychological strain to behavioral strain, which was called for in prior research but has not yet been provided (Thomée et al. 2007). The results show that including a psychological strain variable such as techno-exhaustion into recent IS-related research discussing stressors and behavioral strain implicates that responses can be better explained in terms of behavioral strain (**Papers II, III, V** and **VI**). In summary, it can be concluded that future research discussing stressors or consequences should consider the impact of psychological strain.

By studying how stressors and their consequences influence whether or not individuals use IT continuously, stressors and psychological strain are theorized in well-established models (Bhattacherjee 2001; Venkatesh and Brown 2001). As the newly entered exhaustion variable is the main influencing factor for behavioral intention (**Paper V**), this dissertation posits that research models in the stream of IS continuance should be extended by incorporating stressors and exhaustion to understand users' continuance behavior more detailed.

Finally, this dissertation also contributes to IS change research (**Paper VI**) as it studies multifaceted causes of stressors and exhaustion during the change process on user behavior by responding to Morris and Venkatesh (2010, p. 154) identifying "*the influence of stress on … outcomes, particularly as it is induced by technological change*" as a promising area of future research. By discussing multifaceted stressors and exhaustion in behavior change theories, the three exhaustion variables techno-, switching-, and alternative-exhaustion can be concluded as main influencing factor for intention to change. Hence, this contributes the importance of stress in IT change literature reveals that stress determines user behaviors in many different scenarios.

Overall, the dissertation contributes to IS research by positing that the newly identified stressors explain user reaction better than beliefs studied in prior research. Including psychological strain, such as techno-exhaustion, in well-established theories and models (e.g. MATH) increases the ability to explain user behavior significantly.

5.1.5 The influence of user personality

Recent research criticizes the pure focus on linear relations in theories and models (Kim 2009) as the relationship between perceptual beliefs or the impact of perceptual beliefs on usage behavior might differ for individuals (Brown et al. 2012). As perceptual beliefs and usage behavior conceptualized as stressor or strain are also central variables in technostress, this dissertation contributes by theorizing the influence of user personality (**Papers VIII** and **IX**) on these relationships (Table 16).

Based on prior research revealing the importance of user personality in stress research (e.g., Bakker et al. 2010), this dissertation reveals that the personality trait dispositional resistance to change moderates three different relationships (**Paper IX**).

First, based on the intention-behavior gap identified in prior research suggesting inconsistencies between intentions and behavior, as only a small number of individuals with high intentions actually change their behavior (Bhattacherjee and Sanford 2009), the findings of this dissertation reveal that less resistant individuals transfer lower intention levels into behavior than resistant individuals. This contribution is central to technology acceptance and continuance research as theories and models in this stream use the intention-behavior relationship to explain user behavior. Hence, including dispositional resistance to change as a moderator is one possibility to close the identified gap. For technostress research, this implies that even when stressors cause adverse behavioral reactions, whether they are transferred into non-usage behavior depends to some degree on user personality.

Second, results contribute to belief-update theory (Hogarth and Einhorn 1992; Bolton 1998) by revealing that some individuals are more consistent in their beliefs, whereas others update their beliefs more frequently and change the degree of their beliefs. Resistant individuals are more consistent concerning the degree of their perceptual beliefs than less resistant individuals. As perceptions about the usefulness or complexity (Ragu-Nathan et al. 2008) are considered a stressor influencing strain (Tarafdar et al. 2010), this results contribute that stressors are updated differently depending on user personality.

Third, this dissertation extends self-perception theory (Bem 1972) by contributing dispositional resistance to change as a moderator of the usage-belief relationship. The results indicate that resistant individuals who use a technology less frequently evaluate the technology as poorer than less resistant individuals with an equal technology usage. Nonetheless, the perceptual beliefs for individuals using technologies frequently are evaluated equally for highly and less resistant individuals. In addition to contributing to general self-perception theory, the results contribute to technostress by revealing that stressors vary after using IS continuously.

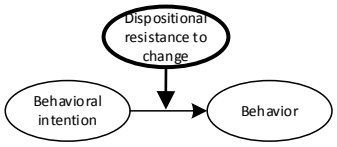
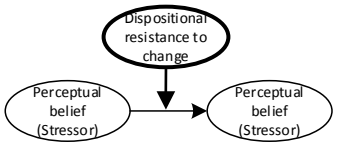
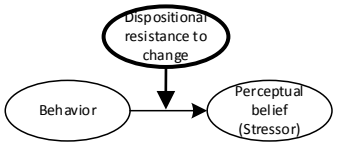
	This dissertation …	
Dispositional resistance to change bridges the intention-behavior gap		• Discovers that dispositional resistance to change moderated the impact of intention on behavior • Identifies that less resistant individuals transfer intention into behavior at lower intention levels than resistant individuals • Reveals one possibility to close the identified intention-behavior gap
Dispositional resistance to change determines belief updates		• Identifies that beliefs are updated in line with user personality • Reveals that resistant individuals are highly consistent in their beliefs; less resistant individuals update and change their beliefs more often • Extends belief-update theory
Dispositional resistance to change influences the behavior-belief relationship		• Discovers that perceptual beliefs are formed based on prior behavior; and also based on user personality • Identifies that dispositional resistance to change moderates how perceptual beliefs are evaluated based on prior usage behavior • Contributes to self-perception theory

Table 16: Research question 5 – Research contribution concerning the influence of user personality

In summary, with contributing user personality as one particular and important cause of whether individuals perceive techno-stressors and how they react to them, the dissertation contributes to two well-established theories in terms of belief-update theory and self-perception theory as well as to the intention-behavior relation that is used in most IS usage models.

5.1.6 User addiction determines whether intentions are transferred into behavior

Recent research highlights user addiction as an important variable when studying voluntary IT usage (Turel et al. 2011; Turel and Serenko 2012) as it might distort perceptual beliefs. Based on that, **Paper VII** focuses on the role of addiction in technostress research.

The results of **Paper VIII** do not confirm recent findings by Turel et al. (2011) that addiction distorts perceptual beliefs. The rationale for this might be that **Paper VIII** also controls for other influencing factor, such as prior usage behavior (Kim and Malhotra 2005; Kim 2009). However, it can be concluded that discontinuous usage intentions is influenced by user addiction, so addicts have lower intentions to stop using an IT than non-addicts. This result is particularly interesting from the viewpoint of technostress research and when considering that techno-exhaustion causes discontinuous usage intentions, as user addiction and technostress are two negative phenomena

of IT usage (Tarafdar et al. 2010; Turel and Serenko 2012), which have, however, opposite consequences on users intentions.

Particularly, **Paper VIII** also finds that user addiction moderates the intention-behavior relationship. This means that addicts have a significantly higher threshold of discontinuous usage intention, possibly grounded in techno-stressors, than non-addicts before these intentions are transferred into non-usage behavior. The rationale for this high threshold is that addicts have a pathological and compulsive need to use IS continuously, so that it is difficult for them to escape from their deeply-rooted behavior. Consequently, technostress does not cause non-usage behavior for individuals who are addicted to the technology.

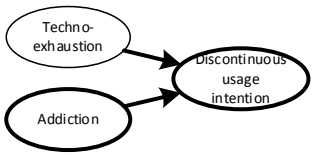
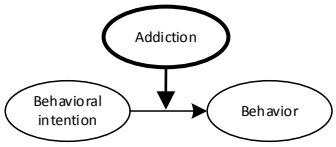
		This dissertation …
Addiction does not distort intentions to stop using an IT		• Reveals user addiction as contributing factor for discontinuous usage intention • Identifies that addicts have no intention to stop using an IT
Addicts transfer only high discontinuous usage intentions into non-usage behavior		• Identifies addiction as moderating factor of the intention-behavior relationship • Reveals that addicts need higher discontinuous usage intentions to transfer them in non-usage behavior than non-addicts • Provides a solution for the intention-behavior gap

Table 17: Research question 6 – Research contribution concerning the influence of user addiction

5.1.7 Technostress and workstress

This dissertation also contributes to understand the role of technostress on whether employees perceive stress at work, by embedding the findings of technostress research into an overall work stress context (e.g., Moore 2000a; 2000b). **Paper II** identifies techno-stressors as a contributing factor for overall work stressors and finds that employees consider IT a specific element at work which is responsible for an increasing overall workload or work-home conflict (Table 18).

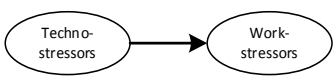
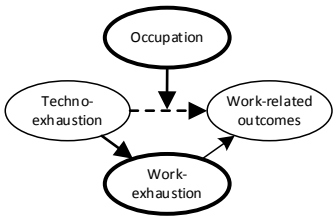
		This dissertation …
Techno-stressors are a particular cause of work stressors		• Reveals that techno-stressors increase employee perceptions of work stressors • Extends work stress research by identifying additional antecedents
Occupation determines whether techno-exhaustion has a direct or indirect impact on work-related outcomes		• Integrates the streams of technostress and work stress research • Discovers techno-exhaustion as antecedent of work-exhaustion • Reveals that the impact of techno-exhaustion on work-related outcomes depends on employee occupation; a direct influence for non-IT professionals and a mediated one through work-exhaustion for IT professionals

Table 18: Research question 7 – Research contribution concerning the influence of technostress on work stress

In addition, although prior research examines techno-exhaustion (Ayyagari et al. 2011) and work-exhaustion (e.g., Moore 2000), no article has theorized how different exhaustion variables influence each other. As work-exhaustion is more all-embracing than techno-exhaustion, techno-exhaustion is theorized and empirically validated as a cause of work-exhaustion, so that work-exhaustion can be contributed as a mediator between techno-exhaustion and work-related outcomes (**Paper II**). Notably, employee occupation determines whether a full or partial

mediation exists as techno-exhaustion has no direct impact on work-related outcomes for IT professionals. For non-IT professionals, techno-exhaustion has a direct and indirect effect through work-exhaustion, so that it can be concluded that occupation plays a role in determining the causes and consequences of techno- and workstress (**Paper II**).

5.1.8 Eye-tracking and EDA to measure psychophysiological reactions towards stress

Finally, this dissertation also includes a methodology contribution (**Paper X**), as it provides new possibilities to measure psychophysiological user reactions to stressful stimuli (Table 19).

As technostress research is mostly on survey-based subjective data, this dissertation revealed two methods for measuring objective reactions to stressors (**Paper X**). First, SCR provides insights into activities in the sympathetic part of the autonomic nervous system (Andreassi 2007) which are caused by stressors (Setz et al. 2010; Svetlak et al. 2010). Using SCR allows objective progress of stress reactions to be measured over time, making it possible to identify situations in which users are most influenced by stressors. Second, eye-tracking technology is used to capture user eye movement in terms of fixations, saccades, number of views and regions of interest. This enables the identification of different behavioral patterns. In order to do so, a novel methodology using the Gaussian mixture model (GMM) to analyze physiological data is contributed. The advantage of this approach is that it does not analyze user behavior based solely on ROIs pre-defined by the researchers (e.g., Kroeber-Riel 1979; Lohse 1997; Drèze and Hussherr 2003; Radach et al. 2003) or based on the subjective evaluation of individuals' fixation maps (e.g., heatmaps) as it is commonly done in prior eye-tracking studies in the field of marketing or social psychology. In contrast, it represents a data-driven approach that enables the researchers to remain objective when evaluating user behavioral patterns. Specifically, the Gaussian mixture model is applied to discover users' actual ROIs and their frequency on view each of ROI.

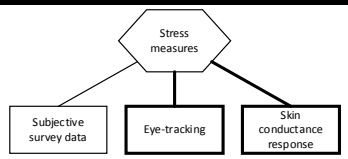
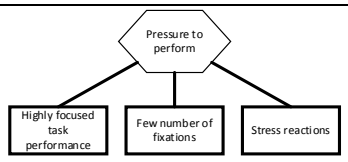
		This dissertation …
Eye-tracking and SCR as methods to measure stress		• Discovers eye-tracking and SCR as measures for consequences of stress • Extends predominant survey-based research
Pressure to perform causes task focus and efficiency; but also stress		• Identifies pressure as cause for high focus and efficiency • Reveals that pressured users have higher SCR values than non-pressured ones

Table 19: Research question 8 – Research contribution concerning psychophysiological reactions on stress

Based on these measures, it can be contributed that the stressor pressure to perform causes users to accomplish task in a more focused manner by viewing regions of interest for fulfilling the task. In addition, users under performance pressure have a lower number of fixations. Nonetheless, the SCR activity of pressured users is significantly higher than for non-pressured users. Overall, pressured users outperform non-pressured ones but suffer in terms of their well-being.

5.2 IMPLICATIONS FOR PRACTICE

In addition to theoretical contributions, this dissertation also has implications for practice. The contributions to practice can be classified as implications for users and providers of SNS as well as for organizations, which are discussed in the following.

5.2.1 Implications for SNS users and providers

Table 20 provides an initial overview of the implications for SNS users and providers. The implications are presented afterwards in detail.

SNS user can reduce stressors and strain on their own	SNS providers can increase the number of active users
• Reduce number of friends • Remove online-only friends • Reduce usage frequency • Use filter mechanism • Disengage from disclosed information	• Optimize filter mechanisms • Increase switching-costs for users intending to stop using SNS to create a lock-in effect

Table 20: Practical implications for SNS users and providers

5.2.1.1 SNS users can actively reduce perceptions of stressors

Research results indicate the identified social stressors can have psychological and behavioral consequences. Although more research is required to identify and evaluate different coping mechanisms, results suggest that users have different possibilities to reduce stressful stimuli when they are perceived. One way is to reduce the number of virtual friends, particularly those only known in the online world. A second way is to lower usage frequency so that stressful stimuli, such as social action overload (**Paper IV**) or social information overload (Laumer et al. 2013c), are perceived as weaker. Another possibility is to use the filter function and hence actively control which information or whose disclosed information is displayed. Finally, users should emotionally disengage from information disclosed in SNS (**Paper IV**). If users do not allow information to influence them emotionally, the stressors are not experienced as strongly.

5.2.1.2 SNS providers might create a lock-in effect by increasing switching-stressors and implementing optimized filter mechanisms to retain users

Paper VI identifies switching-stressors as most strongly influencing whether users stop using SNS and use alternatives instead. This indicates that the two switching-stressors transition and sunk costs can be used by SNS providers to lock users into using SNS continuously.

In addition, the results present a dilemma for SNS providers. On the one hand, SNS providers competing for attention and advertisement revenue want many highly active users. On the other, too many too active users might cause social stressors so that some users reduce their usage (**Papers IV** and **V**). Before more research on this fine balance is available, platform providers might consider offering a critical mass of messages to each user and offering optimized filter mechanisms that allow users to see the commercially and socially most relevant messages but avoid suffering from social stressors. Such filter mechanisms are particularly important as stressors tend to influence user behavior more strongly than comparably positive perceptions. The rationale for this is that users' decision to stop or reduce using SNS is influenced by stressors to a higher extent than by beneficial perceptions such as enjoyment and usefulness.

5.2.2 Implications for organizations

In addition to the presented implications for SNS users and providers, the results of this dissertation also include implications for organizations. These are initially presented in Table 21 and discussed in the following.

Organizations should establish a work environment without adverse reactions to technostress	Organizations should be aware that pressure to perform is a double-edged sword
• Monitor illness days, job satisfaction and turnover behavior during IT implementations • Particularly reduce technostress for non-IT professionals	• Cause benefits in terms of a high focus and efficiency • Cause an adverse reaction in terms of high objective stress reaction

Table 21: Practical implications for organizations

5.2.2.1 Monitor sick days and turnover during IT implementations

The dissertation contains two practical implications for organizations during IT implementations. First, the dependent variables job satisfaction and turnover intention and their importance in IT implementation projects are identified (**Paper I**). These variables should be observed during IT implementation projects, which might cause an increase number of illness days and quitting behaviors during and after the project. However, as organizations do not anticipate this (Laumer et al. 2012a), the observations of decreasing job satisfaction and increasing intentions to quit are a first possible indication of adverse reactions. Second, technostress associated with using IT for work purposes causes particularly non-IT professionals to feel tired from IT activities, but not IT professionals (**Paper II**). Consequently, organizations should particularly focus on non-IT professionals and ensure that they are not exhausted from IT usage, because non-IT professionals react with low job satisfactions or high turnover intentions. Hence organizations should try to implement technical training or organizational help desks for non-IT professionals to avoid such negative consequences.

5.2.2.2 Adjust pressure to perform

The results of this dissertation reveal that pressure to perform has positive but also negative consequences. On the one hand, pressure to perform causes individuals to perform tasks efficiently and be highly focused on their task. On the other hand, pressure to perform also causes psychophysical stress reactions among users. As both are captured through objective data, it can be concluded that pressure to perform increases user performance but it also poses a challenge for users when the pressure crosses a certain threshold, which varies from person to person (**Paper X**). Consequently, organizations might use pressure to perform to increase efficiency but users should be allowed to relax regularly.

6 LIMITATIONS

As with all research, the findings of this dissertation are limited due to the methodologies applied.

The literature reviews of technostress in Section 2 of this introductory paper and of user personality (**Paper VIII**) only cover a limited period. Although the literature review of technostress is up-to-date, the personality review covers articles published before September 2011. Moreover, both reviews concentrate on a selection of top journals and conferences (Lowry et al. 2013), excluding articles in both streams that have been published in other journals or conferences.

The other papers of this dissertation follow an empirical research approach and are limited as only German-speaking individuals could participate in the studies and experiments. This might limit the generalizability of the presented results to this population (Lee and Baskerville 2003; Seddon and Scheepers 2011). One rationale for this is that individuals with another culture

background might differ in their susceptibility to perceiving technostress or that individual differences or addiction influence may cause technostress to another extent.

Moreover, **Papers III** to **VII** study the antecedents and consequences of stress experienced when using IT for private purposes, focusing on Facebook as one representative of a hedonic IT used voluntarily for private purposes. The advantage is that this SNS has the most users and is currently the most prevalent. However, the results may or may not apply to other SNS or technologies.

Some papers of this dissertation include statements from interviews and diary entries (e.g., **Papers IV** and **VI**) to exemplify the meaning of the identified stressors and strains. However, results from these interviews are not generalizable to technologies other than SNS. This means that stressors and reactions to them might differ when studying technostress for another hedonic IT that is used voluntarily for private purposes. Among others, when intending to study stressors and consequences for users of smartphones or instant massagers, other stressors then the identified ones might cause psychological and behavioral strain.

Papers I to **VIII** use perceptual data to study the causes and consequences of technostress. Despite evaluating the influence of CMB with different techniques (see section 2.3.3.1) and revealing that CMB does not influence the data (**Papers I** to **VIII**), Chin et al. (2012) criticize the current ULMC technique by identifying that it does not detect CMB in each scenario. As this might limit the results of the papers including perceptual data, the dissertation also develops a new objective method to measure stress (**Paper X**).

Finally, this dissertation aims to investigate the influence of user personality on the causes and consequences of technostress. Therefore, the dissertation focuses on one particular personality trait; dispositional resistance to change. As a consequence, the results of how user personality influences the causes and consequences of technostress is limited to this personality trait and future research might study how other personality traits influence the perception of and reactions to technostress (for an overview of possible traits see **Paper VIII**). Nonetheless, the focus on this personality trait is in line with prior research for two reasons. First, prior research (Paunonen and Nicol 2001; Lounsbury et al. 2002) identifies narrower personality traits, such as dispositional resistance to change (see **Paper VIII**) as having higher explanatory power with regard to higher-order concepts, such as the Big Five (Costa and McCrae 1985; Eckhardt et al. 2014a). Second, prior research (Paunonen and Ashton 2001) argues that studying personality traits is more promising when identifying a personality trait that has a high accuracy of fit with the research objective (see RQ5). This fit has been discussed in several articles (Laumer et al. 2010; Maier et al. 2011a; 2012b; 2014c), so that the trait dispositional resistance to change seems to be suitable for theorizing and evaluating whether and how user personality contributes to determining the causes and consequences of technostress.

As this section indicates the results of this dissertation are limited in their generalizability, future research is necessary to confirm these results and provide evidence for their generalizability. Beyond that, the following section also provides some possible future research directions.

7 FUTURE RESEARCH

The results and contributions of this dissertation discussed above enable future research to provide additional insights. In detail, this section discusses some research perspectives that might be important and exiting for the discussed research stream.

Theorizing the relationship between subjective and objective stress measures. The majority of the papers of this cumulative dissertation study technostress from a subjective perspective by using measurement items in studies (e.g., **Papers II to VI**). Here, perceptions such as techno-strain are used to determine whether individuals are stressed when using IT. In addition, **Paper X** focuses on objective measures of technostress by using SCR and eye-tracking technology. It is argued that SCR increases and individuals have less numbers of fixations and are more focused in their usage behavior when stressors are perceived. Nonetheless, none of the papers of this dissertation focuses on subjective and objective technostress. As a consequence future research might theorize how these influence each other and study whether perceptions or physiological responses influence usage behavior stronger. Particularly, as the perception of stress and physiological stress responses, such as cortisol levels or heart rate, do not highly correlate (Hellhammer and Schubert 2012), the findings of such research approaches would provide fruitful insights in how the causal chain of biological processes and perceptions in stress situations influence IT usage behavior.

Identifying coping mechanisms and theorizing their effect on technostress. The findings of this dissertation show that individuals are exposed to technostress when using IT for work and private purposes, which in turn influences behaviors (e.g., **Papers II**, **VI**, and **X**). However being increasingly confronted with technostress increases users' need to protect themselves. As the results posit that not using stressful technology is not always a viable solution (**Paper VI**), future research might identify IT-specific coping mechanisms that counteract technostress. Therefore, research might differ between the two coping mechanisms emotional- and problem-focused coping. Emotional-focused coping regulates emotions which occur in response to the stressor (Lazarus and Folkman 1984), aiming to change the emotions towards the perceived threat without changing the realities of the situation. Problem-focused coping manages or mitigates the problem by directly solving the problems (Lazarus and Folkman 1984). These two coping mechanisms might be used by future research to theorize how they influence technostress. Such results would also increase the understanding of how to reduce the perceptions and negative consequences of technostress and provide managers and users with advice.

Studying social-stressors in enterprise or commercial social networking sites. This dissertation aims to study technostress when using voluntary IT privately. **Papers III** to **VII** focus on individuals using SNS for private purposes, such as Facebook, and identify new stressors. However, SNS is also becoming increasingly interesting for organizations as a way to align organizations corporate culture, increase productivity by connecting different software, increase collaboration, optimize organizations knowledge by guiding individuals to the right people, or listen to and understand employees by analyzing interactions and discussions through network analysis tools. Despite these benefits of using enterprise or commercial SNS, they might also be the cause of stressors and hence limit the intended benefits, as technostress reduces productivity (Tarafdar et al. 2010). Consequently, future research might study whether social stressors, such as social information overload, social action overload or social communication overload, or techno-stressors are also an issue when using enterprise or commercial SNS. Such research findings might provide insights whether enterprise SNS are a boon or bane for organizations and its employees.

Identifying 'positive' technostress. The majority of papers in this dissertation consider technostress as something negative. Among others it is considered as cause of low job satisfaction (e.g., **Paper I**), high turnover intentions (e.g., **Paper II**), low satisfaction with using the technology (e.g., **Papers III** and **VII**), high discontinuous usage intentions (e.g., **Papers IV** and **V**) and high change intentions to switch to use another IT (e.g., **Paper VI**). Nonetheless, **Paper X** theorizes and validates through experiment and objective data that some kinds of stressors, such as pressure to perform, might have positive consequences so that individuals

behave more efficiently and in a more focused manner. Based on this, future research might study when IT usage is considered a positive stress, which is known as eustress. Such research would help illuminate when and why stress caused by using IT is friend or foe to users.

Theorizing the influence of new IT for individuals. This cumulative dissertation presents the results of an experiment in which individuals were not allowed to use an IT they had previously used habitually and continuously (**Paper VI**). The aim of this experiment was to integrate multiple strain objects into technostress research and to study individuals' behavior after they are allowed to use the IT again. As this experiment provides significant research contributions to technostress and users behavior (e.g., choice behavior, extent of usage), future research might modify this experiment by giving a group of participant an additional IT which they have not used before. For example, non-users of tablet PC might get one each for four to eight weeks and then have to give them back. Based on such an experiment, future research might provide new insights into different IS research streams. Among others, such findings might reveal how quickly individuals integrate new IT into their daily life and what other IT (or non-IT) is replaced by using the functionality of the new one. Particularly the latter possibility might be interesting as an increasing amount of IT is available to individuals but since time is limited, using an additional IT is likely to result in refraining from doing other activities. In addition, such an experiment would help to study IT-related change-stress twice: first at the beginning when individuals integrate a new IT into their lives, and then when they have to stop using the IT again. Finally, as participants of this experiment are non-users of the IT before using it in the experiment, it also would be interesting whether participants decide to buy the IT after taking part in the experiment and perceiving the benefits and drawbacks. Such research findings might help to understand user behavior in general and the relationship between a number of IT-related perceptions such as technostress, change stress, habit, experience and usage behavior.

In conclusion, after presenting possible future research directions, the next section summarizes the research results and contributions.

8 CONCLUSION

The main objective of this dissertation is to provide theoretical explanations and empirical evidence for the causes and consequences of technostress. The results of this dissertation posit that the IT usage context matters. This means that users perceive technostress when using IT for work and for private purposes; but the causes and consequences differ for both contexts. In the case of using IT for work, technological characteristics and techno-stressors cause employees to feel exhausted at the end of their work day, feel dissatisfied with their job, and develop intentions to quit their job. In the case of IT usage for private purposes, social stressors are identified as new sort of stressor influencing psychological and behavioral strain even more strongly than techno-stressors. Although users of a stressful IT become dissatisfied with its usage and develop intentions to stop using it, the dissertation finds that switching to and using one or more alternatives can be even more stressful. In this context, this dissertation also emphasizes the influence of additional variables, such as user personality on technology characteristics, stressors and strain, concluding that the perception of stressors and strain varies among individuals.

Bearing these conclusions in mind, IT can be seen as a double-edged sword: using IT can be a source of fun, but potentially also a source of stress to others and to ourselves.

9 REFERENCES

Adam, F., and O'Doherty, P., 2000. Lessons from enterprise resource planning implementations in Ireland – towards smaller and shorter ERP projects, Journal of Information Technology (15:4), pp. 305–316.

Ahuja, M. K., Chudoba, K. M., Kacmar, C. J., McKnight, H. D., and George, J. F., 2007. IT Road Warriors: Balancing work-family conflict, job autonomy, and work overload to mitigate turnover intentions, MIS Quarterly (31:1), pp. 1–17.

Ajzen, I. 1991. The theory of planned behavior, Organizational Behavior and Human Decision Processes (50:2), pp. 179–211.

Ajzen, I., and Fishbein, M. 1980. Understanding attitudes and predicting social behavior, Englewood Cliffs, N.J.: Prentice-Hall.

Anderson, J. C., and Gerbing, D. W. 1982. Some Methods for Respecifying Measurement Models to Obtain Unidimensional Construct Measurement, Journal of Marketing Research (19:4), pp. 453–460.

Andreassi, J. L. 2007. Psychophysiology: Human behavior and physiological response, Mahwah, N.J: Lawrence Erlbaum.

Arebey, M., Hannan, M. A., Basri, H., Begum, R. A., and Abdullah, H. 2011. Integrated technologies for solid waste bin monitoring system, Environmental Monitoring and Assessment (177:1-4), pp. 399–408.

Ayyagari, R., Grover, V., and Purvis, R. 2011. Technostress: Technological Antecedents and Implications, MIS Quarterly (35:4), pp. 831–858.

Bagozzi, R. P. 2011. Measurement and meaning in information systems and organizational research: Methodological and philosophical foundations, MIS Quarterly (35:2), pp. 261–292.

Bakker, A. B., Boyd, C. M., Dollard, M., Gillespie, N., Winefield, A. H., and Stough, C. 2010. The role of personality in the job demands-resources model: A study of Australian academic staff, Career Development International (15:7), pp. 622–636.

Bakker, A. B., and Demerouti, E. 2007. The Job Demands-Resources model: state of the art, Journal of Managerial Psychology (22:3), pp. 309–328.

Bakker, A. B., Van Der Zee, K. I., Lewig, K. A., and Dollard, M. F. 2006. The relationship between the Big Five personality factors and burnout: A study among volunteer counselors, The Journal of Social Psychology (146:1), pp. 31–50.

Baron, R. M., and Kenny, D. A. 1986. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations, Journal of Personality and Social Psychology (51:6), pp. 1173–1182.

Bem, D. 1972. Self-Perception Theory, in Advances in experimental social psychology, L. Berkowitz (ed.), New York: Academic Press, pp. 1–62.

Bentler, P., and Bonett, D. G. 1980. Significance tests and goodness of fit in the analysis of covariance structures, Psychological Bulletin (88:3), pp. 588–606.

Bhattacherjee, A. 2001. Understanding Information Systems Continuance: An Expectation-Confirmation Model, MIS Quarterly (25:3), pp. 351–370.

Bhattacherjee, A., and Lin, C.-P. 2014. A unified model of IT continuance: three complementary perspectives and crossover effects, European Journal of Information Systems.

Bhattacherjee, A., and Premkumar, G. 2004. Understanding Changes in Belief and Attitude toward Information Technology Usage: A Theoretical Model and Longitudinal Test, MIS Quarterly (28:2), pp. 229–254.

Bhattacherjee, A., and Sanford, C. 2009. The intention–behaviour gap in technology usage: the moderating role of attitude strength, Behavior & Information Technology (28:4), pp. 389–401.

Bolton, R. N. 1998. A dynamic model of the duration of the customer's relationship with a continuous service provider: The role of satisfaction, Marketing Science (17:1), pp. 45–65.

Boyar, S. L., Jr, Carl P. Maertz, Jr, Donald C. Mosley, and Carr, J. C. 2008. The impact of work/family demand on work-family conflict, Journal of Managerial Psychology (23:3), pp. 215–235.

Brown, S. A., Massey, A. P., Montoya-Weiss, M. M., and Burkman, J. R. 2002. Do I really have to? User acceptance of mandated technology, European Journal of Information Systems (11), pp. 283–295.

Brown, S. A., and Venkatesh, V. 2005. Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Life Cycle, MIS Quarterly (29:3), pp. 399–426.

Brown, S. A., Venkatesh, V., and Goyal, S. 2012. Expectation Confirmation in Technology Use, Information Systems Research (23:2).

Brown, S. R. 1997. The history and principles of Q methodology in psychology and the social sciences (Red at the British Psychological Society Symposium on, A Quest for a Science of Subjectivity: The Lifework of William Stephenson, University of London).

Brynjolfsson, E., and Hitt, L. 1996. Productivity, Profitability and Consumer Surplus: Three Different Measures of Information Technology Value, MIS Quarterly (20:2), pp. 121–142.

Bühl, A. 2008. SPSS 16: Einführung in die moderne Datenanalyse, München: Pearson Studium.

Campbell, D., and Frei, F. 2010. Cost Structure, Customer Profitability, and Retention Implications of Self-Service Distribution Channels: Evidence from Customer Behavior in an Online Banking Channel, Management Science (56:1), pp. 4–24.

Caplan, G. 1974. Support systems and community mental health;: Lectures on concept development, New York: Behavioral Publications.

Carmines, E. G., and Zeller, R. A. 2008. Reliability and validity assessment, Newbury Park, Calif.: Sage Publ.

Cassel, J. 1976. The contribution of the social environment to host resistance, American Journal of Epidemiology (104:2), pp. 107–123.

Cenfetelli, R. T. 2004. Inhibitors and Enablers as Dual Factor Concepts in Technology Usage, Journal of the Association for Information Systems (5:11-12), pp. 472–492.

Cenfetelli, R. T., and Schwarz, A. 2011. Identifying and Testing the Inhibitors of Technology Usage Intentions, Information Systems Research (22:4), pp. 808–823.

Chin, W., Thatcher, J. B., and Wright, R. T. 2012. Assessing Common Method Bias: Problems with the ULMC Technique, MIS Quarterly (36:3), pp. 1003–1019.

Chin, W. W. 1998. The Partial Least Squares Approach to Structural Equation Modeling, in Modern methods for business research, G. A. Marcoulides (ed.), Mahwah N.J.: Erlbaum, pp. 295–336.

Chin, W. W., Gopal, A., and Salisbury, W. 1997. Advancing the theory of adaptation structuration: The development of a scale to measure faithfulness of appropriation., Information Systems Research (8:4), pp. 342–367.

Cobb, S. 1976. Social support as a moderator of life stress., Psychosomatic Medicine (38:5), pp. 300–314.

Cohen, J., Cohen, P., West, S. G., and Aiken, L. S. 2002. Applied Multiple Regression - Correlation Analysis for the Behavioral Sciences, Mahwah, N.J: Lawrence Erlbaum.

Costa, P. T., and McCrae, R. R. 1985. The NEO Personality Inventory manual., Odessa, FL: Psycholog. Assessment Resources.

Davis, F. D. 1989. Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology, MIS Quarterly (13:3), pp. 319–340.

Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. 1992. Extrinsic and Intrinsic Motivation to Use Computers in the Workplace, Journal of Applied Social Psychology (22:14), pp. 1111–1132.

Der Spiegel 2011. Blackberry-Pause: VW-Betriebsrat setzt E-Mail-Stopp nach Feierabend durch. http://www.spiegel.de/wirtschaft/service/blackberry-pause-vw-betriebsrat-setzt-e-mail-stopp-nach-feierabend-durch-a-805524.html.

Devaraj, S., Easley, R. F., and Crant, J. M. 2008. How Does Personality Matter? Relating the Five-Factor Model to Technology Acceptance and Use, Information Systems Research (19:1), pp. 93–105.

Dimoka, A., Banker, R. D., Benbasat, I., Davis, F. D., Dennis, A. R., Gefen, D., Gupta, A., Ischebeck, A., Kenning, P., Pavlou, P. A., Müller-Putz, G., Riedl, R., Vom Brocke, J., and Weber, B. 2012. On the use of neurophysiological tools in IS research: Developing a research agenda for NeuroIS, MIS Quarterly (36:3), pp. 679–702.

Drèze, X., and Hussherr, F.-X. 2003. Internet advertising: Is anybody watching? Journal of Interactive Marketing (17:4), pp. 8–23.

Eckhardt, A., Laumer, S., Maier, C., and Weitzel, T. 2012a. Bewerbermanagementsysteme in deutschen Großunternehmen - Wertbeitrag von IKT für dienstleistungsproduzierende Leistungs- und Lenkungssysteme, Zeitschrift für Betriebswirtschaft (Special Issue 4/2012), pp. 47–75.

Eckhardt, A., Laumer, S., Maier, C., and Weitzel, T. 2014a. The effect of personality on IT personnel's job-related attitudes: Establishing a dispositional model of turnover intention across IT job types, Journal of Information Technology. DOI: 10.1057/jit.2014.27

Eckhardt, A., Laumer, S., Maier, C., and Weitzel, T. 2014b. The Transformation of People, Processes, and IT in E-Recruiting: Insights from an Eight-year Case Study of a German Media Corporation, Employee Relations.

Eckhardt, A., Laumer, S., and Weitzel, T. 2009. Who influences whom? Analyzing workplace referents' social influence on IT adoption and non-adoption, Journal of Information Technology (24:1), pp. 11–24.

Eckhardt, A., Maier, C., and Büttner, R. 2012b. The Influence of Pressure to Perform and Experience on Changing Perceptions and User Performance: A Multi-Method Experimental Analysis, Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL).

Eckhardt, A., Maier, C., Hsieh, J. J., Chuk, T., Chan, A., Hsiao, J., and Buettner, R. 2013. "Objective measures of IS usage behavior under conditions of experience and pressure using eye fixation data," Proceedings of the 34th International Conference on Information Systems.

Eisenhardt, K. M. 1989. Building Theories from Case Study Research, The Academy of Management Review (14:4), pp. 532–550.

Festinger, L. 1957. A theory of cognitive dissonance, Stanford, Calif: Stanford University Press.

Fishbein, M., and Ajzen, I. 1975. Belief, attitude, intention and behavior: An introduction to theory and research, Reading, Mass.: Addison-Wesley.

Flanagan, J. C. 1954. The Critical Incident Technique, Psychological Bulletin (51:4), pp. 327–359.

Flom, P., and Strauss, S. M. 2003. Some graphical methods for interpreting interactions in logistic and OLS regression., Multiple Linear Regression Viewpoints (29:1), pp. 1–7.

Fornell, C., and Larcker, D. F. 1981. Evaluating structural equation models with unobservable variables and measurement error, Journal of Marketing Research (18:1), pp. 39–50.

Fuchs, C., Hofkirchner, W., Schafranek, M., Raffl, C., Sandoval, M., and Bichler, R. 2010. Theoretical Foundations of the Web: Cognition, Communication, and Co-Operation. Towards an Understanding of Web 1.0, 2.0, 3.0, future internet (2:1), pp. 41–59.

Gartner 2011. Gartner Survey Highlights Consumer Fatigue with Social Media. http://www.gartner.com/it/page.jsp?id=1766814. Accessed 7 September 2011.

Gefen, D., Rigdon, E. E., and Straub, D. 2011. An update and extension to SEM guidelines for administrative and social science research, MIS Quarterly (35:2), pp. iii-A7.

Hair, J. F., Hult, G. Thomas M., Ringle, C., and Sarstedt, M. 2014. A primer on partial least squares structural equations modeling (PLS-SEM), Los Angeles: Sage.

Helal, S., Mann, W., El-Zabadani, H., King, J., Kaddoura, Y., and Jansen, E. 2005. The Gator Tech Smart House: a programmable pervasive space, Computer (38:3), pp. 50–60.

Hellhammer, J., and Schubert, M. 2012. The physiological response to Trier Social Stress Test relates to subjective measures of stress during but not before or after the test, Psychoneuroendocrinology (37:1), pp. 119–124.

Henseler, J., and Chin, W. W. 2010. A Comparison of Approaches for the Analysis of Interaction Effects Between Latent Variables Using Partial Least Squares Path Modeling, Structural Equation Modeling: A Multidisciplinary Journal (17:1), pp. 82–109.

Henseler, J., Ringle, C. M., and Sinkovics Rudolf R. 2009. The use of partial least squares path modeling in international marketing, Advances in International Marketing (20), pp. 277–319.

Hogarth, R., and Einhorn, H. J. 1992. Order effects in belief updating: The belief adjustment model, Cognitive Psychology (24:1), pp. 1–55.

Hosmer, D. W., and Lemeshow, S. 2000. Applied logistic regression, New York: Wiley.

Hsu, C.-L., and Lu, H.-P. 2004. Why do people play on-line games? An extended TAM with social influences and flow experience, Information & Management (41:7), pp. 853–868.

Hu, L., and Bentler, P. 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives, Structural Equation Modeling (6:1), pp. 1–55.

Hunton, J. E., Lippincott, B., and Reck, J. L. 2003. Enterprise resource planning systems: comparing firm performance of adopters and nonadopters, International journal of Accounting Information Systems (4:3), pp. 165–184.

Johns, G. 2006. The essential impact of context on organizational behavior, Academy of Management Review (31:2), pp. 386–408.

Jöreskog, K. G., and Sörbom, D. 1989. LISREL-7: User's Reference Guide, Mooresville: Scientific Software.

Karahanna, E., Straub, D. W., and Chervany, N. L. 1999. Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs, MIS Quarterly (23:2), pp. 183–213.

Khan, Z., and Jarvenpaa, S. L. 2010. Exploring temporal coordination of events with Facebook.com, Journal of Information Technology (25:2), pp. 137–151.

Kim, S. S. 2009. The integrative framework of technology use: An extension and test, MIS Quarterly (33:3), pp. 513–537.

Kim, S. S., and Malhotra, N. K. 2005. A Longitudinal Model of Continued IS Use: An Integrative View of Four Mechanisms Underlying Postadoption Phenomena, Management Science (51:5), pp. 741–755.

Kolb, D. G. 2008. Exploring the Metaphor of Connectivity: Attributes, Dimensions and Duality, Organization Studies (29:1), pp. 127–144.

Kolb, D. G., Collins, P. D., and Lind, E. A. 2008. Requisite Connectivity: Finding Flow in a Not-So-Flat World, Organizational Dynamics (37:2), pp. 181–189.

Kroeber-Riel, W. 1979. Activation research: Psychobiological approaches in consumer research, Journal of Consumer Research (5:4), pp. 240–250.

Lang, S., Laumer, S., Maier, C., and Eckhardt, A. 2011. Drivers, challenges and consequences of E-recruiting: a literature review, Proceedings of the 49th SIGMIS annual conference on Computer personnel research, pp. 26–35.

Lankton, N. K., and McKnight, H. D. 2012. Examining Two Expectation Disconfirmation Theory Models: Assimilation and Asymmetry Effects, Journal of the Association for Information Systems (13:2), pp. 88–115.

Laumer, S., Beimborn, D., Maier, C., and Weinert, C. 2013a. Enterprise Content Management, Business & Information Systems Engineering (5:6), pp. 449–452.

Laumer, S., Maier, C., and Eckhardt, A. 2010. Why do they resist? - An empirical analysis of an individual's personality trait resistance regarding the adoption of new information systems, Pretoria, South Africa.

Laumer, S., Maier, C., and Eckhardt, A. 2014. The impact of human resources information systems and business process management implementations on recruiting process performance: A case study, Proceedings of the 20th Americas Conference on Information Systems.

Laumer, S., Maier, C., Eckhardt, A., and Weitzel, T. 2012a. The Implementation of Large-scale Information Systems in Small and Medium-Sized Enterprises - A Case Study of Work- and Health-related Consequences, Proceedings of the 45th Hawaii International Conference on System Sciences.

Laumer, S., Maier, C., von Stetten, A., Weitzel, T., Eckhardt, A., and Guhl, E. 2013b. Bewerbungspraxis 2013 - Eine empirische Studie mit über 6.000 Stellensuchenden und Karriereinteressierten im Internet.

Laumer, S., Maier, C., and Weinert, C. 2013c. The Negative Side Of ICT-Enabled Communication: The Case Of Social Interaction Overload In Online Social Networks, ECIS 2013 Proceedings.

Laumer, S., von Stetten, A., Maier, C., Weitzel, T., Eckhardt, A., and Guhl, E. 2012b. Bewerbungspraxis 2012 - Eine empirische Untersuchung mit über 10.000 Stellensuchenden und Karriereinteressierten im Internet.

Lavee, Y., McCubbin, H. I., and Olson, D. H. 1987. The Effect of Stressful Life Events and Transitions on Family Functioning and Well-Being, Journal of Marriage and Family (49:4), pp. 857–873.

Law, K. S., and Mobley, W. M. 1998. Toward a taxonomy of multidimensional constructs, Academy of Management Review (23:4), pp. 741–755.

Lazarus, R. S., and Folkman, S. 1984. Stress, appraisal, and coping, New York: Springer Pub. Co.

Lee, A. S., and Baskerville, R. L. 2003. Generalizing Generalizability in Information Systems Research, Information Systems Research (14:3), pp. 221–243.

Liang, H., Saraf, N., Hu, Q., and Xue, Y. 2007. Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management, MIS Quarterly (31:1), pp. 59–87.

Liang, H., and Xue, Y. 2009. Avoidance of Information Technology Threats: A theoretical perspective, MIS Quarterly (33:1), pp. 71–90.

Limayem, M., and Hirt, S. G. 2003. Force of Habit and Information Systems Usage: Theory and Initial Validation, Journal of the Association for Information Systems (4:1), pp. 65–97.

Limayem, M., Hirt, S. G., and Cheung, C. M. 2007. How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance, MIS Quarterly (31:4), pp. 705–737.

Lohse, G. L. 1997. Consumer Eye Movement Patterns on Yellow Pages Advertising, Journal of Advertising (26:1), pp. 61–73.

Lounsbury, J. W., Sundstrom, E., Loveland, J. L., and Gibson, L. W. 2002. Broad versus narrow personality traits in predicting academic performance of adolescents, Learning and Individual Differences (14:1), pp. 65–75.

Lowry, P. B., Moody, G. D., Gaskin, J., Galletta, D. F., Humphreys, S. L., Barlow, J. B., and Wilson, D. W. 2013. Evaluating Journal Quality and the Association for Information Systems Senior Scholars' Journal Basket via Bibliometric Measures: Do Expert Journal Assessments Add Value? MIS Quarterly (37:4), pp. 993–1012.

Maier, C. 2012. Personality within Information Systems Research: A Literature Analysis, Proceedings of the 20th European Conference on Information System.

Maier, C., Laumer, S., and Eckhardt, A. 2011a. Dispositional Resistance to Change and Social Network Site Adopters' and Non-Adopters' Attitudinal Beliefs - An Empirical Analysis, Proceedings of the 19th European Conference on Information Systems.

Maier, C., Laumer, S., and Eckhardt, A. 2011b. Technology Adoption by Elderly People – An Empirical Analysis of Adopters and Non-Adopters of Social Networking Sites, in Theory-guided modeling and empiricism in information systems research, A. Heinzl, P. Buxmann, O. Wendt, and T. Weitzel (eds.), Heidelberg, New York: Springer, pp. 85–110.

Maier, C., Laumer, S., and Eckhardt, A. 2013a. Pinning Down the Sources of Burnout: The Role of Information Technology as Daily Stressor, Erweiterte Zusammenfassung veröffentlicht im Tagungsband der 75. Wissenschaftlichen Jahrestagung des VHB, Würzburg.

Maier, C., Laumer, S., and Eckhardt, A. 2014a. Information technology as daily stressor: pinning down the causes of burnout, Journal of Business Economics.

Maier, C., Laumer, S., Eckhardt, A., von Stetten, A., and Weitzel, T. 2012a. Recruiting Trends 2012 Österreich - Eine empirische Untersuchung mit den 500 größten Unternehmen aus Österreich.

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2012b. Conceptualization, Operationalization, and Empirical Evidence for an Individual's Dispositional Resistance to IT-Induced Changes, Proceedings of the 18th Americas Conference on Information Systems (AMCIS), Seattle (WA).

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2012c. Online Social Networks as a Source and Symbol of Stress: An Empirical Analysis, Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL).

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2012d. Using User Personality to explain the Intention-Behavior Gap and Changes in Beliefs: A Longitudinal Analysis, International Conference on Information Systems.

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2012e. When social networking turns to social overload: Explaining the stress, emotional exhaustion, and quitting behavior from social network sites' users, ECIS 2012 Proceedings. Paper 71.

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2013b. Analyzing the impact of HRIS implementations on HR personnel's job satisfaction and turnover intention, The Journal of Strategic Information Systems (22:3), pp. 193–207.

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2014b. Giving too much Social Support: Social Overload on Social Networking Sites, European Journal of Information Systems.

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2014c. Who really quits? A longitudinal analysis of voluntary turnover among IT personnel, The DATA BASE for Advances in Information Systems.

Maier, C., Laumer, S., von Stetten, A., Weitzel, T., Eckhardt, A., and Guhl, E. 2012f. Recruiting Trends im Mittelstand 2012 - Eine empirische Untersuchung mit 1.000 Unternehmen aus dem deutschen Mittelstand.

Maier, C., Laumer, S., Weinert, C., and Eckhardt, A. 2011c. Is Facebook Usage Becoming Stressful? Proposing and Validating a Theory of Stress-induced ICT Discontinuous Usage, Proceedings of the Special Interest Group on Adoption and Diffusion of Information Technology (DIGIT) (Pre-ICIS Workshop), Shanghai, China.

Maier, C., Laumer, S., Weinert, C., von Stetten, A., Weitzel, T., Eckhardt, A., and Kraft, B. 2014c. Bewerbungspraxis 2014 - Eine empirische Studie mit über 10.000 Stellensuchenden und Karriereinteressierten im Internet.

Mazmanian, M., Orlikowski, W. J., and Yates, J. 2013. The Autonomy Paradox: The Implications of Mobile Email Devices for Knowledge Professionals, Organization Science (24:5), pp. 1337–1357.

McElroy, J. C., Hendrickson, A. R., Townsend, A. M., and DeMarie, S. M. 2007. Dispositional Factors in Internet Use: Personality Versus Cognitive Style, MIS Quarterly (31:4), pp. 809–820.

Moore, J. E. 2000a. One Road to Turnover. An Examination of Work Exhaustion in Technology Professionals, MIS Quarterly (24:1), pp. 141–168.

Moore, J. E. 2000b. Why is this happening? A causal attribution approach to work exhaustion consequences, Academy of Management Review (25:2), pp. 335–349.

Morris, M. G., and Venkatesh, V. 2010. Job Characteristics and Job Satisfaction: Understanding the Role of Enterprise Resource Planning System Implementation, MIS Quarterly (34:1), pp. 143–161.

Nahm, A. Y., Solís-Galván, Rao, S. S., and Ragu-Nathan, T. S. 2002. The Q-Sort Method: Assessing Reliability and Construct Validity of Questionnaire Items at a Pre-Testing Stage, Journal of Applied Statistics (1:1), pp. 114–125.

Niehaves, B., and Plattfaut, R. 2013. Internet adoption by the elderly: employing IS technology acceptance theories for understanding the age-related digital divide, European Journal of Information Systems.

Nunnally, J. C., and Bernstein, I. H. 1994. Psychometric theory, New York: McGraw-Hill.

Oliver, R. 1977. Effect of Expectation and Disconfirmation on Postexposure Product Evaluations: An Alternative Interpretation, Journal of Applied Psychology (62:4), pp. 480–486.

Oliver, R. 1980. A Cognitive Model for the Antecedents and Consequences of Satisfaction, Journal of Marketing Research (17:4), pp. 460–469.

Orlikowski, W. J., and Iacono, C. S. 2001. Research Commentary: Desperately Seeking the IT in IT Research - A Call to Theorizing the IT Artifact, Information Systems Research (12:2), pp. 121–134.

Ortiz de Guinea, A., and Markus, M. L. 2009. Why Break the Habit of a Lifetime? Rethinking the Roles of Intention, Habit, and Emotion in Continuing Information Technology Use, MIS Quarterly (33:3), pp. 433–444.

Paunonen, S. V., and Ashton, M. C. 2001. Big Five Factors and Facets and the Prediction of Behavior, Journal of Personality and Social Psychology (81:3), pp. 524–539.

Paunonen, S. V., and Nicol, A. 2001. The personality hierarchy and the prediction of work behaviors, in Personality psychology in the workplace, B. Roberts, and R. Hogan (eds.), Washington, DC: American Psychological Association, c, pp. 161–191.

Petter, S., Straub, D. W., and Rai, A. 2007. Specifying formative constructs in information systems research, MIS Quarterly (31:4), pp. 623–656.

Podsakoff, N. P., LePine, J., and Lepine, M. A. 2007. Differential Challenge Stressor–Hindrance Stressor Relationships With Job Attitudes, Turnover Intentions, Turnover, and Withdrawal Behavior: A Meta-Analysis, Journal of Applied Psychology (92:2), pp. 438–454.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., and Podsakoff, N. P. 2003. Common Method Biases in Behavioral Research: A Critical Review and Recommended Remedies, Journal of Applied Psychology (83:5), pp. 879–903.

Polites, G. L., Roberts, N., and Thatcher, J. 2012. Conceptualizing models using multidimensional constructs: a review and guidelines for their use, European Journal of Information Systems (21:1), pp. 22–48.

Preacher, K. J., and Hayes, A. F. 2004. SPSS and SAS procedures for estimating indirect effects in simple mediation models., Behavior Research Methods, Instruments, & Computers (36:4), pp. 717–731.

Radach, H. J., Lemmer, S., Vorstius, C., Heller, D., and Radach, K. 2003. Eye movements in the processing of print advertisements, in The mind's eye: Cognitive and applied aspects of eye movement research, J. Hyönä, R. Radach, and H. Deubel (eds.), Amsterdam, Boston: North-Holland, pp. 609–623.

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., and Qiang, T. 2008. The Consequences of Technostress for End Users in Organizations: Conceptual Development and Empirical Validation, Information Systems Research (1:4), pp. 417–433.

Riedl, R., Kindermann, H., Auinger, A., and Javor, A. 2012. Technostress from a Neurobiological Perspective - System Breakdown Increases the Stress Hormone Cortisol in Computer Users, Business & Information Systems Engineering (4:2), pp. 61–69.

Ringle, C. M., Wende, S., and Will, A. 2005. SmartPLS: University of Hamburg.

Rogerson, P. 2001. Statistical methods for geography, London, Thousand Oaks, Calif: Sage Publications.

Rossiter, J. R. 2002. The C-OAR-SE procedure for scale development in marketing, International Journal of Research in Marketing (19:4), pp. 305–335.

Rutner, P. S., Hardgrave, B. C., and McKnight, H. D. 2008. Emotional Dissonance and the Information Technology Professional, MIS Quarterly (32:3), pp. 635–652.

Salisbury, W., Chin, W. W., Gopal, A., and Newsted, P. R. 2002. Research report: Better theory through measurement— Developing a scale to capture consensus on appropriation., Information Systems Research (13:1), pp. 91–103.

Sandmann, W., and Maier, C. (2008), On the statistical accuracy of stochastic simulation algorithms implemented in Dizzy, Proceedings of the 5th International Workshop on Computational Systems Biology (WCSB 2008), Leipzig, Germany, 153–156

Seddon, P. B., and Scheepers, R. 2011. Towards the improved treatment of generalization of knowledge claims in IS research: drawing general conclusions from samples, European Journal of Information Systems (21:1), pp. 6–21.

Setz, C., Arnrich, B., Schumm, J., La Marca, R., Tröster, G., and Ehlert, U. 2010. Discriminating stress from cognitive load using a wearable EDA device., IEEE Transactions on Information Technology in Biomedicine (14:2), pp. 410–417.

Shrout, P. E., and Bolger, N. 2002. Mediation in experimental and nonexperimental studies: New procedures and recommedations, Psychological Methods (7:4), pp. 422–445.

Shu, Q., Tu, Q., and Wang, K. 2011. The Impact of Computer Self-Efficacy and Technology Dependence on Computer-Related Technostress: A Social Cognitive Theory Perspective, International Journal of Human-Computer Interaction (27:10), pp. 923–939.

Sicking, M. 2011. Burnout weiter auf dem Vormarsch. http://www.heise.de/resale/artikel/Burnout-weiter-auf-dem-Vormarsch-1230727.html.

Stephenson, W. 1953. The study of behaviour: Q-technique and its methodology, Chicago: University of Chicago Press.

Straub, D., Boudreau, M.-C., and Gefen, D. 2004. Validation Guidelines for IS Positivist Research, Communications of the Association for Information Systems (13:1), pp. Article 24.

Süddeutsche 2012. Von der Leyen will Arbeitnehmer vor Computerstress schützen. http://www.sueddeutsche.de/karriere/erreichbarkeit-bei-der-arbeit-von-der-leyen-will-arbeitnehmer-vor-computerstress-schuetzen-1.1380168. Accessed 16 November 2012.

Suprem, A., Mahalik, N., and Kim, K. 2013. A review on application of technology systems, standards and interfaces for agriculture and food sector, Computer Standards & Interfaces (35:4), pp. 355–364.

Svetlak, M., Bob, P., Cernik, M., and Kukleta, M. 2010. Electrodermal complexity during the Stroop colour word test, Autonomic Neuroscience (152:1-2), pp. 101–107.

Tarafdar, M., Tu, Q., Ragu-Nathan, B., and Ragu-Nathan, T. 2007. The Impact of Technostress on Role Stress and Productivity, Journal of Management Information Systems (24:1), pp. 301–328.

Tarafdar, M., Tu, Q., and Ragu-Nathan, T. S. 2010. Impact of Technostress on End-User Satisfaction and Performance, Journal of Management Information Systems (27:3), pp. 303–334.

Tarafdar, M., Tu, Q., Ragu-Nathan, T. S., and Ragu-Nathan, B. S. 2011. Crossing to the Dark Side: Examining Creators, Outcomes, and Inhibitors of Technostress, Communications of the ACM (54:9), pp. 113–120.

Thomée, S., Eklöf, M., Gustafsson, E., Nilsson, R., and Hagberg, M. 2007. Prevalence of perceived stress, symptoms of depression and sleep disturbances in relation to information and communication technology (ICT) use among young adults – an explorative prospective study, Computers in Human Behavior (23:3), pp. 1300–1321.

Triandis, H. C. 1977. Interpersonal behavior, Monterey, Calif: Brooks/Cole Pub. Co.

Tu, Q., Wang, K., and Shu, Q. 2005. Computer-related technostress in China, Communications of the ACM (48:4), pp. 77–81.

Turel, O., and Serenko, A. 2012. The benefits and dangers of enjoyment with social networking websites, European Journal of Information Systems (21:5), pp. 512–528.

Turel, O., Serenko, A., and Giles, P. 2011. Integrating Technology Addiction and Use: An Empirical Investigation of Online Auction Users, MIS Quarterly (35:4), pp. 1043–1061.

van der Heijden, H. 2004. User Acceptance of Hedonic Information Systems, MIS Quarterly (28:4), pp. 695–704.

Venkatesh, V., and Bala, H. 2008. Technology Acceptance Model 3 and a Research Agenda on Interventions., Decision Sciences (39:2), pp. 273–315.

Venkatesh, V., and Brown, S. A. 2001. A Longitudinal Investigation of Personal Computers in Homes: Adoption Determinants and Emerging Challenges, MIS Quarterly (25:1), pp. 71–102.

Venkatesh, V., and Davis, F. D. 2000. A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies, Management Science (46:2), pp. 186–204.

Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. 2003. User Acceptance of Information Technology: Toward a unified view, MIS Quarterly (27:3), pp. 425–478.

Venkatesh, V., Thong, J. Y. L., and Xu, X. 2012. Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology, MIS Quarterly (36:1), pp. 157–178.

Verplanken, B., Aarts, H., and van Knippenberg, A. 1997. Habit, information acquisition, and the process of making travel mode choices, European Journal of Social Psychology (27:5), pp. 539–560.

Vespignani, A. 2009. Predicting the Behavior of Techno-Social Systems, Science (325:5939), pp. 425–428.

von Stetten, A., Laumer, S., Maier, C., Eckhardt, A., Weitzel, T., and Ganouchi, M. 2012a. Recruiting Trends 2012 Schweiz - Eine empirische Untersuchung mit den Top-500-Unternehmen aus der Schweiz.

von Stetten, A., Laumer, S., Maier, C., Weinert, C., Weitzel, T., Eckhardt, A., and Kraft, B. 2014. Recruiting Trends 2014 - Eine empirische Untersuchung mit den Top-1.000-Unternehmen aus Deutschland sowie den Top-300-Unternehmen aus den Branchen Health Care, IT und Maschinenbau.

von Stetten, A., Laumer, S., Maier, C., Weitzel, T., Eckhardt, A., and Guhl, E. 2012b. Recruiting Trends 2012 - Eine empirische Untersuchung mit den Top-1.000-Unternehmen aus Deutschland sowie den Top-300-Unternehmen aus den Branchen Health Care, IT sowie Umwelt & Recycling.

von Stetten, A., Laumer, S., Maier, C., Weitzel, T., Eckhardt, A., and Guhl, E. 2013a. Recruiting Trends 2013 - Eine empirische Untersuchung mit den Top-1.000-Unternehmen aus Deutschland sowie den Top-300-Unternehmen aus den Branchen Automotive, Finanzdienstleistung und IT.

von Stetten, A., Laumer, S., Maier, C., Weitzel, T., Eckhardt, A., and Guhl, E. 2013b. Recruiting Trends im Mittelstand 2013 - Eine empirische Untersuchung mit 1.000 Unternehmen aus dem deutschen Mittelstand.

Wang, K., Shu, Q., and Tu, Q. 2008. Technostress under different organizational environments: An empirical investigation, Computers in Human Behavior (24:6), pp. 3002–3013.

Webster, J., and Watson, R. T. 2002. Analyzing the Past to Prepare for the Future: Writing a Literature Review, MIS Quarterly (26:2), pp. xiii–xxiii.

Weinert, C., Laumer, S., Maier, C., von Stetten, A., Weitzel, T., and Eckhardt, A. 2013. Recruiting Trends 2013 Österreich - Eine empirische Untersuchung mit den 500 größten Unternehmen aus Österreich.

Weinert, C., von Stetten, A., Laumer, S., Maier, C., Weitzel, T., and Eckhardt, A. 2014. Recruiting Trends 2014 Österreich - Eine empirische Untersuchung mit den 500 größten Unternehmen aus Österreich.

Weitzel, T., Laumer, S., Maier, C., Eckhardt, A., von Stetten, A., and Guhl, E. 2012. Recruiting Trends - Ein Rückblick auf 10 Jahre.

Williams, M. D., Dwivedi, Y. K., Lal, B., and Schwarz, A. 2009. Contemporary trends and issues in IT adoption and diffusion research, Journal of Information Technology (24:1), pp. 1–10.

Xu, Y., Yang, Y., Cheng, Z., and Lim, J. 2014. Retaining and attracting users in social networking services: An empirical investigation of cyber migration, The Journal of Strategic Information Systems.

Yin, R. K. 2009. Case study research: Design and methods, Los Angeles, Calif: Sage.

1.

Chapter I

Technostress in work life

Paper I

ANALYZING THE IMPACT OF HRIS IMPLEMENTATIONS ON HR PERSONNEL'S JOB SATISFACTION AND TURNOVER INTENTION

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The Journal of Strategic Information Systems (JSIS) (22:3), p. 193-207

DOI: 10.1016/j.jsis.2012.09.001

Paper II

INFORMATION TECHNOLOGY AS DAILY STRESSOR:

PINNING DOWN THE CAUSES OF BURNOUT

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DOI: 10.1007/s11573-014-0759-8

2.

Chapter II

Technostress in private life

Paper III

ONLINE SOCIAL NETWORKS AS A SOURCE AND SYMBOL OF STRESS:

AN EMPIRICAL ANALYSIS

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Paper IV

GIVING TOO MUCH SOCIAL SUPPORT:

SOCIAL OVERLOAD ON SOCIAL NETWORKING SITES

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Paper V

EXPLAINING TECHNICAL AND SOCIAL STRESSORS IN TECHNO-SOCIAL SYSTEMS:

THEORETICAL FOUNDATION AND EMPIRICAL EVIDENCE

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EXPLAINING TECHNICAL AND SOCIAL STRESSORS IN TECHNO-SOCIAL SYSTEMS:

THEORETICAL FOUNDATION AND EMPIRICAL EVIDENCE

Abstract

In response to indications that there might be a negative side to hedonic techno-social systems, including the unintended consequences of individuals feeling stressed and struggling to decide how intensely to use such platforms, this manuscript develops and validates a model of techno-social systems stress. Drawing on the well-known stressor-strain relationship, the model proposes that technological stressors (e.g., complexity, uncertainty, or invasion) and social stressors (e.g., social information, social communication, or social action overload) are related to a user's feeling of techno-exhaustion, a form of psychological strain, resulting in the intention to discontinue using techno-social systems and in behavioral strain reflecting intentions to reduce usage intensity. The results of an empirical study of 571 social networking sites' users, as one example of a techno-social system, indicate that these hedonic systems can induce feelings of techno-exhaustion, that social stressors cause techno-exhaustion to a higher extent than techno-stressors, that techno-exhaustion is an inhibiting mediator of techno-stressors and discontinuous usage intention, and that techno-exhaustion has an even higher impact on discontinuous usage intention than other existing alternative theoretical explanations from research on voluntary, hedonic technology adoption outside the workplace.

Keywords: Technostress, IS-induced social stress, Hedonic techno-social systems, Social networking sites, Discontinuous usage

1 INTRODUCTION

Techno-social systems such as social networking sites (SNSs, e.g. Facebook) are technology-mediated forums for social interaction (e.g., Vespignani 2009; Fuchs et al. 2010). The increasingly ubiquitous dispersion of SNSs has attracted a great deal of research focusing primarily on their benefits, such as in staying in touch with remote friends (Khan and Jarvenpaa 2010; Koroleva et al. 2011). But at the same time, there are indications there might unintended negative consequences of SNS usage on the individual level (e.g., Krasnova et al. 2010; Turel and Serenko 2012) and where individuals also feel stressed and struggle to decide how much to use such online platforms in the future (Gartner 2011). When trying to understand such SNS stress phenomena through the lens of IS usage and adoption theories, it is notable that SNSs should not induce stress at all because they are at least partly hedonic technologies (Turel and Serenko 2012) used voluntarily for fun and pleasure, as opposed to mandatory IS usage in the professional context (van der Heijden 2004). It is unclear to what extent users are stressed by technological

features of the underlying system versus social phenomena enabled through such techno-social systems (techno- vs. social stress). The goal of this paper is to understand the sources and consequences of these types of stress in more detail.

We frame our research by drawing on the well-established stressor-strain relationship known from technostress research (Ragu-Nathan et al. 2008; Tarafdar et al. 2010), which suggests, as the name indicates, that various stressors create psychological and subsequent behavioral reactions characterized as strain. Realizing that the term 'stress' is sometimes used colloquially to denote stressors, sometimes strain, and sometimes the stressors-strain relationship, we use this term in specific ways, as depicted in Figures 1 and 2. This allows us to incorporate findings from stress research from other disciplines, to clearly separate technological and social stressors from psychological and behavioral strain and to suggest a research model and measurement scales that can also be used with other strain variables.

Applied to an SNS usage context, our model proposes that technological stressors (like complexity or invasion) and social-stressors (like social information overload or social action overload) are related to feelings of techno-exhaustion, a form of psychological strain, resulting in the intention to discontinue using SNSs (behavioral strain). Consequently, our research question is:

What are stressful stimuli when using techno-social systems and how are they breeding grounds for psychological (techno-exhaustion) and behavioral strain (discontinuous usage intention)?

This research proposes and empirically evaluates a model of stress experienced while using techno-social systems that aims at extending IS-related stress research by focusing on hedonic and other voluntary technologies and by providing evidence for differences in the influence of social versus technological stressors. Additionally, we contribute to technology adoption research by verifying stressors and strain as significant factors in discontinuous usage decisions.

We first present a review of existing research in the field of technostress and then we discuss technological and social stressors. Then, drawing on stress and IS adoption literature, we develop and test a model of techno-social system stress. We conclude by discussing our results critically and suggesting promising avenues for future research.

2 RELATED RESEARCH ON TECHNOSTRESS

Recent research has discussed negative consequences of IS usage by looking at sources and consequences of feeling stressed by technologies. This research defines the term technostress as IS users' experience of stress when using IS (Ragu-Nathan et al. 2008)and identifies organizational characteristics (e.g., involvement facilitation, support), technological characteristics (e.g., usefulness, complexity), and IS user characteristics (e.g., age, gender, negative affectivity) as factors determining whether techno-stressors are perceived (see separate File Table 1).

From a theoretical point of view, techno-stressors are technology-induced stimuli, events or demands (Ragu-Nathan et al. 2008; Ayyagari et al. 2011) which cause reactions that are commonly called strain (Tarafdar et al. 2010; Ayyagari et al. 2011). Some individuals may react psychologically by becoming dissatisfied or exhausted (Ragu-Nathan et al. 2008; Ayyagari et al. 2011). These kinds of reactions are called psychological strain (Tarafdar et al. 2010). Other individuals may also react behaviorally, which is called behavioral strain (Tarafdar et al. 2010).

One example of such a behavioral reaction is when someone quits his or her job due to techno-stressors (Ragu-Nathan et al. 2008; Tarafdar et al. 2010).

In summary, perceived techno-stressors with various technological, individual and organizational characteristics cause reactions among IS users. These become visible as they involve changes in users' psychology (e.g., satisfaction, exhaustion) or behavior (e.g., performance, usage behavior).

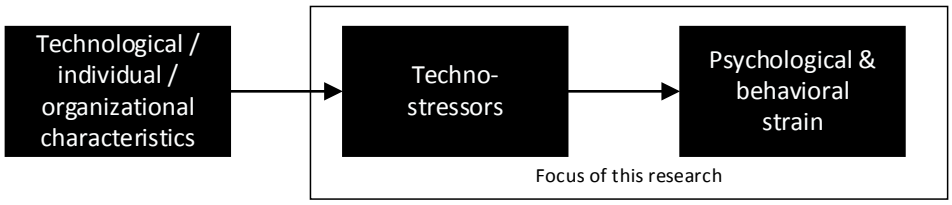


Figure 1: Status quo of technostress research (see for a detailed overview see separate file; Table 1)

This general theoretical understanding of technostress has been used primarily to study technostress from an organizational perspective in situations where IS usage is mandated. Ragu-Nathan et al. (2008) have conceptually developed and empirically validated an instrument that focuses on five technological stimuli causing employees to react with strain when using IS. First, techno-overload is when IS cause perceptions of information overload and force multitasking. Second, techno-invasion is when users are connected to IS at work and at home. Third, techno-complexity is when an IS is too difficult and users are frightened to learn and use it. Fourth, techno-insecurity is when employees describe their job as insecure and fear losing their job to employees with more knowledge about IS. Fifth, techno-uncertainty reflects the situation that upgrades and changes are too often accompanied by IS usage. Using this instrument, researchers have discussed the role of individual differences on whether these five stressors are perceived. Among other findings, Ragu-Nathan et al. (2008) find that men experience more technostress than women and that technostress decreases with increasing age, education and computer confidence. Some research finds that employees react to these five techno-stressors adversely with low job satisfaction, low organizational commitment, low user satisfaction, poor user productivity, poor user innovation and increasing role stress in terms of role conflict and role overload (Tarafdar et al. 2007, 2010, 2011; Ragu-Nathan et al. 2008). However, research in this stream also theorizes and validates that inhibiting mechanisms such as computer literacy support, technical support provision, technology involvement facilitation and involvement support weaken the adverse influence of techno-stressors on strain such that inhibiting mechanisms diminish psychological and behavioral strain (e.g., Tarafdar et al. 2011).

Likewise, in the stream of mandated IS usage, Tu et al. (2005) theorize the role of culture on the stressor-strain relation. They theorize and validate that the five techno-stressors are not the sole influences on user productivity in China, concluding that only the three techno-stressors overload, insecurity and invasion decrease productivity in their study there. Next, they identify antecedents of technostress by focusing on individual differences, organizational characteristics and technology-related perceptions. Concerning individual differences, their findings are in line with the results of Ragu-Nathan et al. (2008) in that younger employees perceive technostress to a higher extent. This team of researchers also reveals that working in a more centralized or in a highly innovative organization contributes to high levels of technostress (Wang et al. 2008). Finally, this team also reveal that the higher the technology dependence of an employee or the lower the computer self-efficacy, the higher the technostress (Shu et al. 2011).

More recently, Ayyagari et al. (2011) focus on the role of technology characteristics in technostress and theorize three categories of characteristics in terms of usability, dynamic and intrusive features as antecedents of techno-stressors. The techno-stressors used in this research

are adapted from the general stress literature to the technostress research domain and include work-home conflict, invasion of privacy, work overload, role ambiguity and job insecurity. Results show that the three categories of technological characteristics cause whether employees perceive techno-stressors. Next to technology characteristics, technology usage is also identified as a source of techno-stressors. Concerning consequences of these techno-stressors, Ayyagari et al. (2011) provide evidence that individuals react psychologically by showing high levels of psychological strain called techno-exhaustion whereupon this reaction also depends on individual characteristics.

In parallel, Riedl et al. (2012) set up a laboratory experiment to investigate the influence of system breakdowns on users' reactions. The research team does not use Ragu-Nathan et al.'s (2008) five general techno-stressors, but rather focus on one particular techno-stressor. They find that users' cortisol levels increase consistently and conclude that techno-stressors also have objective physiological consequences on IS users.

In addition to these findings focusing on mandated technology usage, recent research also discusses technostress experience while using technology voluntarily (Maier et al. 2012, 2014). Some research has identified SNS-specific stressors grounded in technological characteristics such as complexity or uncertainty, a technology-induced rethinking of disclosing information, or the changed role of technology in one's daily lives, such as being forced to adapt new behavioral patterns (Maier et al. 2012). This research team theorizes that individuals experiencing these stressors react with psychological and behavioral strain, resulting in low satisfaction and low intentions to use the technology continuously. Beside these stressors, this researcher team also identifies another SNS-specific stressor called social overload, which is influenced by individual characteristics such as age, usage characteristics such as usage extent and number of SNS friends, and characteristics of social relationships such as type of relation and subjective social support norm (Maier et al. 2014). Further, results of that study confirm that SNS users respond psychologically and behaviorally to techno-stressors by developing decreased levels of satisfaction and increased levels of exhaustion and discontinuous usage intentions.

Unfortunately, the insights offered do not provide a holistic understanding of stress while using techno-social systems like SNSs, as only one article (Maier et al. 2014) focuses on only one social-stressor. Their research does not provide an extended conceptualization and theorizing of different social stressors and the role of techno-stressors. All other articles concentrate on strain resulting from using utilitarian technologies with different motivations than for using hedonic technologies (van der Heijden 2004) and do not focus on voluntary technology usage. Prior models discuss technologies such as ERP systems through which a user is connected to a technological component which embeds organizational elements such as routines or processes and gives these elements a material aspect (Volkoff et al. 2007). In contrast, techno-social systems (e.g., Vespignani 2009; Fuchs et al. 2010) represent a technological infrastructure through which a user is connected to one's social environment such that the technology creates and supports social relationships among users. The technology and its characteristics might be only one specific stimulus initiating strain and virtual interpersonal relationships also might be an additional stimulus causing strain.

By applying this theoretical lens to the techno-social system domain, we can now develop our model. We therefore first focus on identifying and discussing stressful stimuli that arise when using techno-social systems and then hypothesize their effect on psychological strain, which in turn causes behavioral strain (Figure 2).

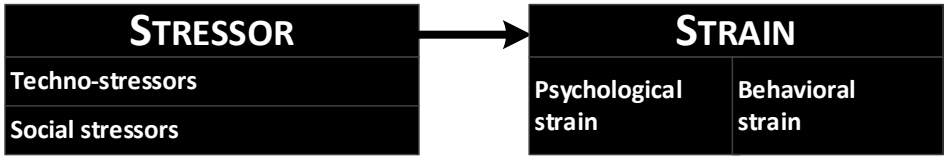


Figure 2: Nomological network of the core idea of this research

3 MODEL AND HYPOTHESES DEVELOPMENT

We first develop hypotheses of how techno- and social-stressors produce psychological strain and then how this reaction influences behavioral strain. The stressors section hence focuses on technology versus social related stimuli in SNS and the influence on the psychological strain variable that is conceptualized as techno-exhaustion. Then we argue that feeling techno-exhaustion, as the concrete psychological strain variable, leads an individual to reduce or stop using SNS, a phenomenon called discontinuous usage intention and representing one concrete type of behavioral strain. Complementing the theoretical arguments, the separate file describes construct development and validation for the new scales.

3.1 STRESSORS AND THEIR INFLUENCE ON PSYCHOLOGICAL STRAIN

Technology characteristics have been identified as one source of psychological strain in terms of techno-exhaustion (Ayyagari et al. 2011) and, as such, are called techno-stressors (Ragu-Nathan et al. 2008; Tarafdar et al. 2010). Through the theoretical lens of prior technostress research, the technology can be perceived adversely, such as being perceived as too complex so that the demands placed by the technology exceed the abilities of the user and causes psychological reactions (Ayyagari et al. 2011).

But the social part of the techno-social equation might also induce psychological reactions in terms of techno-exhaustion. Here, the stimuli entailing techno-exhaustion are not grounded in technology-user relations but in technology enabled user-user relations as the technology connects the user to her social environment. Whenever the balance between desired and actual social exchanges gets out of kilter, as when the actual relations and exchanges outweighs desired ones, individuals will perceive social relations as stressful stimuli. Social relations as sources of psychological strain have been observed in social and psychological studies of densely populated housing projects and high-rise buildings where individuals cannot reliably avoid undesired social relations (Baum and Paulus 1987; McCarthy and Saegert 1978). We argue that the relation and exchanges between a user and her environment is out of equilibrium when demands resulting from social connections in SNS go beyond the user's limits, as Baum and Paulus (Baum and Paulus 1987) as well as McCarthy and Saegert (McCarthy and Saegert 1978) have shown in the research context of high-rise buildings.

We thus assume that there are two different kinds of stimuli that can cause techno-exhaustion. The first, techno-stressors, are stimuli that are grounded in the characteristics of a technology encountered by an individual using the technology. The second, social-stressors, are stimuli grounded in interpersonal social connections. In the following we derive facets of techno- and of social-stressors in the SNS domain.

3.1.1 Techno-stressors: Complexity, uncertainty, and invasion

Users often feel confronted with often unanticipated updates, add-ons, or new applications. For example, the most prominent SNS, Facebook, recently introduced new features, like timeline and graph search, and regularly confronts users with surprising changes in privacy policies. The techno-uncertainty related to unanticipated changes can be a source of techno-exhaustion, particularly when such changes and uncertainties accumulate (Tarafdar et al. 2010). Besides, technologies such as SNSs can become increasingly complex and difficult to use (Liao et al. 2007). The techno-complexity of SNSs can be seen in various fields, maybe most prevalently in the context of data privacy when individuals do not know much about SNSs and the privacy implications and thus shy away from using them. In the context of technology usage in private settings, increased complexity is discussed in particular in the digital divide literature as an important reason inhibiting the usage of technologies (Hsieh et al. 2008). We hence hypothesize that both technological characteristics of SNSs are techno-stressors and hence induce feelings of techno-exhaustion:

H1a: The higher the techno-complexity, the higher the techno-exhaustion.

H1b: The higher the techno-uncertainty, the higher the techno-exhaustion.

SNSs often tend to become a constant companion of users and of the "wired from birth"-generation in particular (Brown 2008). As a result, individuals are connected with SNSs all the time and everywhere, such that SNSs invade users' lives as they are present during leisure and work time for hours per day via laptop or smartphone. SNS users can thus experience techno-exhaustion due the necessity of adjusting their behavior to these new conditions and getting used to SNSs.

H2: The higher the techno-invasion the higher the techno-exhaustion.

3.1.2 Social-stressors: Social information, social communication, and social action overload

Individuals perceive the social environment in SNSs as a stressor when they are incapable of sufficiently controlling information and interaction exposure. The different stressors in this context can be characterized similarly to those in high-rise buildings by the degree of individuals involved in the social interactions: from (1) just receiving information to (2) communicating to (3) giving social support to the social environment (Baum and Paulus 1987; McCarthy and Saegert 1978).

In multilateral n:1 relations, a focal user can suffer from the frequently cited information overload. An example of receiving information as stressor in the research context of high-rise buildings is when one or more neighbors pin too many notices on a public message board. In SNSs like Facebook this can be exposure to dozens of revelations of the "doing nothing" or "hungry" kind. We call this stimulus social information overload.

In few:1 or even bilateral 1:1 relations, the focal user can even be pulled from information to more active interaction relations like conversations. An example from high raising buildings is too many meetings with neighbors which result in talks at an inappropriate time or talks about inconvenient content. In the SNS context, this occurs when SNS users communicate with friends at an inappropriate time or about inconvenient content.

Moreover, in especially bilateral 1:1 relations individuals are even more involved when friends directly call for assistance. An example for giving too much social support might be that one feels one has to assist neighbors with apartment house responsibilities or by watering their plants while

they are away from home. In the context of SNS, this means that an SNS user is asked for assistance and feels he or she has to respond to many social demands.

Stressors, then, are the undesired virtual contiguity to personal social content, too many conversations, and the perceived undesired pull to have to take care of virtual friends. We call these stimuli social information overload, social communication overload, and social action overload (see Figure 3).

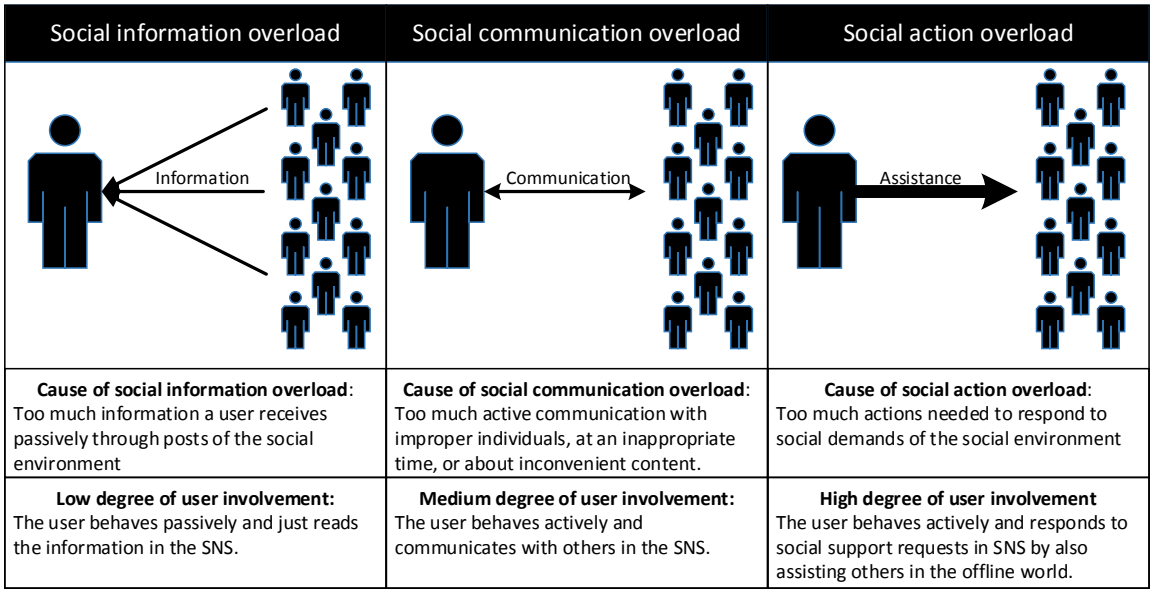


Figure 3: Social stressors

3.1.2.1 Social information overload

SNSs encourage their users to disclose and regularly update a wide range of personal information (Krasnova et al. 2010). However, the more users participate in such information circles the less interesting social information becomes. "*Michael has married Amy*", "*Michael is waiting for the bus*", "*Amy is now friends with Fred*", "*Amy likes Nora's photo*", and "*Kilroy was here: Golden Gate Bridge with Amy, Mario, and Sebastian*" are probably of different informational value, especially when the focal user only knows Amy. The news feed function of SNSs confronts users with a large amount of information, such as status updates, photos, videos, questions, or links to newspaper articles and YouTube videos even when just checking for particular messages.

In work environments, too much information has become known as information overload (e.g., Eppler and Mengis 2004). It suggests a positive correlation between an individual's performance and the amount of information received up to a certain point, after which additional information rapidly decreases performance. The reason is a limited information processing capacity of humans that can result in feelings of being emotionally exhausted when overextended (Jones et al. 2004). We hence call this stimulus social information overload and define it in the context of hedonic SNSs as a users' state when they receive too much social information through the disclosure of virtual friends so that all these information cannot be processed anymore. The social information overload in SNSs is thus a consequence of postings by virtual friends who disclose vast amounts of both useful as well as useless information (e.g., Krasnova et al. 2010). An SNS user's psychological response to this stressor is feeling exhausted by using the technology, so that we hypothesize that:

H3: The higher the social information overload, the higher the techno-exhaustion.

3.1.2.2 Social communication overload

SNSs provide individuals the opportunity to communicate via several distinct channels. Users can communicate with each other directly via chat, video conference, or private messages, with a group of friends via private messages, and publicly with all virtual friends via SNS walls. These different communication channels of SNSs allow users to interact in a synchronous as well as an asynchronous manner so that an increasing number of individuals use SNSs among others for coordinating events with one or more friends (Khan and Jarvenpaa 2010). Since, however, some virtual SNS friends are only nodding acquaintances or even unknown persons in the offline world, a user can easily be drawn into communication about more than casual topics with quite casual acquaintances. In the end, such kinds of communications can be stressful stimuli grounded in one's escalating social embeddedness. As SNS users increasingly tend to check private messages between various activities at work, on mobile phones or during university lectures (Pempek et al. 2009), this stressor can become even worse through a perceived inappropriateness of the situation concerning time or place in the offline world.

Moreover, communications in SNSs span a growing number of topics, and individuals interact about private issues, such as family matters or diseases (e.g., Greene et al. 2011). As avoiding too much of such communications exposure can fail, getting dragged into a cornucopia of topics and pleasantries can be a substantial social SNS stressor.

In summary, communications in SNSs can be stressful stimuli when a user finds herself interacting with undesired communication partners, in an undesired situation (online-offline conflict) and swamped with inconvenient content. These stressors have also been identified in the context of other communication technologies as inducing strain when "*[t]he level of interaction which the individual needs to engage in exceeds his or her communicative and cooperative capacity*" (Ljungberg and Sørensen 1998). Interestingly, communications have been found as stressors for both the initiator and responder of a message, so that we hypothesize that:

H4: The higher the social communication overload the higher the techno-exhaustion.

3.1.2.3 Social action overload

Based on the high amount of disclosed information and communications in SNSs, many messages give the user the impression of being responsible for the well-being of their virtual friends (Maier et al. 2014). Messages such as "*Help me, I need an apartment in New York!*" or "*Who can help me with math*" call directly for assistance. Activated by signal words forcing recipients' actions to help and driven by a sense of duty and general expectations that friends help friends, one might feel committed to act on such social support requests (Boyd 2008). Yet, the daily confrontation with such messages, even more so from less close acquaintances in the offline world who are first degree friends on SNSs, results in users being under pressure to constantly help. This can translate in feelings of being overwhelmed (Maier et al. 2014).

Beside clear requests, other SNSs users also write messages such as "*I am sick*" or "*I have to go to the dentist*". Readers of such disclosures are driven to show compassion and to feel obliged to either click the *like* button or to comment the post with some encouraging words because of social expectations to behave this way or in order to enhance their own reputation, to remind friends of them, or just to demonstrate solidarity (Maier et al. 2014). Intrinsically, responses to such messages pursue the aim to strengthen ties, but when such messages get out of hand they can become a source of stress. In addition to that, other messages, such as "*I urgently need your help, Ellie, to teach me mathematics, because I have an exam! Otherwise I will fail!*" directly addresses other users so that they feel obligated to help. This reflects that posts of social networking sites cause that users have to do things in the real, offline world and consequently feel exhausted if they receive too many requests from their social environment.

In addition to that, users of SNSs receive high numbers of invitations to join online social games. Invitations contain some default text with personalized components, which create the impression that users have to accept the invitation in order to help their friend become more successful within this game and stay in contact through such a game. Thus, someone may join a game not out of playfulness but based on interpersonal motivations (Wohn et al. 2011). The commitment to maintain relationships, to obligate, or to show affiliation to friends thus leads to a situation in which an individual acts in a way that is more positive for others and might be perceived as stressor. Due to the fact that individuals have to react on social demands through actions, we name this phenomenon social action overload (Maier et al. 2014). For the context of SNSs, social action overload thus describes that a user is exposed to too many social demands and feels responsible to take care of the virtual friends beyond a desired limit, to address their problems also in the offline world, or to amuse them and thus strengthen ties with others.

H5: The higher the social action overload the higher the techno-exhaustion.

3.2 PSYCHOLOGICAL AND BEHAVIORAL STRAIN

Whenever the social or technological parts of techno-social SNSs induce feelings of techno-exhaustion, users aim to change something about the current situation by changing their behavior. This means that individuals reduce their usage intensity or even stop using SNSs. This behavioral response includes that techno-exhaustion induces a rethinking of behavioral patterns and with it a kind of social withdrawal from the virtual social life. In a first instance, behavioral responses become visible in users' usage intentions (Ajzen 1985), so that an increasing number of users report high discontinuous usage intentions. Hence, we theorize that SNSs users feeling techno-exhausted report high intentions to discontinue SNSs usage, despite perceived benefits of using SNSs, such as staying in contact with friends or coordinate events (Khan and Jarvenpaa 2010), so that we hypothesize:

H6: The higher the techno-exhaustion the higher the discontinuous usage intention.

3.3 ALTERNATIVE THEORETICAL EXPLANATION OF DISCONTINUOUS USAGE

To account for alternative explanations and possibly relevant additional effects we also integrate theoretical (expectation disconfirmation, attitudinal beliefs, normative beliefs) control variables that might influence the dependent variable. The rationale for the controls is summarized in Table 1. The resulting research model is illustrated in Figure 4.

Control	Rationale
C1: The higher the **disconfirmation**, the higher the dissatisfaction.	Within expectation disconfirmation theory, disconfirmation is identified as a significant determinant for the level of satisfaction. This means that the congruence between an individual's expectation of using SNSs and his/her actual performance determines his or her degree of satisfaction. This degree in turn determines whether or not an individual intents to use SNSs continuously. (e.g., Bhattacherjee and Premkumar 2004)
C2: The higher the **dissatisfaction**, the higher the discontinuous usage intention.	
C3: The higher the **utilitarian outcomes**, the lower the **a)** dissatisfaction and **b)** discontinuous usage intention.	Attitudinal beliefs, which can be broken down into utilitarian, hedonic, and social outcomes, are identified as a source for an individual's degree of satisfaction and whether or not a technology is used continuously (e.g., Bhattacherjee 2001; Brown and Venkatesh 2005). This means that SNS users, who perceive that the usage is useful, provides pleasure, and increases his or her reputation, are more satisfied and have higher willingness to use SNSs continuously. (e.g., van der Heijden 2004; Brown and Venkatesh 2005)
C4: The higher the **hedonic outcomes**, the lower the **a)** dissatisfaction and **b)** discontinuous usage intention.	
C5: The higher the **social outcomes**, the lower the **a)** dissatisfaction and **b)** discontinuous usage intention.	
C6: The higher the **social influence**, the lower the **a)** dissatisfaction and **b)** discontinuous usage intention.	Normative beliefs determine the level of satisfaction as well as whether or not a technology is used continuously. This means that a user of SNSs will be more satisfied and will use SNS continuously when he or she is supported by his or her social environment (e.g., Liao et al. 2007).

Table 1: The influence of theoretical control variables

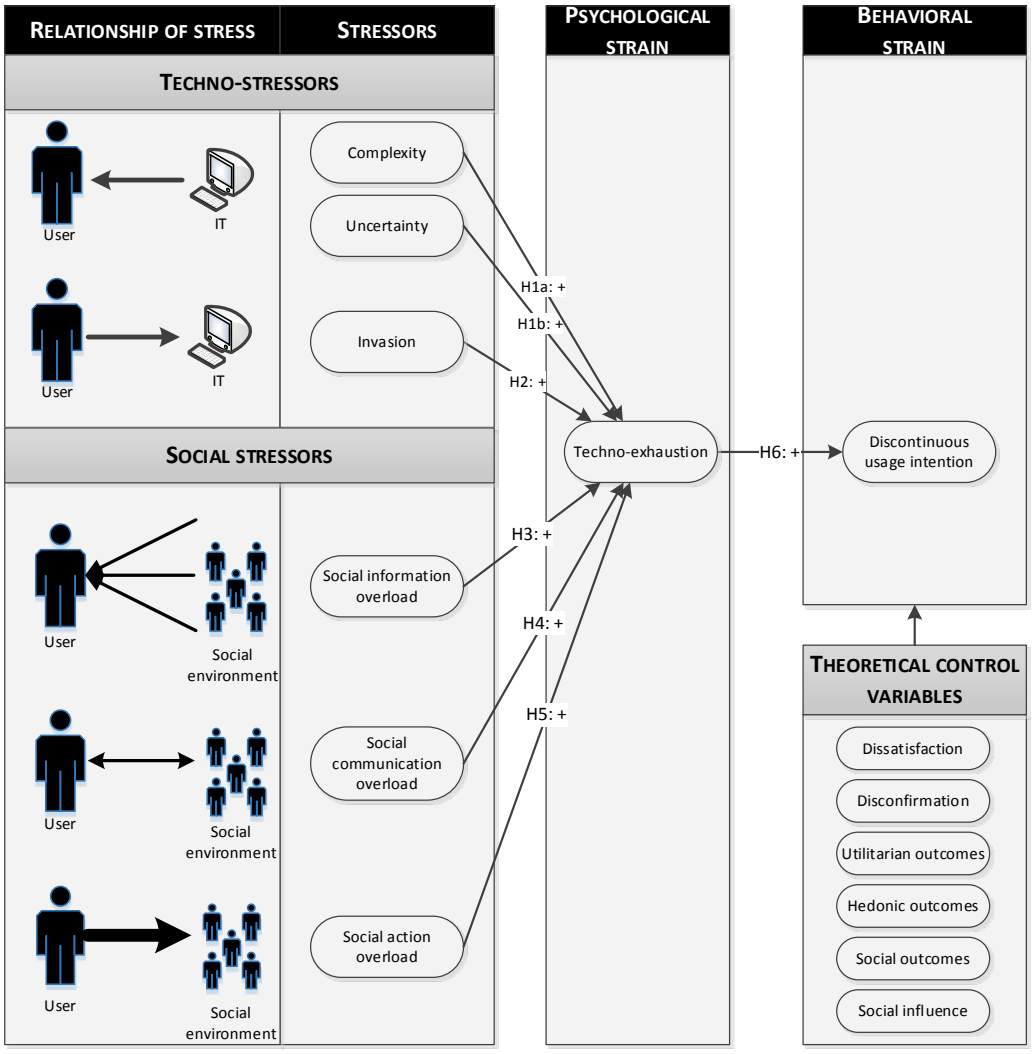


Figure 4: Research model

4 EMPIRICAL DATA AND MEASUREMENT

To evaluate the proposed model empirically, we set up online surveys focusing on SNS use. As our analysis looks at techno- and social-stressors that might induce techno-exhaustion and in turn lead users to reduce their SNS usage, we needed participants with SNS experience. Moreover, we needed large data sets to gather data to validate the new scale as well as to assess our research model. To fulfill these data size requirements, we set up online surveys to collect data about SNS use. To obtain the required samples, we invited individuals via email to participate in our study. The email addresses to which we sent out the invitations, were collected over the last years using two different methods. Some individuals provided their email address, including some demographic data and technology usage characteristics, on our university page voluntarily in order to take part in forthcoming surveys. Individuals storing their email address in this way are mostly current or former students or individuals interested in our research topics. Alternatively, in the past we set up surveys related to distinct issues, such as computer personnel-related topics. At the end of the survey we asked participants whether we can contact them by email for new research projects or surveys. Using these two methods, we set up an email list including individuals of different age and cultural backgrounds.

Since these individuals have participated in previous research studies or enrolled on our university page, we know some basic information about their demographics and technology usage characteristics. Hence, using these data provides a high level of control so we can identify SNS users more easily and invite them to take part in one of our surveys. Nonetheless, to ensure that all respondents are SNS members, we asked: "*Are you registered on Facebook?*" Only those answering affirmatively were able to take part in the study, thus ensuring that our participants are members of the desired population of Facebook users.

We sent 15-minute surveys to 1,800 participants. In order to increase the response rate, we raffled three prizes (an iPad, an iPod, and a navigation device). We received 832 surveys, of which 571 had no missing values and were from respondents who use Facebook and could thus be used in our analysis. This represents a response rate of 31.7 percent. Table 2 shows demographics and SNS usage properties of the 571 participants.

Demographics and characteristics							
Gender	male	45.0%	Extent of usage	Hourly	9.1%	Number of friends	0-50	11.9%
	female	55.0%		Several times a day	49.2%		51-100	11.3%
Age	<19	10.4%		Once daily	15.8%		101-150	15.5%
	19-24	41.1%		Several times a week	12.7%		151-200	19.8%
	25-34	36.7%		Once a week	5.1%		200-250	19.8%
	35-44	6.2%		Several times a month	4.1%		251-300	7.7%
	45-54	4.0%		Once a month	4.0%		301-350	10.7%
	>54	1.6%					>351	14.2%

Table 2: Demographics and usage characteristics of the 571 participants using SNSs

To measure the constructs, we use established scales as far as possible.

Stressors were measured with three techno-stressors and three social-stressors. The three techno-stressors uncertainty (α=0.85), invasion (α=0.87), and complexity (α=0.82) were operationalized as proposed in prior research on stressors (Ragu-Nathan et al. 2008). We adapted them to the context of voluntary SNS usage in private settings. The three scales for the social-stressors information overload (α=0.95), communication overload (α=0.93), and action overload

(α=0.93) had to be newly developed as described in detail in the separate file. A 7-point Likert scale was used for each item.

Techno-exhaustion was conceptualized as psychological strain and measured recently with the help of the scale used by Ayyagari et al. (2011). The scale is adapted to the context of SNSs. Again, a 7-point Likert scale was used (α=0.96).

Discontinuous usage intention was measured using a scale based on Bovey and Hede (2001) as well as Bhattacherjee and Premkumar (2004). The construct serves as a user resistance variable to describe the phenomenon that individuals decrease their usage intensity or de-register from SNSs. The scale contains three items and was evaluated on a 7-point Likert scale (1=totally disagree; 7=totally agree). For descriptive purposes, we can note that the coefficient alpha was high (α=0.82).

Theoretical control variables were also included in the model and consider additional perceptual beliefs in terms of utilitarian, hedonic and social outcomes and also social influence, which are important when studying voluntary usage of hedonic technology, such as SNSs (e.g., Brown and Venkatesh 2005; Turel and Serenko 2012). A 7-point Likert scale was used for these items. In addition, dissatisfaction and disconfirmation were included based on the scales used by Bhattacherjee (2001) and Bhattacherjee and Premkumar (2004) (1=totally disagree; 7=totally agree).

5 RESEARCH RESULTS

Based on the data from 571 SNSs users, we first assess data quality to then evaluate the structural model. For model evaluation, the hypotheses are transferred into a structural equation model. For data analysis, SmartPLS was used (Ringle et al. 2005), because negative perceptions and behaviors, such as stressors, strain, and discontinuous usage, tend to produce skewed distributions, whereby the partial least square method (PLS) places less restriction on the distribution of variables (Turel et al. 2011).

5.1 COMMON METHOD BIAS AND MEASUREMENT MODEL

Table 3 shows means, standard deviations, and bivariate correlations among study variables and the demographics as well as SNS usage characteristics. Our analysis reveals significant correlations between the three techno-stressors and age, frequency of usage, and number of friends. In terms of social-stressors, only social action overload correlates significantly with these three demographics and SNS usage specific variables, such that the younger the SNS user and the higher the usage extent and the higher the number of virtual friends in SNS, the higher the social action overload. Furthermore, social information overload is correlated significantly with the number of friends. For techno-exhaustion, a correlation with frequency of usage and number of friends could be shown, so that techno-exhaustion is higher for individuals, who use SNS extensively or have a high number of friends.

	Construct	Mean	Std	1	2	3	4
1	Age	26.1	8.31				
2	Gender	1.55	0.50	0.11*			
3	Frequency of usage	6.29	1.44	-0.31**	-0.09		
4	Number of friends in SNS	193	114.84	-0.42**	-0.07	0.43**	
5	Techno-complexity	2.58	1.27	0.18**	0.03	-0.16**	-0.23**
6	Techno-uncertainty	4.76	1.24	-0.15**	-0.01	0.18**	0.20**
7	Techno-invasion	3.87	1.70	-0.21**	0.04	0.51**	0.40**
8	Social information overload	3.31	1.42	0.06	0.02	0.07	0.16**
9	Social communication overload	4.51	1.34	0.01	0.01	-0.00	0.02
10	Social action overload	3.67	1.31	-0.09*	-0.05	0.36**	0.29**
11	Techno-exhaustion	2.50	1.49	-0.07	0.03	0.17**	0.18**
12	Discontinuous usage intention	2.96	1.40	0.07	0.17*	-0.07	-0.06

Table 3: Means, standard deviations, and bivariate correlations (* p < 0.05; ** p < 0.01)[1]

5.1.1 Common method bias

As discussed by Podsakoff et al. (2003), self-reported data can be affected by common method bias (CMB). In order to identify the extent of possible common method bias, two statistical tests are performed. First, Harman's single factor test indicates whether the majority of the variance can be explained by one single factor. For our data, the test reveals that less than 50 percent of the variance of all indicators is explained by one factor. Rather, a single factor explains only 22 percent. Second, an additional CMB factor is included into the PLS model (Williams et al. 2003; Podsakoff et al. 2003) that contains every indicator of the origin model. The remaining factors are transformed into single-item constructs. In a next step, the ratio of R^2 with CMB factor to R^2 without CMB factor are compared. As the method factor explains a delta of R^2 of 0.006 and the R^2 without this CMB factor is 0.727, the ratio is 121:1. By comparing this with the ratio of Liang et al. (Liang et al. 2007), we can conclude that no signs of noteworthy CMB influence are observable.

5.1.2 Measurement model

As all constructs are measured by reflective indicators, content validity, indicator reliability, construct reliability, and discriminant validity need to be observed to validate the measurement model (Bagozzi 1979).

5.1.2.1 Content validity

To ensure content validity, items which have been used in prior research approaches are transferred to our research domain whenever possible (e.g., utilitarian, hedonic, and social outcomes, and disconfirmation). Other negative scales such as dissatisfaction and discontinuous usage intention are developed based on the related positive scales satisfaction or continuous usage intention. In addition, we develop new scales for social information, social communication, and social action overload. The derivations of these scales are explained in the separate file.

[1] The other bivariate correlations are included in the Appendix.

5.1.2.2 Indicator reliability

Indicator reliability indicates the rate of the variance of an indicator that has its origins in the latent variables. In order to explain at least 50 percent of the variance of a latent variable by the indicators, each value has to be 0.707 or more (Carmines and Zeller 2008). Here, this condition is fulfilled for all indicators. Additionally, bootstrapping with 5,000 samples shows that all loadings are highly significant.

5.1.2.3 Construct reliability

The concepts of composite reliability (CR) and average variance extracted (AVE) are used to determine the quality at the construct level (Fornell and Larcker 1981). Here, AVE should be higher than 0.5 and CR higher than 0.7. Both criteria are fulfilled by the model (Table 8).

5.1.2.4 Discriminant validity

Discriminant validity describes the extent to which measurement items differ from each another (Campell and Fiske 1959). Therefore, the square root of AVE is contained within Table 8 on the diagonal of the latent variable correlations. As these square root values are greater than the corresponding construct correlations (Fornell and Larcker 1981, Hulland 1999), it can be stated that this requirement is fulfilled and the measurement model is valid.

5.2 STRUCTURAL MODEL

The coefficient of determination (R^2) and significance levels of each path coefficient are used to evaluate the structural model (Chin 1998). Figure 5 indicates that the stressors explain 54 percent of techno-exhaustion, which in turn mediates the impact of stressors on discontinuous usage intention. Here, techno-exhaustion as well as the theoretical control variables explain 53 percent of the variance of discontinuous usage intention in our research model. Moreover, our results show that techno-exhaustion explains 34 percent of the variance of discontinuous usage intention when ignoring the impact of the theoretical control variables. Figure 5 illustrates the complete model.

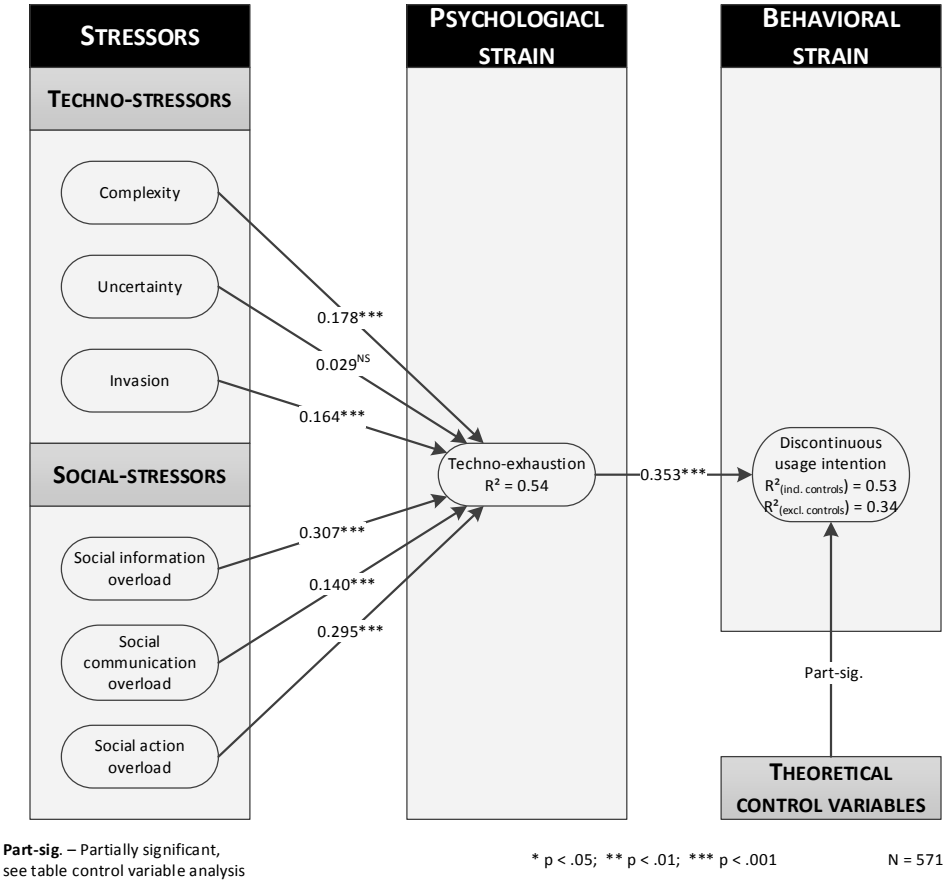


Figure 5: Research results

Concerning the path coefficients, only the techno-stressor uncertainty is not a significant contributing factor for techno-exhaustion. In addition to that, Table 4 shows the influence of the theoretical control variables, which have been identified as contributing factors for continuous usage intention in prior research (e.g., Bhattacherjee and Premkumar 2004). Here, results show that utilitarian, hedonic, and social outcomes, as well as social influence have a significant influence on dissatisfaction but not on discontinuous usage intention. Moreover, disconfirmation is a significant contributing factor for dissatisfaction, which in turn has a significant effect on discontinuous usage intention. These findings are discussed in the following section.

Influence of … on …	Dissatisfaction	Discontinuous usage intention
Disconfirmation	0.142**	
Utilitarian outcomes	-0.276***	-0.046^{NS}
Hedonic outcomes	-0.295***	-0.071^{NS}
Social outcomes	-0.118**	-0.031^{NS}
Social influence	0.215***	-0.049^{NS}
Dissatisfaction		0.409***

Table 4: Influence of theoretical control variables [2]

[2] Due to the fact the utilitarian, hedonic, and social outcomes as well as social influence have no significant effect on discontinuous usage intention but on dissatisfaction, we evaluate whether or not these have a mediated effect on discontinuous usage intention through dissatisfaction. Results of a bootstrapping mediation analysis (Preacher and Hayes (2004)) reveal that an indirect effect exists for all beliefs (Table 16).

To determine effect strengths, f^2 values are calculated (Cohen et al. 2003).The techno-stressors have a weak effect and the social-stressors have a strong effect on techno-exhaustion. Concerning the dependent variable discontinuous usage intention, the techno-exhaustion has a medium effect while dissatisfaction, attitudinal beliefs, and normative beliefs have a weak effect (Table 5).

Independent variable	Techno-stressors	Social-stressors	Techno-exhaustion	DisSat	AttBel	NormBel
Dependent variable	Techno-exhaustion		Discontinuous usage intention			
f^2	0.08	0.59	0.19	0.13	0.03	0.02
Interpretation	Weak effect	Strong effect	Medium effect	Weak effect	Weak effect	Weak effect

Note: DisSat = dissatisfaction; AttBel = attitudinal beliefs (incl. utilitarian outcomes, hedonic outcomes, social outcomes); NormBel = normative beliefs (incl. social influence);
f^2 = effect size of the independent variable(s) on the dependent variable.
$f^2 > 0.35$ = strong, $f^2 > 0.15$ = medium, $f^2 > 0.02$ = weak

Table 5: The strength of effect

5.3 MEDIATION EFFECT

To test if the mediation logic of the proposed model also holds, we test whether or not the influence of the three techno-stressors and three social-stressors on discontinuous usage intention is mediated by techno-exhaustion. We used the bootstrapping method as proposed by several researchers (Preacher and Hayes 2004). The indirect effects as well as the associated 95 percent bias corrected confidence intervals are shown in Table 9. Due to the fact that zero is not within the bias-corrected intervals, the bootstrapping method supports the assumption that the effect of each stressor is mediated through techno-exhaustion on discontinuous usage intention.

5.4 LIMITATIONS

As with every empirical research, the described results are limited by several issues. The results only represent one example of one particular SNS. Here, Facebook was chosen as it represents the largest and most popular SNS and hence provides good insight into potential stressors in SNSs. Stressors are likely to be different on other platforms and will vary over time with new features. But as our research is not about Facebook-specific instances but stressors in technology enabled social interaction platforms, the results should be relevant to all such techno-social systems. Furthermore, there might be differences for Facebook users with differing cultural backgrounds or individual predispositions which we did not account for theoretically or empirically. The consideration of personality might show that some individuals are more vulnerable to experience strain in terms of techno-exhaustion. Besides, the results are based on a single-point empirical study. Longitudinal surveys are necessary to strengthen the model and include the link to actual discontinuous usage behavior and to understand the development of the stressor strain relation over time. And while this research utilizes solely perceptual beliefs, recent bio-experimental research provides initial insights into how to control users' level of strain in experimental settings. Among others, researchers might measure electrodermal activity or users' level of cortisol (e.g., Riedl et al. 2012) in order to determine changes in users' level of strain while using technologies, such as SNSs, in an objective manner, thereby complementing our results, which are based on perceptual data.

6 DISCUSSION AND IMPLICATIONS

Matched by practical observations of Gartner (2011), whereupon individuals feel exhausted when using social media in general and the hedonic SNS Facebook in particular, the objective of this research is to understand the stress process of techno-social system usage. The proposed model suggests techno- and social-stressors as contributing factors for techno-exhaustion, which in turn has an impact on user behavior in terms of discontinuous usage intention. The results have several implications which will be discussed in the following and are summarized by Table 6.

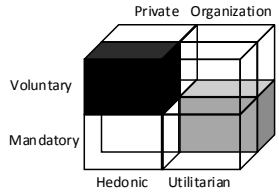
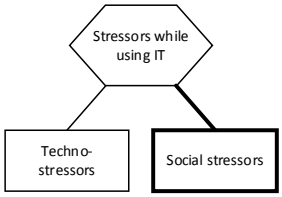
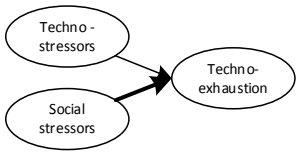
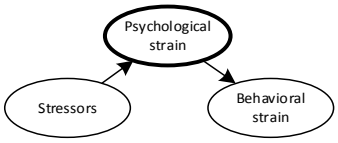
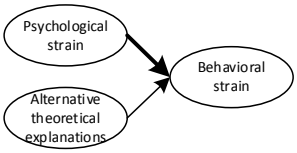
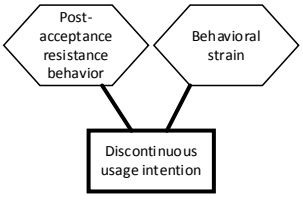
Stress while using hedonic, voluntary IS at home	Enriched conceptualization of stressors when using techno-social-systems	Three important social-stressors
		
• Identified that stress when using IS is not limited to using uti-litarian IS mandatorily in organizations, as it is discussed in prior research • Revealed users perceive stressful stimuli caused by hedonic IS used voluntarily at home.	• Revealed that stressful stimuli when using IS are caused by IS (techno-stressors); but also by the social environment (social stressors) • Contextualized social-stressors to the IS usage context • Developed and validated scales for the three social-stressors (social interaction overload, social communication overload, social action overload) using multiple methods and studies	• Indicate that social stressors have a strong effect on techno-exhaustion • Reveal that social-stressors have a stronger positive impact on techno-exhaustion than techno-stressors
Mediation effect of psychological strain	**Psychological strain as the main influencing factor for behavioral strain**	**Discontinuous usage intention as an important post-acceptance resistance behavior and behavioral strain**
		
• Identifying the importance of psychological strain in technostress research, as it mediates the impact of stressors on behavioral strain • Extending theoretical argumentation in prior research by identifying psychological strain as an influencing factor for behavioral strain	• Revealed the importance of psychological strain in post-acceptance research • Discovered that psycho-logical strain has a stronger impact on behavioral strain than perceptions studied in prior research • Discovered attitudinal and normative beliefs have no direct, signify-cant impact on behavioral strain when considering psycho-logical strain • Revealed psychological strain as inhibitor	• Conceptualized a user resistance variable for post-acceptance behavior that differs from prior user resistance behavior, as in post-acceptance research, users had initially decided to use the IS but then develop thoughts of decreasing usage or even stop using it, which is reflected in discontinuous usage intention • Contextualized discontinuous usage intention as behavioral strain when using IS voluntarily at home

Table 6: Theoretical implications

6.1 EVEN HEDONIC TECHNO-SOCIAL SYSTEMS CAN INDUCE FEELINGS OF TECHNO-EXHAUSTION AS AN UNINTENDED CONSEQUENCE OF THEIR VOLUNTARY USAGE

Findings in technostress research are currently limited to *mandated* usage of *utilitarian* technologies in *organizations* (e.g., Ragu-Nathan et al. 2008; Tarafdar et al. 2010; Tarafdar et al. 2011; see grey part of the cube in Table 6). In contrast to that, we examine techno-induced stress in *private* settings through the example of SNSs. As prior research emphasizes the essential impact of context (Johns 2006) we focus on a usage context, in which individuals use *hedonic* technologies *voluntarily*, so that we can conclude stress is also relevant in these fields of technology adoption research.

However, prior research in the field of voluntary SNS usage highlights positive consequences of SNS usage, such as coordinating events easily (Khan and Jarvenpaa 2010) or even that high usage intensity induces higher degrees of life satisfaction, civic participation, and political participation. Recent research extends this knowledge by identifying and researching unintended consequences of SNS usage, such as user addiction (Turel and Serenko 2012) or privacy risks (Krasnova et al. 2010). At that point, we extend this knowledge by contributing that the usage of SNSs also causes stress and hence has a further unintended consequence. Thereby, we contribute to Brown (2008), who suggests that ubiquitous technologies integrated in individuals' lives might lead to difficulties. This research underpins Brown's suggestion theoretically and empirically, as it identifies techno-exhaustion as one problem of modern technologies by means of techno-social systems such as SNSs.

Based on our findings, future research might investigate why individuals continue using a voluntary technology when its usage creates psychological strain. On the one hand, it might be reasonable that individuals expect more negative consequences when they stop using the technology. In the context of SNSs, users might perceive pressure from their friends to use it continuously or even experience the risk of becoming socially excluded from their circle of friends. On the other hand, it might be possible that users develop distorted positive perceptual beliefs (e.g., Turel et al. 2011) as a consequence of being exhausted, so that these outweigh feelings of being exhausted and result in inflated continuous usage intentions.

6.2 SOCIAL-STRESSORS CAUSE MORE TECHNO-EXHAUSTION THAN TECHNO-STRESSORS

The current understanding in IS research is that the sources of stress are limited to the technology itself and its characteristics (Ayyagari et al. 2011; Tarafdar et al. 2010; Ragu-Nathan et al. 2008; Riedl et al. 2012). However, the proposed research provides theoretical and empirical evidence for the fact that stressors are multifaceted and extend beyond techno-stressors.

Specifically, our results reveal that two techno-stressors – complexity and invasion – are significant contributing factors for techno-exhaustion, whereby uncertainty has no significant impact. This means that the technology is considered a source of stress because either it is too complex to use or it has invaded one's private life extensively, e.g. when technologies such as SNSs become more and more a permanent companion in individuals' life. This techno-invasion of techno-social systems is perceived as a stressor by some users.

In addition to that, our findings also reveal a significant impact of the three social-stressors social action, social information, and social communication overload on techno-exhaustion. First, we identify that the behavior of acquainted individuals represent a stressor. This is particularly noticeable when a user is inundated with information. Although, SNSs are mainly used to read and share information (Krasnova et al. 2010), SNSs users disclose high amounts of senseless and worthless information. Consequently, after users log into an SNS, they are faced with all kinds of information from their virtual friends. Being confronted with all this disclosed information represents the stressor called social information overload. Second, we identify that the behavior or, more specifically, the user's expectations contribute to techno-exhaustion while using techno-social systems like SNSs. This stressor is named social action overload as it results from an overly pronounced feeling of the need to take care of friends' problems or an excessively high degree of responsibility for caring about friends. Although, friendships include assisting friends socially and emotionally and helping them with their daily hassles (Boyd 2008), SNS users are confronted with all kinds of minor and major complaints from their virtual friends. Consequently, an individual faces many complaints of others, and feels responsible for help them. This leads to the perception of social support requests as a stressor. Third, we identify that both the individual and others might be the source of stress when initiating communications. This kind of stressor is named social communication overload and is the result of too much inappropriate communications. Techno-social systems like SNSs provide a wide range of communication media such as chat or private messaging with one or more friends. Whenever the amount of desired communication and cooperative capacity is exceeded, an individual feels stressed, independently of who initiated the communication. Taken together, these stressors arise through interpersonal relations, so we can conclude that social-stressors are an additional factor, beyond techno-stressors, causing techno-exhaustion. For these three social-stressors, we develop and validate scales with the help of multiple methods and studies (see separate file)

Notably, by using the new scales, we find that the three social-stressors have a strong influence on techno-exhaustion, whereas techno-stressors have a weak strength of impact. Future research focusing on the negative side of techno-social systems should acknowledge that the social characteristics of these systems are more important in terms of stress, distinguishing these factors when investigating different phenomena related to these types of systems. As a consequence of identifying and breaking down social-stressors, we extend the findings of Animesh et al. (2011), who identify environmental stimuli in virtual worlds affecting perceptions in the context of purchase intentions. This research shows that the interpersonal relations are not per se an environmental stressor; rather, the stress is the consequence of these relations as social information, social communication, and social action overload, which result from virtual interpersonal relations in crowded virtual places.

6.3 TECHNO-EXHAUSTION IS AN INHIBITING MEDIATOR IN THE STRESSOR-DISCONTINUOUS USAGE INTENTION RELATION AND HAS A GREATER EFFECT ON DISCONTINUOUS USAGE INTENTIONS THAN EXISTING ALTERNATIVE THEORETICAL EXPLANATIONS

Apart from stressors, this research clarifies the role of techno-exhaustion in technology-induced stress processes. Our research reveals that stressors first effect techno-exhaustion, which in turn influences the behavioral strain variable discontinuous usage intention. Specifically, social- and techno-stressors explain 54 percent of individual variance in techno-exhaustion, which in turn explains 34 percent of the variance in discontinuous usage intention. By considering alternative explanations, we even explain 53 percent of the variance in this behavioral variable.

This emphasizes the importance of techno-exhaustion as mediator in the whole model, as stressors initiate the stress process by producing feelings of being exhausted, which afterwards induce a behavioral reaction of individuals in order to reduce this undesired negative exhaustion. Behavioral consequences may include increased intentions to discontinue using techno-social systems. This mechanism of how stressors influence discontinuous usage intentions are validated by mediation analyses.

Hence, we extend current stress-related research by extending the findings of Ayyagari et al. (2011), who demonstrate that stressors influence techno-exhaustion, and verify that techno-exhaustion represents a mediator in the stress process. As a consequence, the proposed model explains the causal mechanism of the cause-effect-chain from stressors through techno-exhaustion to intentions, which was called for in prior research but not delivered so far (Thomée et al. 2007, p.1319). Hence, the inclusion of a psychological strain variable, such as techno-exhaustion, into recent IS-related research discussing stressors and behavioral strain (e.g., Ragu-Nathan et al. 2008), implicates that responses can be better explained in terms of behavioral strain. In summary, we conclude that future research discussing stressors or consequences should integrate strain variables.

In addition, stressors and techno-exhaustion inhibit continuous technology usage only if an individual feels exhausted, whereas lack of perceived techno-exhaustion does not have any consequence. Consequently, stressors and techno-exhaustion represent a specific subset of inhibitors. Such inhibitors have been defined as perceptions which solely discourage usage but have no encouraging effect on usage when absent (Cenfetelli 2004). Consequently, the perceptions of undesired techno-exhaustion increase discontinuous usage intentions, whereas the absence of such feelings does not consequently induce behavioral responses. This is in line with our understanding of psychological and behavioral strain, whereupon behavioral strain is a response to psychological strain in an attempt to cope with these negative undesired feelings. Since such responses are solely necessary when techno-exhaustion is perceived, they can be considered inhibitors.

Although the importance of inhibitors has been shown in recent research (Bhattacherjee and Hikmet 2007), most IS-related models and theories, such as post-acceptance models (e.g., Bhattacherjee 2001; Bhattacherjee and Premkumar 2004), have not incorporated them. In order to overcome this shortcoming, this research discusses the inhibitors stressors and techno-exhaustion – as a specific subset of inhibitors – in the post-acceptance model of Bhattacherjee (2001). Since our research results reveal that these inhibitors have behavioral consequences, such as an increased discontinuous usage intention, we extend current knowledge in the field of post-acceptance by identifying the importance of inhibitors.

In order to evaluate the influence of inhibitors and enablers in continuous usage research as well as to evaluate whether techno-exhaustion or alternative theoretical explanations that have been studied in prior research explain discontinuous usage intention to a higher degree, we included additional perceptual beliefs, such as utilitarian outcomes, hedonic outcomes, social outcomes, social influence, and dissatisfaction as theoretical control variables in our research model. Our results reveal that attitudinal and normative beliefs do not influence discontinuous usage intentions directly, but rather indirectly through dissatisfaction. However, none of these variables considered as an alternative explanation represents an inhibiting factor; instead they are defined as enablers by Cenfetelli (2004). Hence, we propose a post-acceptance model consisting of enablers and inhibitors. Post-hoc findings indicate that techno-exhaustion has the highest explanation power and explains even a higher variance in discontinuous usage intention than an individual's degree of satisfaction. Nevertheless, we reveal one essential difference. On the one hand, our research shows that the inhibiting factor techno-exhaustion has a direct effect on discontinuous usage intention. On the other hand, all four enablers (utilitarian, hedonic, and

social outcomes and social influence) have a direct effect on dissatisfaction but not a direct effect on discontinuous usage intention. Nevertheless, the influence of these enablers is mediated on discontinuous usage intention by dissatisfaction. Hence, we provide empirical evidence that inhibitors and enablers influence users through different mechanisms. In addition, results reveal that inhibitors have a higher strength of effect on discontinuous usage intention than enablers. This might be explained by the specific characteristics of inhibitors and due to the fact that negative or bad experiences are stronger and more dominant in the long run than positive ones (Ito et al. 1998). In summary, we recommend that future research in the field of post-acceptance research should consider inhibitors, because it has a higher strength of effect than variables which have been studied previously, such as satisfaction or usefulness (Bhattacherjee 2001).

6.4 DISCONTINUOUS USAGE AS A NEW USER RESISTANCE VARIABLE IN POST-ACCEPTANCE MODELS AND AS A BEHAVIORAL STRAIN WHEN USING IS VOLUNTARILY AT HOME

Although Venkatesh (2006) points out the importance of understanding user resistance and non-usage behavior, only few articles focus on such non-usage behavior. Prior research has investigated users' initial decisions not to use a technology (Kim and Kankanhalli 2009; Polites and Karahanna 2012). In contrast, we focus on the progressive development of user resistance and thus contribute a new dependent variable in terms of discontinuous usage intention, focusing on individuals who had initially chosen to use a technology in the past, but develop thoughts of decreasing their usage or even stop using it now, which both depicts manifestations of user resistance behaviors (e.g., Kim and Kankanhalli 2009). Furthermore, when discussing post-acceptance technology usage, it is not possible to discuss user resistance from the perspective of initial usage intention. Hence, we provide a new user resistance variable that can be discussed in post-acceptance models after an initial decision has been made. Moreover, with regard to the ongoing debate in IS research regarding the right dependent variable, the model indicates discontinuous usage intention as a suitable dependent variable when investigating decreasing usage intensity.

Furthermore, we contextualize discontinuous usage intention as a behavioral strain variable. As prior technostress research has focused on the behavioral strain variables continuance commitment and performance (Ragu-Nathan et al. 2008; Tarafdar et al. 2010), which are useful in organizational research, we align with Sun (2013) and focus on discontinuous usage intention as we are interested in whether users reduce or stop using the voluntary IS when perceiving techno-exhaustion. Hence we identify and verify discontinuous usage intention as behavioral strain variable.

7 CONCLUSION

In answer to the research question posed, the proposed model of techno-social system stress identifies that techno-complexity and -invasion as technological stressors and social information, social communication, and social action overload as social-stressors are related to a SNS user's feeling of techno-exhaustion resulting in individuals' intention to discontinue using techno-social systems. The conducted empirical study with 571 SNS users also reveals that social stressors cause techno-exhaustion to a higher degree than techno-stressors and that techno-exhaustion mediates the impact of stressors on discontinuous usage intention. Moreover, the findings

indicate that techno-exhaustion has an even higher impact on discontinuous usage intention than other existing alternative theoretical explanations.

8 REFERENCES

Ajzen, I., 1985. From intentions to actions: A theory of planned behavior, in Action control: From cognition to behavior. J. Kuhl (ed.), Berlin: Springer.

Animesh, A., Pinsonneault, A., Yang, S.-B., and Oh, W., 2011. An Odyssey into Virtual Worlds: Exploring the Impacts of Technological and Spatial Environments. MIS Quarterly (35:3), pp. 789–810.

Ayyagari, R., Grover, V., and Purvis, R., 2011. Technostress: Technological Antecedents and Implications. MIS Quarterly (35:4). pp. 831–858.

Bagozzi, R. P., 1979. The Role of Measurement in Theory Construction and Hypothesis Testing: Toward a Holistic Model, in Conceptual and theoretical developments in marketing. O. C. Ferrell, S. W. Brown, and C. W. Lamb (eds.), Chicago, Ill.: American Marketing Assoc., pp. 15–32.

Baum, A., and Paulus, P., 1987. Crowding. In: Handbook of environmental psychology. D. Stokols, and I. Altman (eds.), New York: Wiley, pp. 533–570.

Bhattacherjee, A., 2001. Understanding Information Systems Continuance: An Expectation-Confirmation Model. MIS Quarterly (25:3), pp. 351–370.

Bhattacherjee, A., and Hikmet, N., 2007. Physicians' resistance toward healthcare information technology: a theoretical model an empirical test. European Journal of Information Systems (16:6), pp. 725–737.

Bhattacherjee, A., and Premkumar, G., 2004. Understanding Changes in Belief and Attitude toward Information Technology Usage: A Theoretical Model and Longitudinal Test. MIS Quarterly (28:2), pp. 229–254.

Bovey, W. H., and Hede, A., 2001. Resistance to Organizational Change: The Role of Defense Mechanisms. Journal of Managerial Psychology (16:7), pp. 534–548.

Boyd, D., 2008. Facebook's Privacy Trainwreck: Exposure, Invasion and Social Convergence. Convergence (14:1), pp. 13–20.

Brown, S. A., 2008. Household Technology Adoption, Use, and Impacts: Past, Present, and Future. Information Systems Frontiers (10:4), pp. 397–402.

Brown, S. A., and Venkatesh, V., 2005. Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Life Cycle. MIS Quarterly (29:3), pp. 399–426.

Campell, D. T., and Fiske, D. W., 1959. Convergent and discriminant validation by the multitrait-multimethod matrix. Psychological Bulletin (56:2), pp. 81–105.

Carmines, E. G., and Zeller, R. A., 2008. Reliability and validity assessment, Newbury Park, Calif.: Sage Publ.

Cenfetelli, R. T., 2004. Inhibitors and Enablers as Dual Factor Concepts in Technology Usage. Journal of the Association for Information Systems (5:11-12), pp. 472–492.

Chin, W. W., 1998. The Partial Least Squares Approach to Structural Equation Modeling. In: Modern methods for business research, G. A. Marcoulides (ed.), Mahwah N.J: Erlbaum, pp. 295–336.

Cohen, J., Cohen, P., West, S. G., and Aiken, L. S., 2003. Applied multiple regression-correlation analysis for the behavioral sciences, Mahwah: Lawrence Erlbaum Associates.

Eppler, M., and Mengis, J., 2004. The Concept of Information Overload: A Review of Literature from Organization Science, Accounting, Marketing, MIS, and Related Disciplines. The Information Society (20:5), pp. 325–344.

Fornell, C., and Larcker, D. F., 1981. Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research (18:1), pp. 39–50.

Fuchs, C., Hofkirchner, W., Schafranek, M., Raffl, C., Sandoval, M., and Bichler, R., 2010. Theoretical Foundations of the Web: Cognition, Communication, and Co-Operation. Towards an Understanding of Web 1.0, 2.0, 3.0, future internet (2:1), pp. 41–59.

Gartner 2011. Gartner Survey Highlights Consumer Fatigue with Social Media. http://www.gartner.com/it/page.jsp?id=1766814. Accessed 7 September 2011.

Greene, J. A., Choudhry, N. K., Kilabuk, E., and Shrank, W. H., 2011. Online Social Networking by Patients with Diabetes: A Qualitative Evaluation of Communication with Facebook. Journal of general internal medicine (26:3), pp. 287–292.

Hsieh, J. J. P.-A., Rai, A., and Keil, M., 2008. Understanding Digital Inequality: Comparing Continued Use Behavioral Models of the Socio-Economically Advantaged and Disadvantaged. MIS Quarterly (32:1), pp. 97–126.

Hulland, J. S., 1999. Use of partial least squares (PLS) in strategic management research: A review of four recent studies. Strategic Management Journal (20:2), pp. 195–204.

Ito, T. A., Larsen, J. T., Smith, N. K., and Cacioppo, J. T., 1998. Negative information weighs more heavily on the brain: The negativity bias in evaluative categorizations. Journal of Personality and Social Psychology (75:4), pp. 887–900.

Johns, G., 2006. The essential impact of context on organizational behavior. Academy of Management Review (31:2), pp. 386–408.

Jones, Q., Ravid, G., and Rafaeli, S., 2004. Information Overload and the Message Dynamics of Online Interaction Spaces: A theoretical model and empirical exploration. Information Systems Research (15:2), pp. 194–210.

Khan, Z., and Jarvenpaa, S. L., 2010. Exploring temporal coordination of events with Facebook.com. Journal of Information Technology (25:2), pp. 137–151.

Kim, H.-W., and Kankanhalli, A., 2009. Investigating User Resistance to Information Systems Implementation: A Status Quo Bias Perspective. MIS Quarterly (33:3), pp. 567–582.

Koroleva, K., Krasnova, H., Veltri, N., and Günther, O., 2011. It's all about networking! Empirical investigation of social capital formation on social network sites. Proceedings of the international conference on information systems.

Krasnova, H., Spiekermann, S., Koroleva, K., and Hildebrand, T., 2010. Online social networks: why we disclose. Journal of Information Technology (25), pp. 109–125.

Liang, H., Saraf, N., Hu, Q., and Xue, Y., 2007. Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management. MIS Quarterly (31:1), pp. 59–87.

Liao, C., Chen, J.-L., and Yen, D. C., 2007. Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-service: An integrated model. Computers in Human Behavior (23:6), pp. 2804–2822.

Ljungberg, F., and Sørensen, C., 1998. Are you "pulling the plug" or "pushing up the daisies"? Proceedings of the 31st Hawaii International Conference on System Sciences.

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T., 2012. Online Social Networks as a Source and Symbol of Stress: An Empirical Analysis. Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL).

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T., 2014. Giving too much Social Support: Social Overload on Social Networking Sites. European Journal of Information Systems.

McCarthy, D., and Saegert, S., 1978. Residential Density, Social Overload, and Social Withdrawal. Human Ecology (6:3), pp. 253–272.

Pempek, T. A., Yermolayeva, Y. A., and Calvert, S. L., 2009. College students' social networking experiences on Facebook. Journal of Applied Developmental Psychology (30:3), pp. 227–238.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., and Podsakoff, N. P., 2003. Common Method Biases in Behavioral Research: A Critical Review and Recommended Remedies. Journal of Applied Psychology (83:5), pp. 879–903.

Polites, G. L., and Karahanna, E., 2012. Shackled to the status quo: The inhibiting effects of incumbent system habit, switching costs, and inertia on new system acceptance. MIS Quarterly (36:1), pp. 21-42.

Preacher, K. J., and Hayes, A. F., 2004. SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behavior Research Methods, Instruments, & Computers (36:4), pp. 717–731.

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., and Qiang, T., 2008. The Consequences of Technostress for End Users in Organizations: Conceptual Development and Empirical Validation. Information Systems Research (1:4), pp. 417–433.

Riedl, R., Kindermann, H., Auinger, A., and Javor, A., 2012. Technostress from a Neurobiological Perspective - System Breakdown Increases the Stress Hormone Cortisol in Computer Users. Business & Information Systems Engineering (4:2), pp. 61–69.

Ringle, C. M., Wende, S., and Will, A., 2005. SmartPLS: University of Hamburg.

Shu, Q., Tu, Q., and Wang, K., 2011. The Impact of Computer Self-Efficacy and Technology Dependence on Computer-Related Technostress: A Social Cognitive Theory Perspective. International Journal of Human-Computer Interaction (27:10), pp. 923–939.

Sun, H., 2013. A longitudinal study of herd behavior in the adoption and continued use of technology. MIS Quarterly (4:37), pp. 1013–1041.

Tarafdar, M., Tu, Q., Ragu-Nathan, B., and Ragu-Nathan, T., 2007. The Impact of Technostress on Role Stress and Productivity. Journal of Management Information Systems (24:1), pp. 301–328.

Tarafdar, M., Tu, Q., and Ragu-Nathan, T. S., 2010. Impact of Technostress on End-User Satisfaction and Performance. Journal of Management Information Systems (27:3), pp. 303–334.

Tarafdar, M., Tu, Q., Ragu-Nathan, T. S., and Ragu-Nathan, B. S., 2011. Crossing to the Dark Side: Examining Creators, Outcomes, and Inhibitors of Technostress. Communications of the ACM (54:9), pp. 113–120.

Thomée, S., Eklöf, M., Gustafsson, E., Nilsson, R., and Hagberg, M., 2007. Prevalence of perceived stress, symptoms of depression and sleep disturbances in relation to information and communication technology (ICT) use among young adults – an explorative prospective study. Computers in Human Behavior (23:3), pp. 1300–1321.

Tu, Q., Wang, K., and Shu, Q., 2005. Computer-related technostress in China. Communications of the ACM (48:4), pp. 77–81.

Turel, O., and Serenko, A. 2012. The benefits and dangers of enjoyment with social networking websites. European Journal of Information Systems (21:5), pp. 512–528.

Turel, O., Serenko, A., and Giles, P., 2011. Integrating Technology Addiction and Use: An Empirical Investigation of Online Auction Users. MIS Quarterly (35:4), pp. 1043–1061.

van der Heijden, H., 2004. User Acceptance of Hedonic Information Systems. MIS Quarterly (28:4), pp. 695–704.

Venkatesh, V., 2006. Where to Go from Here? Thoughts on Future Directions for Research on Individual-Level Technology Adoption with a Focus on Decision Making. Decision Sciences (37:4), pp. 497–518.

Vespignani, A., 2009. Predicting the Behavior of Techno-Social Systems. Science (325:5939), pp. 425–428.

Volkoff, O., Strong, D. M., and Elmes, M. B., 2007. Technological Embeddedness and Organizational Change. Organization Science (18:5), pp. 832–848.

Wang, K., Shu, Q., and Tu, Q., 2008. Technostress under different organizational environments: An empirical investigation. Computers in Human Behavior (24:6), pp. 3002–3013.

Williams, L. J., Edwards, J., and Vandenberg, R., 2003. Recent Advances in Causal Modeling Methods for Organizational and Management Research. Journal of Management (29:6), pp. 903–936.

Wohn, D. Y., Lampe, C., Wash, R., Ellison, N., and Vitak, J., 2011. The "S" in Social Network Games: Initiating, Maintaining, and Enhancing Relationships. Proceedings of the 44th Hawaii International Conference on System Sciences, pp. 1–10.

9 APPENDIX A: MEASUREMENT MODEL AND RESEARCH MODEL VALIDATION

Construct	Label	Indicator "totally disagree" to "totally agree" (7-point Likert scale)	Loadings
Social action overload	SAO-1	I take too much care of my friends' well-being on Facebook.	0.819
	SAO-2	I deal too much with my friends' problems on Facebook.	0.844
	SAO-3	My sense of being responsible for how much fun my friends have on Facebook is too strong.	0.800
	SAO-4	I am too often caring for my friends on Facebook.	0.766
	SAO-5	I pay too much attention to posts of my friends on Facebook.	0.796
	SAO-6	I congratulate Facebook friends as a consequence of the birthday reminder, although I would not congratulate them in real life.	0.738
Social communication overload	SCO-1	I receive more messages, notifications and announcements of nodded acquaintances on Facebook than I can respond to.	0.793
	SCO-2	I am overextended from the messages, notifications and announcements I receive on Facebook at every place.	0.864
	SCO-3	The amount of trivial communication on Facebook is too high.	0.893
	SCO-5	I have to respond to messages, notifications and announcements on Facebook quickly at an inappropriate time.	0.852
	SCO-7	I receive and send too many messages, notifications and announcements on Facebook.	0.768
Social information overload	SIO-1	There is more information on Facebook than I can digest.	0.826
	SIO-2	The information on Facebook overextend me.	0.855
	SIO-3	It is difficult for me to focus on the essential information on Facebook.	0.833
	SIO-4	The amount of information on Facebook makes me overlook important information.	0.772
	SIO-5	I am faced with too much irrelevant information on Facebook.	0.825
	SIO-6	The quantity of information on Facebook is higher than its quality.	0.791
	SIO-7	I receive too much information on Facebook.	0.772
Techno-invasion	TInv-2	I am in touch with my Facebook friends over Facebook even during my vacation.	0.900
	TInv-3	I spend too much time during my vacations or weekends on Facebook.	0.913
	TInv-4	I feel my personal life is being invaded by Facebook.	0.849
Techno-complexity	TCom-2	I need a long time to understand and use Facebook.	0.802
	TCom-3	I do not find enough time to upgrade my technology skills to use Facebook.	0.796
	TCom-4	Younger people are better at using Facebook than I am.	0.754
	TCom-5	I often find Facebook too complex to use.	0.858
Techno-uncertainty	TUnc-1	There are always new terms and conditions on Facebook.	0.827
	TUnc-2	There are constant changes in Facebook apps.	0.915
	TUnc-3	Overall, there are constant changes of Facebook.	0.878
Techno-exhaustion (scale ranges from daily to never)	Exh-1	I feel drained from activities that require me to use Facebook.	0.790
	Exh-2	I feel tired from my Facebook activities.	0.881
	Exh-3	Using Facebook is a strain for me.	0.877
	Exh-4	I feel burned out from my Facebook activities.	0.903
Disconfirmation	DisConf-1	My experiences with using Facebook are worse than what I have expected.	0.866
	DisConf-2	Many expectations from using Facebook remain unfulfilled.	0.802
	DisConf-3	Overall, most of my expectations from using Facebook are confirmed (reverse coded).	0.869

Dissatisfaction	DisSat-1	Using Facebook is absolutely terrible.	0.880
	DisSat-2	Using Facebook is very pleasing (reverse coded).	0.861
	DisSat-3	Using Facebook is very frustrating.	0.905
	DisSat-4	Overall, I am extremely dissatisfied with using Facebook.	0.718
Discontinuous usage intention	DisCont-1	I intend to use Facebook less often in future.	0.876
	DisCont-2	I intend to discontinue using Facebook rather than continue its use.	0.879
	DisCont-3	I intend to use other social networking sites instead of Facebook.	0.737
Utilitarian outcomes	UO-1	Using Facebook is useful to stay in contact with friends.	0.863
	UO-2	Using Facebook is useful to communicate with friends.	0.890
	UO-3	Overall, using Facebook is useful.	0.869
Hedonic outcomes	HO-1	Facebook includes a wide range of apps which fulfill the purpose of pleasure.	0.875
	HO-2	I enjoy playing online games in Facebook.	0.956
	HO-3	Overall, I enjoy using Facebook.	0.961
Social outcomes	SO-1	Using Facebook improves my image.	0.924
	SO-2	Using Facebook enhances my social standing.	0.760
	SO-3	Using Facebook is a status symbol.	0.936
Social influence	SI-1	My social environment thinks that I should use Facebook.	0.904
	SI-2	My social environment expects me to use Facebook.	0.926
	SI-3	People, who are important to me, think that I should use Facebook.	0.925
	SI-4	People, who are important to me, expect me to use Facebook.	0.936
Note: all loadings are significant at $p < 0.001$			

Table 7: Measurement items

Concept		Construct	AVE	C.R.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Stressors	1	Complexity	0.644	0.878	0.802													
	2	Uncertainty	0.763	0.906	0.06	0.873												
	3	Invasion	0.790	0.918	-0.04	0.28	0.889											
	4	Social information overload	0.658	0.931	0.35	0.23	0.13	0.811										
	5	Social communication overload	0.698	0.920	0.32	0.20	0.08	0.57	0.835									
	6	Social action overload	0.631	0.911	0.18	0.19	0.46	0.44	0.33	0.794								
Psychological strain	7	Techno-exhaustion	0.747	0.922	0.36	0.19	0.35	0.59	0.47	0.58	0.864							
Behavioral strain	8	Discontinuous usage intention	0.695	0.872	0.35	0.18	0.03	0.49	0.44	0.29	0.57	0.834						
Theoretical control variables	9	Dissatisfaction	0.712	0.907	0.23	0.16	-0.07	0.51	0.52	0.19	0.47	0.65	0.844					
	10	Utilitarian outcomes	0.763	0.906	-0.22	0.15	0.40	-0.11	-0.13	0.21	0.02	-0.25	-0.41	0.873				
	11	Hedonic outcomes	0.867	0.951	-0.14	0.02	0.46	-0.06	-0.17	0.34	0.07	-0.26	-0.43	0.59	0.931			
	12	Social outcomes	0.768	0.908	-0.21	-0.10	-0.33	-0.27	-0.24	-0.42	-0.50	-0.23	-0.10	-0.18	-0.31	0.876		
	13	Social influence	0.850	0.958	-0.11	-0.24	-0.38	-0.31	-0.25	-0.36	-0.41	-0.24	-0.15	-0.28	-0.18	0.56	0.922	
	14	Disconfirmation	0.716	0.883	0.49	0.07	-0.20	0.33	0.34	-0.04	0.18	0.39	0.34	-0.32	-0.38	0.01	0.00	0.846
Note: Square root of AVE highlighted on the diagonal																		

Table 8: Construct reliability and validity

10 APPENDIX B: POST-HOC ANALYSIS: MEDIATION ANALYSES

Mediation analysis		Indirect effect of … on discontinuous usage intention through techno-exhaustion					
		SIO	SCO	SAO	Complexity	Uncertainty	Invasion
Indirect effect		0.20	0.14	0.26	0.18	0.09	0.17
Bias corrected and accelerated confidence interval	Lower	0.137	0.100	0.188	0.120	0.052	0.116
	Upper	0.268	0.197	0.342	0.254	0.149	0.235
Note: 1,000 bootstrap resamples							

Table 9: Mediation analysis for techno- and social stressors

Mediation analysis		Indirect effect of … on discontinuous usage intention through dissatisfaction			
		Utilitarian outcomes	Hedonic outcomes	Social outcomes	Social influence
Indirect effect		-0.28	-0.13	-0.13	-0.05
Bias corrected and accelerated confidence Interval	Lower	-0.362	-0.190	-0.192	-0.105
	Upper	-0.200	-0.065	-0.072	-0.006
Note: 1,000 bootstrap resamples					

Table 10: Mediation analysis for attitudinal and normative beliefs

11 SEPARATE FILES

11.1 FILE A: TECHNOSTRESS LITERATURE REVIEW

Article	Research context	Antecedents*	Techno-stressors	Psychological and behavioral strain*	Controls
Tu et al. 2005	Organi-zation		Overload, invasion, complexity, insecurity, uncertainty	Productivity	Age, computer literacy, task complexity, reward
Tarafdar et al. 2007	Organi-zation		Overload, invasion, complexity, insecurity, uncertainty	Productivity, role stress (role conflict, role overload)	
Ragu-Nathan et al. 2008	Organi-zation	Individual characteristics (age, gender, education, computer confidence)	Overload, invasion, complexity, insecurity, uncertainty	Job satisfaction, organizational commitment(i), continuance commitment(i)	Inhibiting mechanisms
Wang et al. 2008	Organi-zation	Individual characteristics (age, gender, education), organizational characteristics (centralization, innovation)	Overload, invasion, complexity, insecurity, uncertainty		
Tarafdar et al. 2010	Organi-zation	Organizational characteristics (innovation support(i), involvement facilitation)	Overload, invasion, complexity, insecurity, uncertainty	End-user satisfaction, end-user performance	
Ayyagari et al. 2011	Organi-zation	Technology characteristics (usability features, dynamic features, intrusive features)	Work-home conflict, invasion of privacy, work overload, role ambiguity, job insecurity	Emotional exhaustion	Technology usage, negative affectivity
Tarafdar et al. 2011	Organi-zation	Individual characteristics (age, gender, education, computer efficacy and confidence, experience using computers), inhibiting mechanisms (technical support provision, technology involvement facilitation, innovation support)	Overload, invasion, complexity, insecurity, uncertainty	Job satisfaction, organizational commitment, role conflict, role overload, employee innovation, employee productivity, end-user satisfaction	
Shu et al. 2011	Organi-zation	Organizational characteristics (technology dependency), individual characteristics (computer self-efficacy)	Overload, invasion, complexity, insecurity, uncertainty		Age, gender, education
Riedl et al. 2012	Organi-zation		System breakdown	Stress hormone cortisol	
Maier et al. 2012	Private		Invasion, complexity, uncertainty, pattern, disclosure	Satisfaction, continuous usage intention	Attitudinal beliefs, normative beliefs, control beliefs, disconfirmation
Maier et al. 2014	Private	Individual characteristics (age, gender), usage characteristics (extent of usage, number of virtual friends), relationship characteristics (type, subjective social support norm)	Social overload	Exhaustion, satisfaction, discontinuous usage intention	

*: (i) means that an indirect effect of the antecedent variable on the techno-stressor or of the techno-stressor on the strain variable is studied, but not a direct effect.

Table 1: Technostress review in IS research

11.2 FILE B: SCALE DEVELOPMENT AND SCALE VALIDATION

In this section, we develop and validate the scales necessary for this research in six steps (develop pool of items, factor analyses, assess reliability and construct validity, construct reliability, discriminant validity, evaluation of second-order construct).

11.2.1 Step 1: Item development of the scale SNS-induced stress

Starting with a discussion of twelve individuals, we considered how the five technostress creators in work-related settings discussed by Ragu-Nathan et al. (2008) are significant when using SNSs. Based on this discussion, we identified that the stressors invasion, complexity, and uncertainty are solely of importance in the context of SNSs. In addition, we scanned recent articles[3] discussing stressors or the usage of SNSs. Based on both procedures, a first set of items for the proposed technostress creators was developed.

To develop scales for social action, social information, and social communication overload, we first conceptualized items based on prior articles discussing these phenomena in related contexts, such as literature discussing crowding (Regoeczi 2003). To ensure content validation in a first step, we interviewed twelve users of SNSs, who were selected to represent users of SNSs. This means that about 75 percent of the interview partner should be younger than 35 years, because this corresponds to the age distribution of the largest SNS Facebook and as the same number of men as women are registered in this SNS, we interviewed six men and six women (Table 2)[4]. In the interviews, participants rated the relevance and clarity of each item, resulting in a final pool of items. These items were revised based on a discussion with the twelve interview partners to ensure content quality. These steps follow methods used in recent research developing new scales (e.g., Chin et al. 1997; Salisbury et al. 2002; Ragu-Nathan et al. 2008).

Demographics							
Gender		Age					
Men	Women	13-17	18-25	26-34	35-44	45-54	55-65
6	6	2	3	3	2	1	1

Table 2: Demographics of the twelve interview partners

11.2.2 Step 2: Exploratory and confirmatory factor analysis

For this step, an online survey was created, which included the final pool of items of step 1. In order to collect data, 1,500 e-mails were sent out to individuals who had given us their e-mail address in previous surveys and allowed us to contact them when performing a new survey. Based on these mail-outs, 601 individuals completed the survey without missing values (response rate = 40.1 percent).

To run exploratory and confirmatory factor analyses while developing new scales, recent research suggests splitting the data set randomly into two subsamples (e.g., Ragu-Nathan et al. 2008). Hence, we split the data set into a set 1, consisting of 481 cases, and a set 2, consisting of 120 cases. Set 1 was used to develop the constructs and set 2 was used to validate the results of

[3] We scanned the Senior Scholars' Basket of Journals (including MISQ, ISR, JMIS, JAIS, EJIS, ISJ, JSIS, and JIT) for the period 2002-2012 using 32 stress- and SNS-related search terms. In identifying articles, we performed forward and backward search as proposed by Webster and Watson ((2002)) in order to avoid missing articles.

[4] see for example http://www.kenburbary.com/2011/03/facebook-demographics-revisited-2011-statistics-2/

set 1 as a holdout sample. These two partitioned data sets were the basis for performing exploratory and confirmatory factor analyses.

In a first step, set 1 was used to perform an exploratory factor analysis. Results reveal an overall six-factor structure of stressors; a three-factor structure for technostress creators and a three-factor structure for social stress creators. Altogether, two items had to be removed (TInv-1, TUnc-4). These results are visible in Table 3.

Construct	Label	Component					
		1	2	3	4	6	7
Social action overload	SAO-1		0.831				
	SAO-2		0.825				
	SAO-3		0.832				
	SAO-4		0.600				
	SAO-5		0.656				
	SAO-6		0.622				
	SAO-7		0.601				
Social communication overload	SCO-1			0.799			
	SCO-2			0.656			
	SCO-3			0.774			
	SCO-4			0.610			
	SCO-5			0.810			
	SCO-6			0.698			
	SCO-7			0.781			
Social information overload	SIO-1	0.805					
	SIO-2	0.734					
	SIO-3	0.801					
	SIO-4	0.731					
	SIO-5	0.730					
	SIO-6	0.747					
	SIO-7	0.750					
Techno-invasion	TInv-1						
	TInv-2					0.886	
	TInv-3					0.884	
	TInv-4					0.666	
Techno-complexity	TCom-1				0.601		
	TCom-2				0.811		
	TCom-3				0.802		
	TCom-4				0.607		
	TCom-5				0.741		
Techno-uncertanty	TUnc-1						0.808
	TUnc-2						0.887
	TUnc-3						0.824
	TUnc-4						
Eigenvalues		11.670	8.987	2.470	1.997	1.394	1.313
Extraction method: principal component analysis. Rotation method: varimax with kaiser normalization. Rotation converged in eight iterations.							
TInv-1, TUnc-4 are deleted; factor cross loadings below 0.4 are not shown							

Table 3: Rotated component matrix of social stress and technostress creators

In a second step, set 1 was used again to perform a confirmatory factor analysis with AMOS. In this step, we deleted items with high correlations among their error terms for technostress and social stress creators separately. Hence, one item had to be removed (TCom-1). This result is also provided when using set 2 (N_2=120).

11.2.3 Step 3: Assessing the reliability and construct validity of the new items

In a third step, we intended to assess the reliability and construct validity of the new items following procedures suggested in prior research (Landis and Koch 1977; Nahm et al. 2002). Therefore, we asked individuals to assign each newly developed item to one of the six identified stressors. In order to collect data, we again set up an online survey and sent out e-mails to 200 individuals excluding individuals who participated in the survey for step 2. In the end, 57 individuals assigned each item of step 2 to one of the identified SNS-induced stressors. The procedure of this step was as follows. First we presented and defined all stressors to each participant. Then we provided two examples to the participants that explained how individuals should assign items to stressors. Afterwards, each participant read each item and assigned it to one of the six stressors. This procedure was repeated for each item. Based on all 57 responses, we calculated ratios to which participants matched questions to the stressor, which was – according to exploratory factor analysis – the correct higher-order stressor. As suggested in prior research (Landis and Koch 1977; Nahm et al. 2002), we rejected all questions which were assigned correctly by less than 61 percent. The results are summarized in Table 4 and indicate that no item has to be removed. In summary, step 2 summarized all items, which belong statistically together and this step focused on semantically coherence.

Consequently, three items are removed from the list of potential indicators (SAO-7, SCO-4, SCO-6).

Construct	Label	SAO	SCO	SIO	TInv	TCom	TUnc
Social action overload	SAO-1	87.7	1.8	5.3	3.5	0.0	0.0
	SAO-2	75.4	5.3	8.8	3.5	0.0	0.0
	SAO-3	77.2	7.0	5.3	5.3	0.0	0.0
	SAO-4	63.2	15.8	5.3	1.8	0.0	0.0
	SAO-5	75.4	8.8	7.0	5.3	0.0	0.0
	SAO-6	64.9	10.5	10.5	3.5	1.8	0.0
	SAO-7	43.9	24.6	8.8	5.3	1.8	0.0
Social communication overload	SCO-1	1.8	82.5	7.0	1.8	1.8	0.0
	SCO-2	1.8	64.9	12.3	3.5	10.5	0.0
	SCO-3	5.3	61.4	14.0	7.0	0.0	0.0
	SCO-4	0.0	56.1	28.1	0.0	0.0	0.0
	SCO-5	1.8	63.2	12.3	3.5	1.8	0.0
	SCO-6	17.5	50.9	19.3	1.8	1.8	0.0
	SCO-7	1.8	73.7	5.3	5.3	3.5	1.8
Social information overload	SIO-1	0.0	3.5	91.2	0.0	0.0	1.8
	SIO-2	0.0	14.0	66.7	0.0	7.0	7.0
	SIO-3	3.5	1.8	82.5	0.0	7.0	0.0
	SIO-4	0.0	1.8	77.2	0.0	7.0	3.5
	SIO-5	0.0	3.5	84.2	5.3	3.5	1.8
	SIO-6	0.0	1.8	87.7	5.3	1.8	0.0
	SIO-7	1.8	3.5	84.2	1.8	1.8	1.8
Techno-invasion	TInv-1	1.8	3.5	5.3	66.7	1.8	0.0
	TInv-2	3.5	8.8	3.5	77.2	0.0	1.8
	TInv-3	0.0	5.3	7.0	64.9	0.0	0.0
	TInv-4	5.3	1.8	3.5	78.9	0.0	0.0
Techno-complexity	TCom-1	0.0	3.5	5.3	0.0	80.7	8.8
	TCom-2	1.8	1.8	1.8	0.0	82.5	7.0
	TCom-3	0.0	8.8	1.8	1.8	80.7	3.5
	TCom-4	0.0	5.3	1.8	5.3	82.5	3.5
	TCom-5	0.0	1.8	5.3	1.8	80.7	5.3
Techno-uncertainty	TUnc-1	0.0	0.0	1.8	5.3	1.8	87.7
	TUnc-2	0.0	0.0	7.0	0.0	0.0	91.2
	TUnc-3	0.0	3.5	1.8	0.0	3.5	89.5
SAO-7; SCO-4; SCO-6 are removed within this step							

Table 4: Pre-testing stage; values in percentage[5]

11.2.4 Step 4: Construct reliability

We provide means, standard deviation, and reliability in Table 5 to ensure construct reliability of the six stress creators. The base for this calculation was the combined data sample of set 1 and set 2, consisting of 601 cases (see step 2). For each stressor, Cronbach's alpha values were greater than the recommended minimal threshold of 0.7 (Nunnally and Bernstein 1994; Hair 1995; see Table 5: Reliability).

[5] The participants represented by the missing percentage do not assign an item to one of these constructs.

Construct	Mean	Standard deviation	Reliability
Social action overload	3.72	1.28	0.89
Social communication overload	4.42	1.30	0.89
Social information overload	3.47	1.38	0.91
Techno-invasion	3.97	1.75	0.86
Techno-complexity	2.52	1.22	0.84
Techno-uncertainty	4.59	1.26	0.86

Table 5: Mean, standard deviation, and alpha-reliability stressors

11.2.5 Step 5: Discriminant validity of the conceptual model through a first-order correlated measurement model of all constructs

Within this step, we again made use of the complete data sample of step 2, consisting of 601 cases. With using this set, discriminant and convergent validity were examined. Hence, a first-order correlated model was run in AMOS 20 (see Table 6). Due to the fact that no significant error correlations among any items exist, discriminant and convergent validity are good.

Model		χ^2/df	GFI	AGFI	NFI-δ1	SRMR	IFI-δ2	TLI-ρ2	CFI
Techno-stressors	First-order correlated model	2.58	0.96	0.94	0.96	0.05	0.97	0.96	0.97
Social stressors	First-order correlated model	3.48	0.91	0.87	0.95	0.05	0.96	0.95	0.96

Table 6: Discriminant validity

To evaluate both first-order correlated models, several indices were used. Here, χ^2/df is greater than one and smaller than five as recommended by prior research (Salisbury et al. 2002; Chin et al. 1997). The Goodness-of-Fit Index (GFI), which indicates the relative amount of variance and covariance that is explained by the model, exceed the threshold of 0.85 and the Adjusted Goodness-of-Fit Index (AGFI), which adjusts GFI for the degrees of freedom, exceeds the recommended threshold of 0.8 (Hadjistavropoulos and Asmundson 1999; Hair 1995) so that the model fits well. Normal Fit Index (NFI) and Comparative Fit Index (CFI) indicate the percentage enhancement in fit over the baseline model, whereby NFI should be greater than 0.8 (Hair 1995; Hadjistavropoulos and Asmundson 1999) or 0.9 (Salisbury et al. 2002) and CFI should be greater than 0.9 (Bentler and Bonett 1980; Salisbury et al. 2002), which is both fulfilled for the first-order correlated model. For the Standardized Root Mean Square Residual (SRMR), which represents the standardized difference between observed and predicted covariance, values less than 0.08 indicate acceptable fit (Hu and Bentler 1999). The incremental index of fit (IFI) is used to address the issue of parsimony and sample size and should be 0.9 and higher (Bollen 1989; Salisbury et al. 2002) and the recommended values of the Tucker-Lewis coefficient (TLI) are at least 0.90 (Salisbury et al. 2002). While developing new models, Vassend and Skrondal (Vassend and Skrondal 1997) suggest considering more liberal values, so that the discriminant validity can be confirmed.

11.3 REFERENCES

Ayyagari, R., Grover, V., and Purvis, R. 2011. Technostress: Technological Antecedents and Implications, MIS Quarterly (35:4), pp. 831–858.

Bentler, P., and Bonett, D. G. 1980. Significance tests and goodness of fit in the analysis of covariance structures, Psychological Bulletin (88:3), pp. 588–606.

Bollen, K. A. 1989. Structural equations with latent variables, New York: Wiley.

Chin, W. W., Gopal, A., and Salisbury, W. 1997. Advancing the theory of adaptation structuration: The development of a scale to measure faithfulness of appropriation., Information Systems Research (8:4), pp. 342–367.

Hadjistavropoulos, H. F. I., and Asmundson, G. 1999. Exploratory and confirmatory factor analytic investigations of the Illness Attitudes Scale in a nonclinical sample., Behaviour Research and Therapy (37:7), pp. 671–684.

Hair, J. F. 1995. Multivariate data analysis with readings, Englewood Cliffs, N.J: Prentice Hall.

Hu, L., and Bentler, P. 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives, Structural Equation Modeling (6:1), pp. 1–55.

Landis, J. R., and Koch, G. G. 1977. The Measurement of Observer Agreement for Categorical Data, Biometrics (33:1), pp. 159–174.

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2012. Online Social Networks as a Source and Symbol of Stress: An Empirical Analysis, Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL).

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. 2014. Giving too much Social Support: Social Overload on Social Networking Sites, European Journal of Information Systems.

Nahm, A. Y., Solís-Galván, Rao, S. S., and Ragu-Nathan, T. S. 2002. The Q-Sort Method: Assessing Reliability and Construct Validity of Questionnaire Items at a Pre-Testing Stage, Journal of Applied Statistics (1:1), pp. 114–125.

Nunnally, J. C., and Bernstein, I. H. 1994. Psychometric theory, New York: McGraw-Hill.

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., and Qiang, T. 2008. The Consequences of Technostress for End Users in Organizations: Conceptual Development and Empirical Validation, Information Systems Research (1:4), pp. 417–433.

Regoeczi, W. C. 2003. When context matters: A multilevel analysis of household and neighbourhood crowding on aggression and withdrawal, Journal of Environmental Psychology (23), pp. 457–470.

Riedl, R., Kindermann, H., Auinger, A., and Javor, A. 2012. Technostress from a Neurobiological Perspective - System Breakdown Increases the Stress Hormone Cortisol in Computer Users, Business & Information Systems Engineering (4:2), pp. 61–69.

Salisbury, W., Chin, W. W., Gopal, A., and Newsted, P. R. 2002. Research report: Better theory through measurement— Developing a scale to capture consensus on appropriation., Information Systems Research (13:1), pp. 91–103.

Shu, Q., Tu, Q., and Wang, K. 2011. The Impact of Computer Self-Efficacy and Technology Dependence on Computer-Related Technostress: A Social Cognitive Theory Perspective, International Journal of Human-Computer Interaction (27:10), pp. 923–939.

Tarafdar, M., Tu, Q., Ragu-Nathan, B., and Ragu-Nathan, T. 2007. The Impact of Technostress on Role Stress and Productivity, Journal of Management Information Systems (24:1), pp. 301–328.

Tarafdar, M., Tu, Q., and Ragu-Nathan, T. S. 2010. Impact of Technostress on End-User Satisfaction and Performance, Journal of Management Information Systems (27:3), pp. 303–334.

Tarafdar, M., Tu, Q., Ragu-Nathan, T. S., and Ragu-Nathan, B. S. 2011. Crossing to the Dark Side: Examining Creators, Outcomes, and Inhibitors of Technostress, Communications of the ACM (54:9), pp. 113–120.

Tu, Q., Wang, K., and Shu, Q. 2005. Computer-related technostress in China, Communications of the ACM (48:4), pp. 77–81.

Vassend, O., and Skrondal, A. 1997. Validation of the NEO personality inventory and the three-factor model. Can findings from exploratory and confirmatory factor analysis be reconciled? European Journal of Personality (11), pp. 147–166.

Wang, K., Shu, Q., and Tu, Q. 2008. Technostress under different organizational environments: An empirical investigation, Computers in Human Behavior (24:6), pp. 3002–3013.

Paper VI

SHOULD I STAY OR SHOULD I GO?

THEORIZING AND ANALYZING BEHAVIOR CHANGE IN TECHNOSTRESS RESEARCH

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SHOULD I STAY OR SHOULD I GO?

THEORIZING AND ANALYZING BEHAVIOR CHANGE IN TECHNOSTRESS RESEARCH

Abstract

Building on recent research positing technostress among IT users, we aim to determine whether individuals should continue to use stressful technologies or switch to alternatives. We theorize that switching to and using alternatives to technology is also a stress factor, so users' intention to change is influenced by an expected drop in technostress but also by an expected increase in the stress of switching to and using alternatives.

To validate our research model, we set up an experiment with 82 IT users and collected empirical data at four different points in time. Our findings indicate that although technostress and the stress caused by using alternatives impact individuals' intention to change to a degree, the stress of switching from using a technology to other alternatives is the largest perceived stress factor and impacts their decision the most. We conclude that even though a technology is a source of stress, switching to and using alternatives might be perceived as more stressful and may impact individual behavior by causing users to continue to use a technology continuously.

Keywords: Technology usage, Behavior change, Technostress, Experiment, PLS, Facebook, Post-adoption research, Hedonic technology usage, Voluntary, Technology usage

1 INTRODUCTION

Recent research has identified technostress as a possible negative consequence of IT usage (see Riedl, 2013 for a review). This has triggered an instructive strand of research of the drivers of IT-induced end-user stress and how it can be avoided. A prominent example is the usage of social networking sites (SNS) like Facebook, which many users consider a source and symbol of daily stress (Maier et al., 2012). However, as Facebook usage is not compulsory, why would people continue using it if it creates negative stress experiences? More generally, how can we explain continued usage of a non-mandated technology when that technology is perceived as causing negative stress?

Considering the almost ubiquitous prevalence of SNS (Wilson et al., 2012) and research findings indicating SNS-related negative technostress (Maier et al., 2012), we strive to better understand the drivers and consequences of IT-induced stress. As individuals can choose to use or avoid SNS but also to use alternative technologies, we also consider the stress exposure from using alternatives. To understand the broader individual usage decision, including the possibility to switch to (non-) technical alternatives to stay in touch with friends or coordinate events (Khan

and Jarvenpaa, 2010; Koroleva et al., 2011; Turel and Serenko, 2012), we have to better distinguish stressors related to the technology from stressors related to switching to and using alternatives. For example, a user quitting Facebook might use a technology perceived as less stressful or do without technology altogether in social communication instead (Ferneley and Sobreperez, 2006). However, this switch might also require time and effort (Polites and Karahanna, 2012) or offer less social connectivity and thus be perceived as a source of stress itself. To elicit the true drivers and gravity of technostress and how they relate to IT usage behavior, we also need to consider the alternatives available to the user. The research question of this article thus is:

How do different sources of stress influence the decision whether to use a stressful technology continuously?

Our theoretical model compares stress levels among individuals using a technology vis-à-vis stress levels while switching to alternatives. Our experimental setting includes four surveys, diary entries and interviews to validate our research question. After reviewing the relevant literature, we hypothesize how variants of perceived stress from using a technology, switching to alternatives and using them influence the intention to change and behavior change. Finally, we describe our experimental setting and discuss our results, the limitations of our research and the contributions to IS research.

2 THEORETICAL BACKGROUND

This research builds on findings indicating that some individuals perceive stress caused by using technologies (e.g., Ragu-Nathan et al., 2008; Tarafdar et al., 2010; Ayyagari et al., 2011). Our research focus is on individuals who have already adopted a technology. This section provides an overview of current research in the streams of post-adoption and technostress research forming the theoretical foundation of our approach and reflects on the current state of knowledge in these two research streams. We then discuss our research model in the following section.

2.1 POST-ADOPTION RESEARCH

In recent years, post-adoption research has become one of the most mature streams of IS research (Williams et al. 2009; Lankton and McKnight, 2012). In this stream, studies aim to identify why individuals continue to use a certain technology once they have adopted it (Bhattacherjee, 2001; Bhattacherjee and Premkumar, 2004; Kim, 2009). Due to the fact that an individual's decision to initially use or adopt a technology is made on a different basis than the decision to continue to use a technology (Karahanna et al., 1999), models and theories have been developed that go beyond basic technology usage models such as the technology acceptance model (TAM) (Davis, 1989) or the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003).

To date, post-adoption research has based their research on different theories and models to understand continuous usage behavior. For example, the lens of expectation disconfirmation theory (EDT) (Oliver, 1977; 1980) is used to explain whether or not an IT is used continuously by individuals (Bhattacherjee, 2001; Bhattacherjee and Premkumar, 2004; Lankton and McKnight, 2012). In doing so, researcher have theorized expectations, disconfirmations and levels of performance as influencing factors of whether an individual is satisfied with a technology. Based on the level of satisfaction, which reflects the overall affective attitude towards

the technology, an individual develops continuous usage intentions, which are in turn the basis for deciding whether to use a technology continuously.

In addition to EDT, the theory of planned behavior (TPB) (Ajzen, 1991) and feedback mechanism (Bem, 1972) are used in post-adoption research to investigate how perceptual beliefs and behaviors change over time and influence continuance usage (Kim and Malhotra, 2005; Kim, 2009). It is theorized and empirically validated that continuance usage behavior is influenced by perceptual beliefs and technology usage behavior grounded in the proximal as well as the distal past (Kim, 2009).

In summary, recent post-adoption research has either focused on satisfaction or on perceptual beliefs to understand whether or not individuals develop continuous usage intentions, which in turn determines whether a technology will be used continuously. Nonetheless, recent research focusing on technology beliefs in general rather than on post-adoption beliefs in particular reveals that there are also additional beliefs that inhibit intentions (Cenfetelli and Schwarz, 2011) and thus may lead an individual to not use a technology continuously. Such a negative influence on behavioral intentions might be exerted when an individual experiences technostress. As a consequence, we next focus on recent research in the field of technostress.

2.2 TECHNOSTRESS RESEARCH

Recently, technostress – a particularly dark side of technology usage – has been the focus of considerable IS research (see Table 10). Technostress is generally defined as an IT user's experience of stress when using technologies (Ragu-Nathan et al., 2008). More specifically, findings in the stream of technostress identify the characteristics of an organization (e.g., involvement facilitation, support), the characteristics of the technology (e.g., usefulness, complexity), and characteristics of the IT user him- or herself (e.g., age, gender, negative affectivity) as some of the factors determining whether techno-stressors are perceived (for an overview of prior research focusing on these factors see Table 10, Appendix).

From a general point of view, stressors are stimuli, events or demands perceived by an individual, so techno-stressors are technology-induced stimuli, events or demands (Ragu-Nathan et al., 2008; Ayyagari et al., 2011). Such techno-stressors cause reactions among individuals, which are commonly called strain (Tarafdar et al., 2010; Ayyagari et al., 2011). On the one hand, an individual might react psychologically to a techno-stressor by reducing one's level of satisfaction or by feeling exhausted (Ragu-Nathan et al., 2008; Ayyagari et al., 2011). This emotional response is called psychological strain (Tarafdar et al., 2010). On the other hand, techno-stressors might also cause individuals to react behaviorally, which is called behavioral strain (Tarafdar et al., 2010). An example of a behavioral response is when an individual performs poorly or quits his or her job due to technology-induced stressful stimuli (Ragu-Nathan et al., 2008; Tarafdar et al., 2010). Notably, recent research posits that psychological strain is one major influencing factor of behavioral strain (Ragu-Nathan et al., 2008; Tarafdar et al., 2010).

In summary, depending on technological, individual and organizational characteristics, perceived techno-stressors may lead to IT user reactions involving either changes in psychological state (e.g., satisfaction, exhaustion) or in behavior (e.g., performance, usage behavior), whereby psychological strain also influences behavioral strain.

Figure 1: Status quo of technostress research (see Table 10 for a detailed overview)

Based on this understanding, technostress has mostly been studied from an organizational perspective where individuals use IT mandatorily. Ragu-Nathan et al. (2008) have conceptually developed and empirically validated an instrument to reveal why employees react with strain when using IT and identify five techno-stressors. First, techno-overload reflects the demand that employees work faster and longer because they use a certain IT. Second, techno-invasion identifies IT as a source of blurring boundaries between the work and home domains. Third, techno-complexity means that employees feel unable to use IT due to a lack of skills. Fourth, techno-insecurity describes situations in which employees are afraid of losing their job due to IT. Fifth, techno-uncertainty describes the situation that IT is the source of many changes in the organization that cause uncertainty. Using this instrument, researchers in this field have identified individual differences as influencing factors of whether an individual perceives these five stressors. For example, studies indicate that men experience more technostress than women and that technostress decreases with increasing age, education and computer confidence (Ragu-Nathan et al., 2008). While focusing on individual reactions to these stressors, they identify techno-stressors as source of low job satisfaction, low organizational commitment, low user satisfaction, poor user productivity, poor user innovation and increasing role stress in terms of role conflict and role overload (Tarafdar et al., 2007; 2010; 2011; Ragu-Nathan et al., 2008). In addition, scholars pursing research in this field posits that there might be mechanisms that inhibit the influence of technostress on strain. Specifically, four mechanisms are identified: literacy support, technical support provision, technology involvement facilitation and involvement support, and provide empirical evidence that these influence psychological and behavioral strain significant (e.g., Tarafdar et al., 2011).

Alongside this stream of research, Tu et al. (2005) argue that culture might influence the stressor-strain relation, indicating that the five overall technology-induced stressors do not influence user productivity in general in China. Rather, only the three techno-stressors overload, insecurity and invasion significantly impact productivity. Moreover, they identify sources of technostress focusing on individual differences, organizational characteristics and technology-related perceptions. With regard to individual differences, their findings are in line with the results of Ragu-Nathan et al. (2008) in that younger employees perceive technostress to a higher extent. Wang et al.'s (2008) research also indicates that working in a more centralized organization or in a highly innovative one causes high levels of technostress. This group of researchers also reveals that the higher the technology dependence of an employee or the lower the computer self-efficacy, the higher the technostress (Shu et al., 2011).

More recently, Ayyagari et al. (2011) theorize and validate that three categories of technology characteristics in terms of usability, dynamic and intrusive features influence techno-stressors. The techno-stressors discussed in this research are adapted from the general stress literature to the technostress research domain and include work-home conflict, invasion of privacy, work overload, role ambiguity and job insecurity. Next to technology characteristics, technology usage is also identified as a source of techno-stressors. Concerning consequences of these techno-stressors, Ayyagari et al. (2011) provide evidence that individuals react psychologically by showing high levels of psychological strain called techno-exhaustion and that this psychological reaction also depends on individual characteristics such as negative affectivity.

In parallel, Riedl et al. (2012) set up a laboratory experiment to test whether system breakdowns, a particular potential techno-stressor in performing a human-computer interaction task, increases an user's level of cortisol. In this experimental setting, cortisol is used to state that techno-stressors have subjective as well as objective consequences. Their study concludes that techno-stressors also cause psychophysiological reactions in IT user.

Recent research findings also show that technostress is of central importance even when studying technology usage in private settings and hence while using technology voluntarily (Maier et al., 2012; 2014). This research identifies social networking site (SNS)-specific stressors grounded in technological characteristics such as complexity or uncertainty, a technology-induced rethinking of disclosing information, or the changed role of technology in one's daily lives, such as being forced to adapt new behavioral patterns (Maier et al., 2012). Maier et al. (2012) theorize that individuals experiencing these stressors react with psychological and behavioral strain, resulting in lower satisfaction and lower intention to use the voluntary technology continuously. Researchers in this field also identify another SNS-specific stressor called social overload, which is influenced by individual characteristics such as age, usage characteristics such as usage extent and number of SNS friends, and characteristics of social relationships such as type of relation and subjective social support norm (Maier et al., 2014). In addition, this article confirms that SNS users respond psychologically and behaviorally to techno-stressors by developing decreased levels of satisfaction and increased levels of exhaustion and discontinuous usage intentions.

Nonetheless, although prior research identify techno-stressors as sources of discontinuous usage intentions, continued usage of a stressful technology might be reasonable when switching to and using alternatives are perceived as even greater stress factors. As this has not been investigated by prior research and might constitute an important factor in determining continuous technology usage, we aim to broaden the scope of technostress research by considering not only the technology-induced stress, but also the stress-level involved in switching to and using alternatives.

3 THEORIZING BEHAVIOR CHANGE IN TECHNOSTRESS RESEARCH

In order to extend technostress research by incorporating behavior change into its theoretical models, this research proposes a theory that enables the stress caused by a technology to be compared with the stress caused by switching to and using alternatives. Several behavioral change theories have been developed (for an overview see: (Webb and Sheeran, 2006); including the theory of reasoned action (TRA) (Ajzen, 1985) and the theory of planned behavior (TPB) (Ajzen, 1991)), which propose that an individual develops an intention to change a particular behavior based on perceptions of this behavior and its alternatives. This intention is translated into a behavior change if an individual evaluates switching to and using alternatives more positive than using the technology continuously. Such a comparison of different behavioral options is theorized in the mental comparison model (Dabholkar, 1994), which explains why an individual opts for one particular option over another. Dabholkar (1994) theorizes that one's behavior is a result of the comparison of different aspects of given behaviors and that individuals decide for the option that scores best.

As stress is one particular negative perception that inhibits technology usage (Cenfetelli and Schwarz, 2011; Maier et al., 2014) we theorize that individuals compare two possible options and is confronted with stressors in both options. Option one involves the stress caused by a technology and option two involves the stress caused by changing the behavior which means switching to and using (non-) technological alternatives (Polites and Karahanna, 2012). In both

options, stressful stimuli might cause psychological and subsequent behavioral strain (see section 2.2). In the following we base on the status-quo of technostress research by using the general stressor-strain relation to theorize the influence of stressors in terms of technostress, switching-stress, and alternative-stress creators on psychological strain in terms of exhaustion. Therefore, we propose that individuals first individually evaluate the technostress, switching-stress, and alternative-stress creators. Then, depending on these evaluations, we theorize that individuals react psychologically in terms of exhaustion grounded in the technology (techno-exhaustion), the switching process (switching-exhaustion) or the alternative (alternative-exhaustion). We theorize that these three levels of exhaustion cause a behavioral reaction in terms of intention to change, i.e. to use alternatives to the technology. Finally, we theorize that the intention to change is the breeding ground for whether an individual in fact changes his or her usage behavior.

3.1 TECHNOSTRESS

As described in section 2.2 above, recently published technostress research identifies the characteristics of IT usage as a source of exhaustion (e.g., Ayyagari et al., 2011), which can lead to lower continuous usage intention (Maier et al., 2014). The rationale for this is that an individual first reacts psychologically to stressful stimuli caused by using a technology, called technostress creators, and then changes his or her behavior based on this psychological reaction (e.g., Podsakoff et al., 2007).

Accordingly, we theorize that IT user experiencing technostress creators reacts psychologically to these negative stimuli with perceiving exhaustion caused by technologies, defined as techno-exhaustion. Based on this perception of techno-exhaustion, the individual then develops intentions to use other alternatives instead of using the stressful technology continuously. Consequently, we hypothesize that:

H1: The higher the technostress creators, the higher the techno-exhaustion.

H2: The higher the techno-exhaustion, the higher the intention to change.

3.2 SWITCHING-STRESS

Recently, significant recent user resistance research has focused on the behavior of users switching from one technology to an alternative (e.g., Kim and Kankanhalli, 2009; Polites and Karahanna, 2012). From a more general point of view, changing one's behavior causes a wide range of different reactions, which are either perceived as positive or negative by the individual (Oreg et al., 2011). Notably, although changing current behaviors always requires that an individual puts effort into behavioral changes, as one has to overcome inertia and habitual patterns, an individual is confronted with switching-induced stressful stimuli, called switching-stress creators. In such cases, when experiencing switching-stress creators, the individual reacts psychological by perceiving exhaustion (for a review, see Oreg et al., 2011). As the source for this reaction is a switch from using a technology to using an alternative, we define this psychological reaction as switching-exhaustion and propose that:

H3: The higher the switching-stress creators, the higher the switching-exhaustion.

The switching-exhaustion then has also behavioral consequences (Podsakoff et al., 2007) as an individual intends to choose a behavior that lowers this undesired perception (Lavee et al., 1987). Thus, the individual yearns to use the prior technology and develops intentions to use the prior technology continuously instead of switching to alternatives. This is particularly the case when individuals are not willing to spend time and make the effort to switch to alternatives

because they are not altogether convinced that this is the right move (Polites and Karahanna, 2012). The rationale for this is that such adverse switching-related exhaustion weighs heavily on the brain (Ito et al., 1998; Cenfetelli and Schwarz, 2011). Consequently, individuals will intend to use the technology continuously instead of changing to alternatives. As a result of this, we propose that:

H4: The higher the switching-exhaustion, the lower the intention to change.

3.3 ALTERNATIVE-STRESS

Irrespective of whether the alternatives are technology- and/or non-technology-based, individuals may be confronted with stressful stimuli caused by using these alternatives, which we call alternative-stress creators. These are either technology-related (e.g., complexity or uncertainty, Ayyagari et al., 2011), or social-related (e.g., social exclusion or boredom, Ferneley and Sobreperez, 2006). No matter what the source of stressful stimuli caused by the alternatives is, they induce exhaustion (Cooper et al., 2001; Podsakoff et al., 2007), which we call alternative-exhaustion. We therefore propose:

H5: The higher the level of alternative-stress creators, the higher the alternative-exhaustion.

Further, an individual who is exhausted by using alternatives intends to avoid these adverse reactions and develops intentions use the old technology instead of the alternatives. Consequently, we propose that:

H6: The higher the alternative-exhaustion, the lower the intention to change.

3.4 AN INDIVIDUAL'S INTENTION-BASED BEHAVIOR CHANGE

To understand an individual's actual behavior, prior research bases on intention-based theories and models such as the technology acceptance model (TAM) (Davis et al., 1989), the unified theory of acceptance and usage of technology (UTAUT) (Venkatesh et al., 2003), or the integrative framework of technology use (IFTU) (Kim, 2009). These theories and models posit that an individual's intention is the driving force for whether a certain behavior is performed, such that high intentions cause usage behaviors and low intentions do not. This is in line with general behavior change theories such as TRA and TPB.

This means that the intention to change from a technology to an alternative is subsequently transferred into a behavior change. Hence, an individual that intends to change the technology will change the behavior and use alternatives, whereupon an individual with low intentions to change will use the technology continuously, so that we assume that:

H7: Individuals with high intentions to change use alternatives instead of the old technology.

The general theoretical model is visualized in Figure 2.

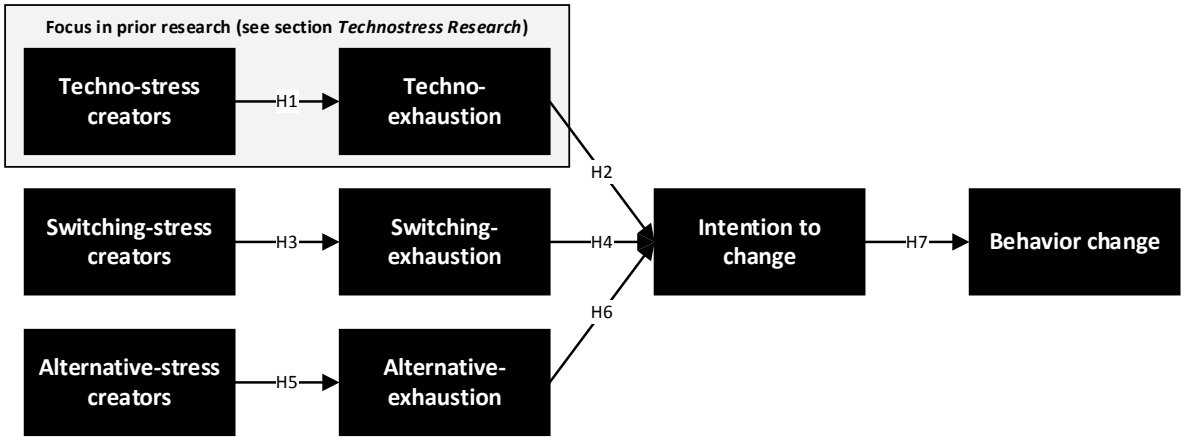


Figure 2: Theoretical model

4 RESEARCH MODEL DEVELOPMENT

Based on this theoretical model that provides a first understanding of the influence of different stressors and strain objects on change intentions and behaviors, we now aim to specify our detailed research model. We first identify a research domain which allows us to compare stress when using a technology with stress caused by switching to and using alternatives. We then identify the specific sources of stress resulting from using a technology or alternatives to it, or during the switching process that cause exhaustion.

4.1 IDENTIFYING THE RIGHT TECHNOLOGY AND SETTING

To answer our research question, we have to choose a technology that fulfills a range of requirements. First, some individuals must feel strained while using the technology (techno-strain) so that stress-induced switching behavior to alternatives can be expected. Second, the technology should be used to fulfill a utilitarian and/or a hedonic purpose so that individuals will search for alternatives if they stop using the technology. Our study would be richer if there were both technology- and non-technology-based alternatives available. Third, the technology should be used voluntarily because in mandatory technology usage settings, individuals are forced to use a technology continuously even when they consider it a source of stress. Finally, the research team must be able to test whether the technology is or is not being used by the participants.

After much consideration, the research team decided to focus on SNS because they best fulfill the above requirements. According to a recent study by Gartner (2011), an increasing number of SNS users feel strained. This finding has also been verified by IS research (Maier et al., 2012). Furthermore, SNS use is voluntary and fulfills a utilitarian (Xu et al., 2012) and hedonic (Turel and Serenko, 2012) purpose. Moreover, individuals can use technical – such as Skype – as well as non-technical – such as face-to-face communication – alternatives instead of SNS. Finally, we can also ensure – by using an application and changing participants' passwords – that SNS is not used during the experiment. Consequently, we use SNS as a technology in our experimental setting and focus in our research model development on stressors related to this setting.

4.2 IDENTIFICATION AND THEORIZING OF DIFFERENT SOURCES OF EXHAUSTION

Now that SNS has been established as the target technology for our research, we review recent IS literature discussing sources of stress involved in using the technology (here: SNS), when switching to alternatives, and when using (non-) technical alternatives and develop hypotheses for all stressors. These sources of stress are summarized and defined in Table 11.

4.3 SOURCES OF TECHNO-EXHAUSTION

In the theoretical model, we hypothesize that technostress creators, and hence stressful stimuli caused by using the technology, induce psychological reactions called techno-exhaustion. To further specify H1, we will now discuss which specific technostress creators might cause techno-exhaustion (see Figure 2).

Recent research identifies technological characteristics of SNS (Ayyagari et al., 2011; Maier et al., 2012) as well as social relations to friends via SNS (Maier et al., 2014) as potential technostress creators. Therefore, we focus first on sources of stress caused by the technological characteristics of SNS (technostress creators), and then on sources of social-stress, which are stressful stimuli caused by being connected with other individuals via SNS (social-stress creators).

Technostress creators. Certain technological characteristics of SNS may be stressful stimuli and thus sources of exhaustion (Ayyagari et al., 2011). One such characteristic is complexity, i.e. SNS that are difficult to use may be experienced as technology-induced stressful stimuli. Furthermore, as applications, conditions or the interface periodically change in SNS, some individuals report experiencing the uncertainty in SNS as a source of techno-exhaustion. Eventually, since SNS has become a central part in modern daily life for many, some individuals perceive being invaded by the technology (Maier et al., 2012). Based on these sources of stress, which have been identified in general technostress research (Tarafdar et al., 2010; Ayyagari et al., 2011) and SNS-specific research (Maier et al., 2012) as well, we specify hypothesis H1 more precisely by arguing that:

H1a: The higher the complexity of SNS, the higher the techno-exhaustion.

H1b: The higher the uncertainty with SNS, the higher the techno-exhaustion.

H1c: The more invasive SNS is, the higher the techno-exhaustion.

Social-stress creators. In addition to technological sources of stress, some SNS users also perceive the social environment in terms of their virtual friends as stressful stimuli (Maier et al., 2014). This has three different reasons. First, virtual friends disclose a wealth of information on SNS (Krasnova et al., 2010; Posey et al., 2010; Tow et al., 2010). However, individuals willing to process all information are in danger of experiencing information overload (Jones et al., 2004; Koroleva et al., 2010; Koroleva and Bolufé Röhler, 2012), which results in a perception of being exhausted by SNS. We thus hypothesize that:

H1d: The higher the information overload, the higher the techno-exhaustion.

Second, individuals use many different SNS-specific possibilities to interact with others. Most SNS provide a chat or private message functionality to communicate with one particular virtual friend and wall posts, status updates and/or personal group messages to communicate with a group of virtual friends (e.g., Koroleva et al., 2011). However, individuals might consider these communication possibilities in SNS undesirable or uninteresting, such as when one does not

want to communicate with the communication partner or when one does not want to talk about a particular topic (Ljungberg and Sørensen, 1998; 2000). This puts them at risk of perceiving communication overload (Laumer et al., 2013), which causes psychological reactions in terms of techno-exhaustion. We thus hypothesize that:

H1e: The higher the communication overload, the higher the techno-exhaustion.

Third, SNS users perceive that they give too much social support to their virtual friends and hence are in a state of social overload (Maier et al., 2014). This means that individuals think they have to respond to messages disclosed by virtual friends such as "*Help me, I need an apartment in New York*" or "*My girlfriend dumped me! What should I do now?!*". As a consequence, SNS users react psychologically by feeling exhausted, so we hypothesize that:

H1f: The higher the social overload, the higher the techno-exhaustion.

4.4 SOURCES OF SWITCHING-EXHAUSTION

Based on hypothesis H3, switching-stress creators lead to psychological reactions in terms of switching-exhaustion (see Figure 2). This section investigates change-literature to identify concrete sources of stress causing this perception.

An individual that intends to change current behavior has to break the status quo and habitual patterns. These two sources of stress in the process of change are referred to as transition costs and sunk costs (Polites and Karahanna, 2012). The switching-stress creator transition costs includes the time and effort required by an individual to adapt to a new situation and learn to use new alternatives. This includes the time and effort needed to identify technological and/or non-technological alternatives, as well as to experiment with and learn to use these alternatives appropriately. We therefore hypothesize that transition costs are a concrete switching-stress creator causing switching-exhaustion:

H3a: The higher the transition costs, the higher the switching-exhaustion.

Likewise, the source of exhaustion sunk costs refers to a particular form of psychological commitment to continuously use the technology. In our research case, the psychological commitment to using SNS deters individuals from switching to an alternative (Samuelson and Zeckhauser, 1988) because of the high amount of time and effort individuals have invested in learning to use the previous IT (Kim and Kankanhalli, 2009). Individuals dedicate time and effort to learning, optimizing and integrating SNS technologies in their daily lives. This time and effort is worthless if SNS are no longer used. Hence, individuals might experience exhaustion when switching from SNS to alternatives, so that we concretize hypotheses H3 by arguing that:

H3b: The higher the sunk costs, the higher the switching-exhaustion.

4.5 SOURCES OF ALTERNATIVE-EXHAUSTION

In hypothesis H5, we argue that the usage of alternatives to SNS might also cause psychological reactions in terms of exhaustion (see Figure 2). In this section, we now hypothesize that stressful stimuli are grounded in (a) using too many alternatives to replace the functionality of SNS, (b) the technological characteristics of technological-based alternatives, or (c) social stimuli resulting from not using SNS anymore.

Replacement-stress creator. First, in order to replace the functionalities of SNS, such as to network, communicate, inform friends, keep informed about friends' life and have fun (Koroleva

et al., 2011), individuals use several different alternatives. SNS, as a toolkit for all these functionalities, provides its users with all of these functionalities through one technology, but individuals are likely to need several different alternatives to access these functionalities by other means. As a consequence, we theorize that some individuals might consider the high number of different alternatives needed to replace these functionalities as a stressful stimulus. This phenomenon may cause alternative-exhaustion and is called replacement overload. Hence we assume that:

H5a: The higher the replacement overload, the higher the alternative-exhaustion.

Technostress creators. Second, functionalities of SNS can be replaced by technological-based (e.g., SMS, email, computer games) and non-technological-based (e.g., go out and meet friends, games) alternatives. While focusing technological alternatives, alternative-exhaustion might be caused by the characteristics of the technological-based alternatives itself (e.g., Ayyagari et al., 2011). Particularly, the alternatives might be perceived as stressful stimuli as these might be complex to use, create uncertainty or invade one's daily life (Tarafdar et al., 2010; Ayyagari et al., 2011). We therefore specify hypothesis H5 more precisely by arguing that:

H5b: The higher the complexity of the technological alternatives, the higher the alternative-exhaustion.

H5c: The higher the uncertainty with the technological alternatives, the higher the alternative-exhaustion.

H5d: The higher the invasion of the technological alternatives, the higher the alternative-exhaustion.

Social-stress creators. Finally, the social life of individuals is also influenced in many ways when they no longer use SNS. First, not using SNS removes automatic access to information disclosed by virtual friends (Krasnova et al., 2010; Posey et al., 2010; Tow et al., 2010). Hence, no longer using SNS may lead to a sense of being uninformed about the lives of the people in one's virtual social network. This state of being underinformed is called information underload and is a stressful stimulus of not using SNS anymore which could lead to the psychological reaction of perceiving exhaustion. Consequently, we propose that:

H5e: The higher the information underload, the higher the alternative-exhaustion.

Second, among certain users, SNS has become one of the most used and frequently checked communication media. Among others, SNS are used to communicate with friends, to coordinate events and to schedule social meetings (Khan and Jarvenpaa, 2010). SNS are used instead of email, instant messaging, or SMS because they facilitate group communications and fast response cycles. If SNS are not used, other media have to be used and the quality as well as the quantity of communications may decline. We call this state of low communication quality or quantity communication underload. An individual perceiving communication underload may react psychologically by experiencing exhaustion. Hence, we assume that:

H5f: The higher the communication underload, the higher the alternative-exhaustion.

Third, using SNS conveys the impression to its users that one is not alone but embedded in a social network consisting of hundreds of friends. Although the meaning of friendship has changed with the rise of SNS (Amichai-Hamburger et al., 2013), each user perceives that one is surrounded by friends. Whereas in the pre-SNS era an individual has an average of 150 contacts (Dunbar, 1993), this increased to a number of more than 400 contacts in the era of SNS (Manago et al., 2012). Hence, average SNS users currently belong to and are socially embedded in a large virtual social network. Not using SNS anymore may decrease the size of the virtual network again. If SNS are no longer used, the number of virtual social contacts decreases and with it the

sense of belonging to a large social network. We shall call this state social exclusion and hypothesize that it leads the psychological reaction of exhaustion:

H5g: The higher the social exclusion, the higher the alternative-exhaustion.

Fourth, individuals use SNS to shorten waiting time, to procrastinate, or to reduce boredom (Lampe et al., 2008; Sheldon, 2008; Pempek et al., 2009). Some individuals use SNS to fill time when there is nothing else to do. If they no longer use SNS, some individuals may not know what to do in this time and feel boredom. The stimulus of boredom might then cause the psychological reaction of exhaustion, so that we assume that:

H5h: The higher the degree of boredom, the higher the alternative-exhaustion.

4.6 ALTERNATIVE THEORETICAL EXPLANATIONS OF INTENTION TO CHANGE AS CONTROL VARIABLES

Although prior research has not focused on intentions to change and behavior change in the field of technostress, there has been a plethora of recent research on continuous or discontinuous technology usage (e.g., Bhattacherjee and Premkumar, 2004; Lankton and McKnight, 2012; Sun, 2013). To account for the explanation power of factors identified in this research, we also include control variables in our research model, which enable or inhibit switching to alternatives, such as satisfaction, perceived usefulness and perceived enjoyment (e.g., Bansal et al., 2005; Ye et al., 2008; Hou et al., 2011; Polites and Karahanna, 2012). Table 1 includes the controls and their rationale.

Control	Rationale
C1: The higher the **Satisfaction** (with the technology), the lower the intention to change the technology.	Expectation-Confirmation Theory posits satisfaction as the key to intend repeating a behavior (e.g., Bhattacherjee, 2001; Bhattacherjee and Premkumar, 2004; Lankton and McKnight, 2012). This means that an individual's satisfaction with a technology influences whether she intends to use the technology or alternatives. Satisfied individuals are less likely to intend to change the technology and use alternatives instead.
C2: The higher the **Perceived Usefulness** (of the technology), the lower the intention to change the technology.	The Theory of Planned Behavior posits attitudinal beliefs, such as perceived usefulness and enjoyment as factors influencing behavioral intention to use a technology (continuously) (Ajzen, 1991). This means that an individual is less likely to stop using a technology and use alternatives instead if she considers the technology useful and a source of fun.
C3: The higher the **Perceived Enjoyment** (through the technology), the lower the intention to change the technology.	
C4: The higher the **Social Influence** (to use the technology), the lower the intention to change the technology.	People in an individual's reference group (Roca et al., 2006; Liao et al., 2007) as well as individuals already using a technology (Sun, 2013) influence whether one intends to use a technology continuously. This means that an individual who follows others when deciding to use a technology or who perceives that others think she should use a technology continuously is less likely to change a technology and use alternatives instead.
C5: **Imitating Others** (to use the technology) is negatively related to the intention to change.	

Table 1: Hypotheses for the influence of additional perceptions on intention to change

4.7 INDIVIDUAL DIFFERENCES AS CONTROL VARIABLES

While we have not yet focused on the influence of individual differences, we include them as control variables by hypothesizing that these can influence an individual's behavior (McElroy et al., 2007) in terms of behavior change. The individual difference control variables include age,

gender and three user personality variables. We focus on dispositional resistance to change that reflects an individual's inclination to resist changes (Oreg, 2003), because it is reasonable that individuals high on resistance may prefer to use the incumbent and habitual technology continuously (Polites and Karahanna, 2012). In addition, we focus on the higher-order traits neuroticism and extraversion because of their importance in stress research (Bakker et al., 2010; Ayyagari et al., 2011). These controls are summarized in Table 2.

Individual difference	Rationale
ID1: **Younger** individuals rather use the technology instead of alternatives.	Prior research reveals that age is central to understand an individual's reaction to technologies (Agarwal et al., 2009). As SNS are used more frequently by younger individuals, we assume that they use the technology instead of alternatives.
ID2: **Women** rather use the technology instead of alternatives, whereupon men change to alternatives.	Prior research posits that technologies are used differently by men and women (Venkatesh and Morris, 2000). As women are less risk seeking (Powell and Ansic, 1997), they continue using the technology more often.
ID3: Individuals high on **Dispositional Resistance to Change** do not change and use the technology instead of alternatives.	Predispositions are attributes that determine that some individuals, just as in nature, use technologies (McElroy et al., 2007). Individuals high on dispositional resistance to change tend to be shackled to the status quo and hence use the technology continuously (Polites and Karahanna, 2012).
ID4: Individuals high on **Neuroticism** do not change and use the technology instead of alternatives.	As neurotic individuals tend to be exhausted more easily (Ayyagari et al., 2011) and use technologies to a higher extent (McElroy et al., 2007), we assume that neurotic individuals use the technology continuously.
ID5: Individuals high on **Extraversion** do not change and use the technology instead of alternatives.	We also control for the influence of extraversion, because extraverted individuals use SNS more extensively than introverted ones (Ryan and Xenos, 2011).

Table 2: Hypotheses for the influence of individual differences on behavior change

5 METHODOLOGY

5.1 AN EXPERIMENTAL SETTING

This research aims to investigate how behavioral changes are influenced by sources of stress and exhaustion while using SNS, switching to and using alternatives. Although prior technostress research is mostly survey-based (Riedl et al., 2012; Riedl, 2013), a purely survey-based approach falls short to answer the research question because we have to ensure that all participants are aware of the sources of stress and perceive exhaustion while switching to and using alternatives. To ensure this, we decide to set up an experimental approach with different methods including four surveys, diary entries and interviews.

In section 4.1, we posit SNS as the most suitable technology to investigate our research question. As Facebook is the most used and well-known SNS, we use this SNS as the underlying technology in our experiment. Hence, all participants of the experiment have to use Facebook to be aware of its assets (such as usefulness and source of pleasure) and drawbacks (such as a source of techno-strain). Once they started the experiment, participants were not allowed to use the technology anymore for two weeks, so that they would switch to and use one or more alternatives. During these two weeks, we ensured that the participants could not use the SNS anymore by requiring permission to change their password. To ensure that the researcher team did not use participants' SNS accounts, each participant selected one of 100 random and secret twenty-digit sequences of letters and numbers visible and known only to an independent faculty

member, who changed participants' passwords confidentially. This faculty member had no access to participants' e-mail addresses so neither the faculty member, nor the authors, nor the participants were able to log in. We also configured participants' Facebook settings so they would not receive forwarded messages by email. At the end of the experiment each participant received their new password after we tested whether we could log in with this password to ensure it had not been reset and to ensure that nobody had used the platform during the experiment.

During these two weeks, some of the participants kept a diary to record their perceptions with regard to not using the SNS. We also interviewed some participants to identify which alternatives were used and which stressful stimuli they experienced when switching to and using alternatives. Finally, four surveys were conducted to capture sources of stress and exhaustion at various points in the experiment. The first survey was conducted before the experiment to assess the perceptions caused by using SNS. This survey included technostress creators, techno-exhaustion and control variables. The second survey focused on the switching process and was completed by the participants on day one or two of the non-usage phase. This survey includes switching-stress creators and switching-exhaustion. The third survey focused on alternative-stress creators and alternative-exhaustion and was completed at the end of the non-usage phase on day thirteen or fourteen, when participants were aware of the assets and drawbacks of using SNS and alternatives. This survey also captured participants' intention to change. Survey four focused on the behavior of the participants by asking participants whether they were using the SNS or an alternative one week after the last day of the non-usage phase. Next to these sources of stress and exhaustion variables, the individual difference variables were captured at different stages to ensure short surveys. This is possible because predispositions do not vary significantly over short periods (Ajzen, 2005). Eventually, Table 3 provides an overview of the variables measured in each survey and Figure 3 illustrates the timeline and the different methods used during our experiment.

Survey 1	Survey 2	Survey 3	Survey 4
Age	Dispositional resistance to change	Number of alternatives to Facebook	Minutes spent on Facebook
Gender	Neuroticism	Number of new alternatives	Behavior change
Minutes spend on Facebook	Extraversion	Replacement overload	
Number of friends in SNS	Transition costs	Complexity	
Satisfaction	Sunk costs	Uncertainty	
Perceived usefulness	Switching-exhaustion	Invasion	
Perceived enjoyment		Information underload	
Social influence		Communication underload	
Imitating others		Social exclusion	
Complexity		Boredom	
Uncertainty		Alternative-exhaustion	
Invasion		Intention to change	
Information overload			
Communication overload			
Social overload			
Techno-exhaustion			

Table 3: The four surveys and the constructs

To motivate individuals to take an active part in this experiment, we raffled lottery tickets to win a Google Nexus 7 tablet. Participates got one lottery ticket for writing a diary, one for participating at an interview, and one for completing all four surveys, whereupon the latter was mandatory for each participant of the experiment.

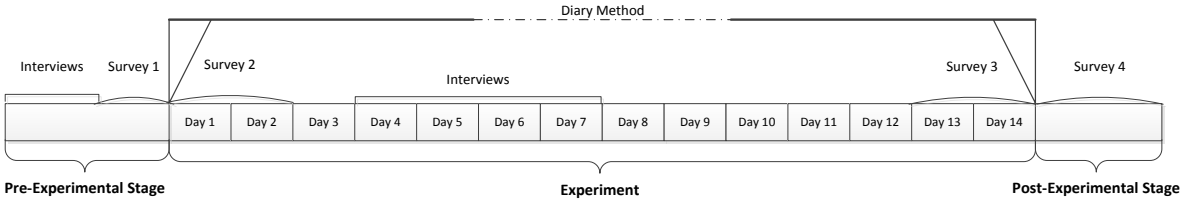


Figure 3: Experimental procedure

5.2 SAMPLE CHARACTERISTICS

A total of 82 individuals took part in our experiment. The demographic characteristics of these 82 participants are summarized in Table 4. The gender of the participants is almost equally distributed (48 percent female). The mean value of participants' age is 27.7 years and the age range was 16-42. Before starting the non-usage phase, participants spent an average of 70.3 minutes per day on Facebook (see Figure 4). 15.5 percent of the participants used the SNS less than 15 minutes per day, 22.5 percent between 16 and 30 minutes, 16.9 percent used it either between 31 and 45 minutes or between 46 and 60 minutes per day. 18.3 percent of the participants used Facebook between one and two hours and 9.9 percent were online in the SNS for an average of more than two hours per day. The average participant had 280.5 virtual friends in the SNS, whereby 8.5 percent of the participants had fewer than 100 friends, 28.2 percent had between 100 and 199 friends, 25.4 percent had between 200 and 299 friends, 15.5 percent had between 300 and 399 friends, 11.3 percent had between 400 and 499 friends, and 11.3 percent had more than 499 virtual friends. These individuals use the SNS for different purposes. 60.6 percent of the participants used the SNS for chatting or writing private messages, 56.3 percent frequently check the newsfeed and one third respond to and/or click on the like-button frequently after reading messages disclosed by friends. In addition, 11.3 percent frequently browse through their friends' list of friends, 7.0 percent post messages frequently and 5.6 percent of the participants use the SNS frequently to search for other individuals.

Gender	48% female, 52% male	
Age (mean 27.7)	<20	9.9%
	20-29	70.4%
	30-39	16.9%
	>39	2.8%
Number of friends in SNS (mean 280.5)	<100	8.5%
	100-199	28.2%
	200-299	25.4%
	300-399	15.5%
	400-499	11.3%
	>499	11.3%

Table 4: Sample characteristics

During the experiment, participants used an average of five alternatives, including on average one that was new to them and that they had to learn to use. 66 percent of the participants thought these alternatives replaced the functionalities of SNS completely. Table 5 illustrates the

number of alternatives used and the number of new alternatives used as a consequence of not using Facebook anymore.

Number of alternatives (mean 5.0)	0-2	14.0%
	3-5	43.7%
	6-8	29.6%
	9-10	12.7%
Number of new alternatives (mean 1.2)	0	57.7%
	1-3	32.4%
	4-7	9.9%

Table 5: Number of alternatives

69.2 percent of the participants use WhatsApp or iMessage to a higher extent during the experiment. SMS (64.7 percent) and e-mail (57.4 percent) are two other communication media used more often during the experiment. Others spent more time studying or working (56.7 percent), reading newspapers or books (52.2 percent), using their telephone (51.5 percent), or going out to meet friends (38.8 percent) during the experiment. In addition, not using Facebook increased the time participants used Skype (37.3 percent), did sports (32.8 percent), used several instant messengers (29.9 percent), watched TV or DVDs (22.4 percent), played board or video games (19.4 percent), or listened to music and the radio (13.4 percent) (Table 6).

Activities while not using SNS	Percentage
WhatsApp and iMessage	69.2
SMS	64.7
Email	57.4
Working or studying	56.7
Reading (magazines, newspaper, books)	52.2
Telephone	51.5
Going out or meet friends	38.8
Skype	37.3
Doing sports	32.8
Instant messengers (ICQ, Jabber, Teamspeak)	29.9
Watching TV or DVD	22.4
Play board or video games	19.4
Listen to music or radio	13.4

Table 6: Alternatives used or done more often while not using SNS

One week after the two weeks of SNS abstinence, participants spent on average 26.3 minutes on Facebook when using it for the first time. Usage time per day decreases to a mean of 33.3 minutes per day and almost the half of the participants used Facebook fewer than 16 minutes and every fifth participant spent between 16 and 30 minutes on Facebook. As a consequence, only a few individuals used Facebook extensively one week after the experiment. Notably, following the experiment, four participants decided to quit Facebook, another four participants reported not having used Facebook for a few days, and another four participants are unsure whether they will use Facebook continuously or use alternatives.

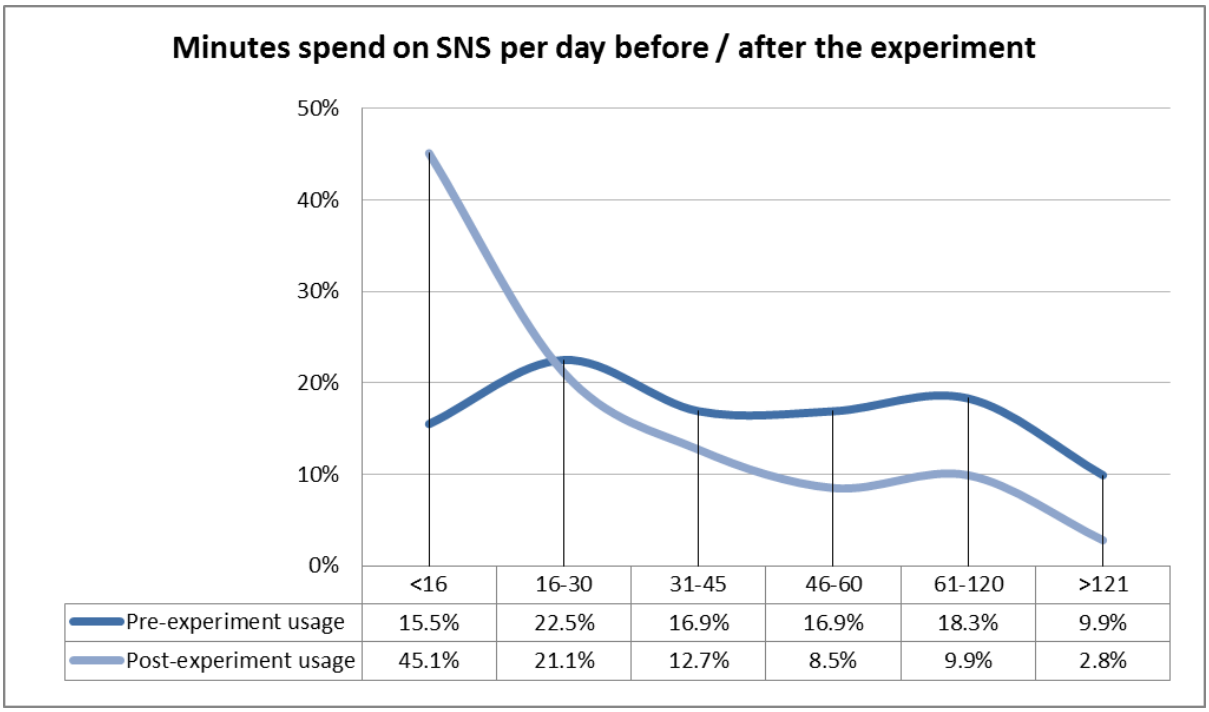


Figure 4: Minutes spend on SNS per day

6 RESEARCH RESULTS

In the following, we present our research results. We first provide statements made by participants in interviews or in diary entries to validate the existence of social-stress creators while not using SNS. This is necessary because this has not the focus of any prior research. Here, we focused on identifying sources of social-stress in addition to sources of stress identified by technostress research, such as replacement overload, uncertainty, insecurity and complexity (e.g., Ayyagari et al., 2011). In a second step, we use the four surveys to evaluate the whole research model empirically.

6.1 INTERVIEWS AND DIARY ENTRIES

To identify social-stress creators perceived while not using Facebook, we first use diary entries written by twelve participants throughout the non-usage phase. We then use interviews of 37 participants conducted at the beginning of the SNS non-usage phase. The demographics of the participants who wrote diary entries and who were interviewed are included in Table 12 in the Appendix. The purpose of the diary entries is to identify all positive and negative stimuli caused by not using SNS, by switching to and by using alternatives. In addition, participants noted occurrences during the two weeks. In the interviews, we use the critical incident technique (Flanagan, 1954) asking first about critical occurrences and major positive and negative reactions participants experienced while not using SNS. To understand the causes of these incidents, we talked about stimuli that occurred during the non-usage phase related to the critical incidents mentioned. After transcribing the diary entries and interviews, the material was coded by two members of the research team, providing meaningful statements that reveal that boredom, social exclusion, information underload and communication underload are stressful stimuli while not using SNS. These statements are listed in Table 13 in the Appendix and some of them are presented in the following paragraph.

One of the participants told us that she uses Facebook on her smartphone. She usually uses Facebook while on the toilet to check news and chat with virtual friends. When she had no access to Facebook, she did not know what to do while sitting on the toilet so she felt bored (Appendix – Table 13: #2). Other participants state directly that they feel isolated from their social environment, particularly since they felt like they are the only people in the world who do not use Facebook (Appendix – Table 13: #10). Notably, one participant traced this exclusion back to not being up to date and losing an opportunity to interact with others (Appendix – Table 13: #13). Not using Facebook meant that some information went unnoticed. This is reported by one participant who is attending college several hours away from home and drives hundreds of kilometers home every weekend to play football. Usually, he uses the group functionality of Facebook during the week to stay in contact with his teammates, exchange information and coordinate a meeting place and time. However, during one week when he was not using Facebook, his coach was fired but did not hear about it until just before the football game began (Appendix – Table 13: #15). Another participant reported troubles due to not using Facebook as a communication channel because he got to know a nice girl, but when they wanted to exchange phone numbers, the girl said she didn't have a smartphone at the moment but they could exchange Facebook names and communicate there (Appendix – Table 13: #8). Other adverse stimuli related to using alternatives include higher costs (Appendix – Table 13: 28) or longer response times (Appendix – Table 13: #21).

Based on the stressful stimuli identified, we identified alternative-stress creators to use in the surveys to collect data and evaluate the research model empirically.

6.2 EMPIRICAL RESULTS

To validate the research model, we transfer it into a structural equation model (Chin, 1998a) using the partial least squares method and SmartPLS (Ringle et al., 2005) because it is suitable for small data samples (Chin and Newsted, 2000). Although the data sample with 82 participants is small, it is enough to assess the model based on the rule of ten (Hair et al., 2011). In addition, SmartPLS does not require normally distributed data. Here, particularly negative perceptions, such as sources of stress, frequently cause skewed distributions (Turel et al., 2011). Hence, we use SmartPLS instead of tools using covariance-based methods.

6.3 COMMON METHOD BIAS

Self-reported data such as that gathered in our four surveys may include common method bias (CMB) that inflates the correlations between the variables in the research model (Podsakoff et al., 2003). To minimize the influence of CMB, which is particularly problematic for studies collecting data at a given point in time from one single survey with similar scales (Spector, 2006), we collected data at four different points during the experiment. We also used two different techniques to assess the impact of CMB. First, the Harman's single factor test indicates whether the majority of the variance can be explained by one single factor. In our data, only 23.8 percent of the variance is explained by one factor. Second, we performed the method proposed by Podsakoff et al. (2003) by using PLS (Liang et al., 2007). This means that a CMB factor is added to our research model and all remaining factors are transformed in single-item constructs (Williams et al., 2003). The ratio of R^2 with CMB to R^2 without CMB factor is then compared. In our case, the CMB factor explains an average delta of 0.005 and the average R^2 without CMB factor is 0.791, so that the resulting ratio is 1:158. Hence, both techniques indicate that CMB has no significant impact on our results.

We break down the overall research model into three separate parts consisting of models in which the dependent and the independent variable were collected in one survey to investigate

whether CMB is a problematic issue, again using the Podsakoff et al (2003) method. The first model includes SNS-specific technostress creators as independent and techno-strain as dependent variable (ratio: 1:104). The second model includes two switching-stress creators and switching-exhaustion (ratio 1:102) and the third one alternative-stress creators, alternative-exhaustion, and intention to change (ratio 1:207). Hence, these three tests also indicate that CMB is no problematic issue in this research.

6.4 MEASUREMENT MODEL

Each source of exhaustion, exhaustion and control variable (except dispositional resistance to change, see Appendix) is measured by using reflective indicators. This means that we have to observe content validity, indicator validity, construct reliability and discriminant validity to validate the measurement model (Bagozzi, 1979).

First, we aim to use existing measurement items whenever possible to ensure content validity by transferring items used in prior research to our research setting. The detailed items are provided in the Appendix (see Table 14) and the measures are explained in detail above.

Techno-, switching-, and alternative-stress creators. To capture social overload (α=0.90), communication overload (α=0.89), information overload (α=0.91), uncertainty (α=0.85), complexity (α=0.83) and invasion (α=0.86), we base on items used in general technostress research (Ayyagari et al., 2011; Tarafdar et al., 2010) as well as research focusing on technostress creators while using SNS (Maier et al., 2012). The switching-stress creators sunk costs (α=0.93) and transition costs (α=0.88) are based on the items of Polites and Karahanna (2012). The alternative-stress creators, namely replacement overload (α=0.94), information underload (α=0.94), communication underload (α=0.93), social exclusion (α=0.96), boredom (α=0.94), uncertainty (α=0.93), complexity (α=0.93) and invasion (α=0.74) again build on general technostress and SNS-specific research. In particular, replacement overload, uncertainty, complexity and invasion are based on Ayyagari et al (2011) and Tarafdar et al. (2010). Communication and information underload are based on the scales of information and communication overload but focus on the opposite extreme (Maier et al., 2012). Social exclusion (Andrews et al., 1977) and boredom (Fahlman et al., 2013; focusing on SNS-relevant dimensions disengagement and time perception) is based on general research in psychology and are adapted to our research context. Here, each stressor is measured on a 7-point Likert scale (1=totally disagree; 7=totally agree).

Techno-, switching-, and alternative-exhaustion. We measure the three psychological strain variables based on Moore's exhaustion scale (2000). This measurement has been also used in field of techno-exhaustion (Ayyagari et al., 2011) and SNS-exhaustion (Maier et al., 2014). We make use of a 7-point Likert scale on which 1 indicates that the described feeling is never perceived and 7 indicates that it is felt daily. This is used for techno-exhaustion (α=0.84), switching-exhaustion (α=0.94) and alternative-exhaustion (α=0.92).

Change. To capture an SNS user's intention to change, we use three items (Curran and Meuter, 2007; α=0.96). We also use four items for measuring an individual's behavior change (α=0.94). In both cases, we use a 7-point Likert scale on which 1 indicates an individual's strong disagreement with the statement and 7 indicates strong agreement.

Control variables. We measure the control variables perceived usefulness (α=0.78; Brown and Venkatesh, 2005), perceived enjoyment (α=0.90; Turel and Serenko, 2012), satisfaction (α=0.87; Bhattacherjee, 2001), social influence (α=0.91; Brown and Venkatesh, 2005), and imitating others (α=0.77; Sun, 2013) with the help of measures used in prior articles and a 7-point Likert scale (1=totally disagree; 7=totally agree). The personality traits extraversion (α=0.83) and

neuroticism (α=0.78) are measured using two items as well as a 7-point Likert scale (1=totally disagree; 7=totally agree) as proposed by Rammstedt and John (2007) and has been used in several IS articles (e.g., Junglas et al., 2008). To control for dispositional resistance to change, we make use of the scale proposed by Oreg (2003), which consists of four dimensions: routine seeking (α=0.86), emotional reaction to change (α=0.78), short-term thinking (α=0.80) and cognitive rigidity (α=0.90). This predisposition has been used in prior IS research (Polites and Karahanna, 2012). We argue here that it has to be conceptualized as second-order aggregate construct (see Appendix Table 15 for the validation).

Second, indicator reliability is used to determine the rate of variance of an indicator that comes from the latent variables, whereupon more than 50 percent of a latent variable's variance should be explained by the indicators. Therefore, the values should be greater than 0.707 (Carmines and Zeller, 2008). That each loading exceeds the recommended threshold is specified in Table 14.

Third, composite reliability (CR) and average variance extracted (AVE) is used to verify a high quality at the construct level (Fornell and Larcker, 1981). To assess construct reliability, CR should be at least 0.7 and AVE at least 0.5. Table 16 shows that both criteria are fulfilled for all constructs.

Fourth, discriminant validity describes the extent to which items differ from others (Campell and Fiske, 1959). To specify that items differ from others, Table 16 includes the square root of AVE and each of these values is greater than the corresponding construct correlation (Fornell and Larcker, 1981; Hulland, 1999).

Based on the above tests, we confirm that our measurement model is valid.

6.5 STRUCTURAL MODEL

We evaluate the structural model by using the coefficient of determination and the significance level of each path coefficient (Chin, 1998b). Based on the empirical data of the four surveys, our findings indicate that technostress creators when using SNS explain 61.3 percent of the variance of techno-exhaustion. Moreover, switching-stress creators explain 65.1 percent of the variance of switching-exhaustion and the alternative-stress creators explain 73.7 percent of the variance of alternative-exhaustion. Together, these three kinds of exhaustion variables and the control variables explain 69.8 percent of the variance of intention to change. However, when excluding control variables, the three exhaustion variables still explain 59.2 percent of the variance of intention to change. This intention in turn explains 63.1 percent of the variance of behavior change and 65.0 percent when also controlling for individual differences.

Concerning the significance level of each path coefficient, results show that information, communication and social overload are the only significant contributing factors for techno-exhaustion. In addition to that, sunk costs and transition costs are both significant influencing factors for switching-exhaustion. Moreover, alternative-exhaustion is influenced by replacement overload, communication underload, social exclusion and boredom. Thus, all three kinds of exhaustion influence intention to change significantly, which in turn influences behavior change significantly (Figure 5).

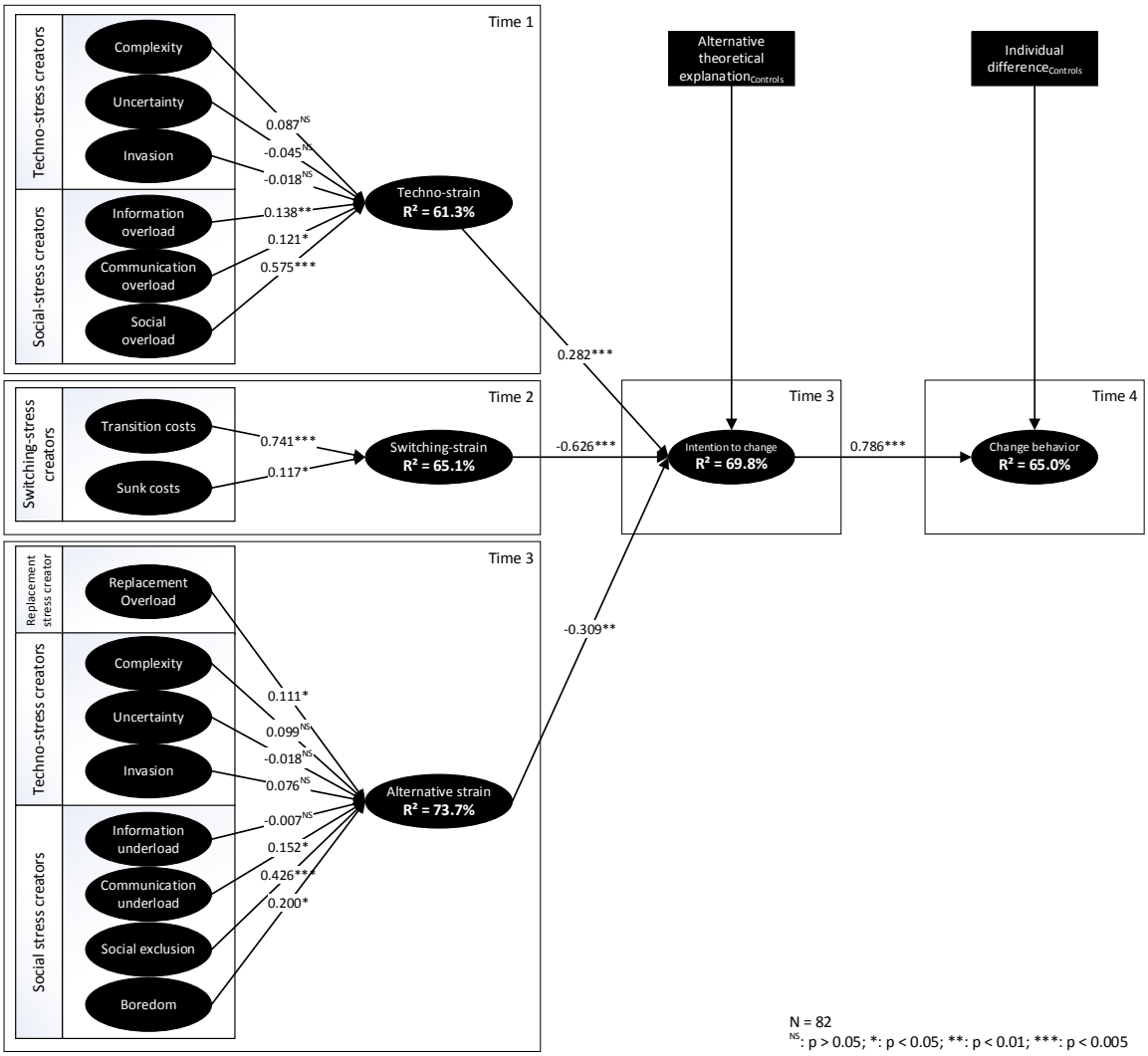


Figure 5: Research model with perceptions captured in four different points in time

Focusing the control variables, we can state that satisfaction, perceived usefulness and perceived enjoyment influence intention to change significantly, whereby satisfaction has a significant positive influence on an individual's intention to change and hence is contrary to the hypothesized effect[3]. Further, extraversion is the only individual difference influencing behavior change significantly (Table 7).

Influence of … on intention to change		Influence of … on behavior change	
Satisfaction [1]	0.340***	Age	-0.016^{NS}
Perceived usefulness	-0.206***	Gender	-0.060^{NS}
Perceived enjoyment	-0.402***	Dispositional resistance to change	0.006^{NS}
Social influence	0.020^{NS}	Neuroticism	-0.102^{NS}
Imitating others	-0.020 ^{NS}	Extraversion	-0.130*

Table 7: The influence of control variables

6.6 STRENGTH OF EFFECT

To determine the strength of effect, we calculate f^2 values. As seen in the results summarized in Table 8, the five control variables (controls) have a medium effect on intention to change and the three exhaustion variables have a very strong effect. In detail, switching-exhaustion has a strong, techno-exhaustion a medium, and alternative-exhaustion a low effect on intention to change.

Independent variable	Techno-, switching-, and alternative-exhaustion	Techno-exhaustion	Switching-exhaustion	Alternative-exhaustion	Controls
Dependent variable	Intention to change				
f^2	1.56	0.16	0.39	0.10	0.34
Interpretation	strong effect	medium effect	strong effect	medium effect	medium effect

Table 8: Effect size of exhaustion and controls based on Cohen (1988)

When focusing on the strength of effect of different sources of stress, results indicate that the social-stress creators have a very strong effect on techno- and alternative-exhaustion, whereby technostress creators have no effect at all and the stressor replacement-overload has a low effect (Table 9).

Independent variable	Social-stress creators	Technostress creators	Replacement-stress creator	Social-stress creators	Technostress creators
Dependent variable	Techno-exhaustion		Alternative-exhaustion		
f^2	1.27	0.01	0.03	0.61	0.01
Interpretation	strong effect	no effect	low effect	strong effect	no effect

Table 9: Effect strength of sources of stress based on Cohen (1988) [2]

6.7 POST-HOC ANALYSIS: THE MEDIATING ROLE OF SOCIAL EXCLUSION AND BOREDOM

Although we hypothesized information and communication underload as antecedents of alternative-exhaustion, only communication underload has a significant impact. In the interviews and the diary entries, some participants report that information and communication underload

[1] Notably, satisfaction does not influence intention to change negatively as hypothesized by us. Rather, it has a positive influence. However, further analyses reveal a suppression effect, because the positive influence of satisfaction turns into a negative one when evaluating an indirect influence of perceived enjoyment and usefulness through satisfaction on intention to change as has been done in prior research (Maier et al., 2012).

We maintain the direct influence on intention to change in our model because we aim to hypothesize all control variables as direct antecedents so that we can more easily present the delta R^2 caused by including our three strain variables.

[2] $f^2 > 0.35$ = strong effect, $f^2 > 0.15$ = medium effect, $f^2 > 0.02$ = weak effect (Cohen, 1988)

causes social exclusion and boredom, citing, among others, the comparatively low levels of information and communication, which cause the perception of not belonging to one's social network and not being able to relieve boredom using fun applications.

As a consequence, we revised our research model post-hoc by considering social exclusion and boredom as a mediator of the influence of information and communication underload on alternative-exhaustion. Then, results indicate that information and communication underload have significant impacts on social exclusion (R^2 = 59.7 percent; β_{IU}=0.472, t_{IU}=4.270; β_{CU}=0.377, t_{CU}=3.935) and boredom (R^2 = 36.7 percent; β_{IU}=0.257, t_{IU}=2.456; β_{CU}=0.406, t_{CU}=3.639). Moreover, a mediation analysis (Preacher and Hayes, 2004) indicates that communication and information underload have a significant indirect effect on switching-exhaustion through social exclusion and boredom. The rationale for this is that the indirect effect of information underload through social exclusion and boredom on alternative-exhaustion is 0.58 and the associated 95 percent bias-corrected interval is between 0.429 and 0.833 (1,000 bootstrap resamples) and the indirect effect of communication underload is 0.764 with a 95 percent bias-corrected interval between 0.465 and 1.120 (1,000 bootstrap resamples). Since zero is not included in both intervals, the bootstrapping method support that social exclusion and boredom mediate the influence of information and communication underload on alternative-exhaustion.

7 DISCUSSION

This research aims to extend technostress research by not only focusing on techno-induced stress, but also on the stress-level while switching to and using alternatives. Our research model argues that using a technology, switching to alternatives and using alternatives is accompanied by different sources of stress and psychological reactions of exhaustion. These perceptions influence whether an individual intends to stop using a certain technology or switch to the alternatives and subsequently transfer this intention in behavior change. To evaluate our research model, we use an experiment with interviews, diary entries and four surveys. The findings of our analysis are presented below.

7.1 SOCIAL-STRESS CREATORS AS ANTECEDENTS OF TECHNO-EXHAUSTION

The proposed model argues that three technostress creators and social-stress creators might cause techno-exhaustion. Although the six sources of stress explain 61.3 percent of the variance of techno-exhaustion, none of the technostress creators complexity (H1a), uncertainty (H1b) and invasion (H1c) has a significant direct influence on techno-exhaustion. This means that the complexity of using SNS, the frequency of SNS updates, and the fact that SNS becomes an integral part of an individual's life have no influence on whether an individual is exhausted by using SNS.

In contrast, the three social-stress creators information overload (H1d), communication overload (H1e) and social overload (H1f) are significant contributing factors for whether an individual is exhausted by using SNS. Specifically, the quantity and quality of disclosed information by other SNS users, undesired and uninteresting communications with virtual friends, and the perception of having to respond to too many disclosed messages cause techno-exhaustion.

The importance of these social-stress creators for understanding techno-exhaustion is also confirmed by calculating strength of effect. Our results reveal that sources of social-stress have a strong and sources of technostress have no effect on exhaustion, which is in line with prior research results (Maier et al., 2014).

7.2 SUNK COSTS AND TRANSITION COSTS AS SWITCHING-STRESS CREATORS CAUSING SWITCHING-EXHAUSTION

More than sixty-five percent of the variance in switching-exhaustion is explained by transition costs (H3a) and sunk costs (H3b). Moreover, both stressful stimuli have a significant direct effect. This supports the argumentation that the additional time and effort it takes to adapt to a new situation and to establish using new alternatives to replace SNS functionalities is perceived as a stressor. The same holds for the fact that an individual's time and effort in learning to use and integrate using SNS in their daily life is worthless when switching to alternatives.

7.3 SOCIAL-STRESS CREATORS AND REPLACEMENT OVERLOAD INDUCE ALTERNATIVE-EXHAUSTION

The proposed model discusses three different categories of stressful stimuli when no longer using SNS, as the participants in our experiment could decide for themselves whether, how many and which alternatives they wished to use to replace the functionalities of SNS. First, we argue that the number of alternatives that have to be used to replace the functionalities might be a stressor. Here, our findings confirm replacement overload as a significant influencing factor for alternative-exhaustion (H5a), i.e. individuals perceive exhaustion because they have to use too many alternatives to replace all the functionalities of SNS.

Second, we theorize that complexity (H5b), uncertainty (H5c) and invasion (H5d) of the technological alternatives might also be perceived as sources of alternative-exhaustion. However, our findings reveal that these technostress creators do not have a significant impact on exhaustion. These results indicate that neither the complexity or difficulty to use nor the uncertainty due to updates nor the invasion into personal life of all technological alternatives to SNS influence whether or not one perceives exhaustion due to using alternatives.

Third, we again argue that social-stress creators cause perceptions of alternative-exhaustion. Particularly, communication underload (H5f), social exclusion (H5g), and boredom (H5h) have a direct significant effect. Mediation analyses reveal significant indirect effects of communication and information underload through social exclusion and boredom. These results imply that individuals are not able to access all information disclosed by virtual friends immediately and the discontinuation of a communication channel cause two different phenomena. First, they feel isolated from the rest of the world because it is problematic to receive information and maintain communication. Second, individuals feel bored. Thus, these perceptions of social exclusion and boredom cause perceptions of being exhausted from using alternatives instead of SNS.

Eventually, these sources of stress explain 73.7 percent of the variance in alternative-exhaustion and strength of effect indicates that social-stress creators have the highest influence.

7.4 MULTIFACETED PSYCHOLOGICAL STRAIN AS THE MAIN DRIVER OF INTENTION TO CHANGE

The proposed research model argues that behavioral intention is influenced by three kinds of strain (techno-, switching- and alternative-exhaustion) as well as perceptions that have been studied in prior research such as satisfaction, perceived usefulness, perceived enjoyment, social influence and imitating others. Our analysis reveals that techno-exhaustion (H2), switching-exhaustion (H4) and alternative-exhaustion (H6) as well as the control variables, perceived usefulness, perceived enjoyment, and satisfaction have a significant influence on intention to change.

Notably, techno-, switching- and alternative-exhaustion have an overall strong effect on intention to change. In contrast, the other control variables included in the research model have a comparable lower strength of effect. Techno-exhaustion and alternative-exhaustion have a medium strength of effect while switching-exhaustion has the highest influence on intention to change. This means that the intention to change is mostly influenced by psychological reactions in terms of exhaustion.

7.5 INTENTION TO CHANGE AS INFLUENCING FACTOR FOR BEHAVIOR CHANGE

Our research design is longitudinal and we capture an individual's behavior and changes in behavior at another point in time than sources of stress, strains and controls. The proposed model argues that intention to change and individual difference variables, such as age, gender, extraversion, neuroticism, and dispositional resistance to change influence an individual's behavior change. In fact, our findings reveal that these variables explain 65.0 percent of the variance of behavior and that intention to change (H7) and the predisposition extraversion are the only two significant antecedents.

8 IMPLICATIONS FOR THEORY AND PRACTICE

8.1 INTEGRATING MULTIFACETED PSYCHOLOGICAL STRAIN OBJECTS AND BEHAVIOR CHANGE INTO TECHNOSTRESS RESEARCH

Prior technostress research has identified a wide range of stressful stimuli when using a technology causing psychological reactions of strain (Tarafdar et al., 2010; Ayyagari et al., 2011). Research in the field of technology continuance uses this concept of strain to explain why users might develop discontinuous usage intentions (Maier et al., 2012). Although these findings are promising, since the multifaceted psychological strain objects have an even higher explanation power of behavioral intention than satisfaction or other perceptual beliefs, it does not take into account that switching to and using alternatives might also cause exhaustion.

We enter this discussion by arguing that the perception of techno-exhaustion only causes serious behavioral reactions in terms of intentions to discontinue using a technology when alternatives are perceived as less stressful. We argue that individuals experience and compare three different kinds of strain developing an intention to continue to use a specific technology or switch to alternatives. In addition to the exhaustion caused by technology (techno-exhaustion) or other alternatives (alternative-exhaustion) we also consider the perception of being exhausted while changing behavior (switching-exhaustion). Consequently, we consider psychological strain during the entire process of switching from one behavior to another. Despite of this holistic perspective, we disaggregate strain effects by isolating psychological strain caused by different sources in multiple surveys, following the advice of Ayyagari et al. (2011), who recommend using an experimental setting and Ayyagari et al. (2011) and Oreg et al. (2011), who recommend a longitudinal research design. Our data analysis confirms that the switching process includes different sources and kinds of psychological strains. Next to different mean values of the three sources of psychological strain, statements of participant diaries and interviews confirm that changing one's behavior causes exhaustion that has to be separated from exhaustion caused by using the technology or alternatives (see Appendix - Table 13: #36-41).

We argue that individuals decide whether to a technology continuously or switch to alternatives based on these kinds of psychological strain and introduce the concept of behavior

change into technostress research. We contribute to recent research indicating that although techno-exhaustion influences individuals' behavior significantly (Ragu-Nathan et al., 2008), switching-exhaustion determines behavior to an even higher extent. We conclude that the exhaustion of IT usage is offset by switching- and alternative-exhaustion, which have stronger effects on behavioral intentions and carry more weight when making decisions.

We see opportunities for future research to consider further alternatives to completely understand the developmental process of perceptual beliefs and behaviors. For technostress research, it is important to factor in the stress induced by the switching process and the usage of alternatives. If we conclude that removing a stressful technology might strain the user more heavily than continuous usage, future research should investigate how to diminish technostress creators and techno-exhaustion in specific usage situations.

8.2 TOO MUCH AND TOO LITTLE SOCIAL EMBEDEDDNESS AS SOURCE OF EXHAUSTION

Prior research focusing on the role of SNS in individuals' life emphasizes its importance in networking and establishing social connections (Koroleva et al., 2011). SNS are used to disclose information, coordinate events and maintain or build social relationships (Khan and Jarvenpaa, 2010; Posey et al., 2010; Tow et al., 2010; Krasnova et al., 2011). Despite of these benefits of using SNS, recent research reveals that online social connections might also have negative effects on individuals, particular when too much information is disclosed, users communicate too much, and when virtual friends ask for too much social support (Maier et al., 2014).

Notably, the sources of stress associated with discontinued usage of SNS are exactly the same but at the other end of the spectrum. The disclosed information no longer available through SNS if usage is discontinued and loss of a channel of communication with friends via SNS cause perceptions of being isolated from the rest of the world and feelings of boredom which in turn cause perceptions of being strained from not using SNS. Hence we can conclude that even though online social ties can cause exhaustion, eliminating these connections altogether can also be perceived negatively by individuals. Hence, we contribute to Brown's (2008) call to investigate the impacts of technology used for personal purposes by arguing that using and discontinuing usage of a technology can lead to individual dissatisfaction because both causes adverse perceptions.

We conclude that social aspects should be the focus of technostress research as many technologies experienced as stressful (Ayyagari et al., 2011) are also used for doing socializing. Techno-induced changes (Polites and Karahanna, 2012) might also change communication paths between users (e.g., when changing functionalities of a forum), so future research should also consider social-stress creators when investigating techno-changes or technostress.

8.3 SUNK COSTS AND TRANSITION COSTS AS SOURCE FOR SWITCHING-EXHAUSTION

Recent research in the field of technological change focusing on the implementation of new technologies has called for future research examining the psychological and behavioral consequences of stress caused by technological changes (Morris and Venkatesh, 2010). We responded to this call by focusing on switching-stress creators as well as switching-exhaustion and find that sunk costs and transition costs can lead to adverse psychological perceptions in terms of switching-exhaustion. We conclude that these two aspects are not solely drivers of user resistance (Kim and Kankanhalli, 2009) and inertia (Polites and Karahanna, 2012), but also of

perceptions of exhaustion and a concrete psychological consequence of stressful stimuli when changing technologies, as demanded by Morris and Venkatesh (2010).

Moreover, as suggested by Morris and Venkatesh (2010), stress during techno-changes also influences an individual's behavior. We find that it has a strong effect on intention to change and binds individuals to using the habitual technology continuously instead of embracing change. Future research on user resistance or change should consider the strong influences of sources of stress and exhaustion on behavioral variables.

8.4 REDUCING SWITCHING COSTS TO CONVINCE INDIVIDUALS TO CHANGE BEHAVIOR

A practical contribution of our study relates to transition costs. Our research identifies these costs as one major factor hindering switching to alternatives. For organizations preparing to launch a new product that competes with well-established competing product, such as a new SNS, this implies that the organization should reduce the perceived switching costs to individuals, which might impact whether or not the new product passes the tipping point.

8.5 PSYCHOLOGICAL STRAIN CHANGES INDIVIDUALS' BEHAVIORAL PATTERNS

Our research results indicate that four participants closed their Facebook account as a result of the experiment, another four are still registered but did not use the technology for at least a week following the experiment, and another four participants are also registered but are not sure whether they will use Facebook continuously. After the experiment, only twelve participants spent as much as or more time on Facebook than before the experiment. This caused that the average mean of time spent in Facebook to drop from 70.3 minutes to 33.3 minutes per day. In summary, although most participants still use the technology, they use it to a different extent and have changed their behavioral pattern.

We conclude that even if using a technology is perceived as stressor causing techno-exhaustion, switching to and using alternatives might also be perceived as source of psychological strain. Most individuals do not completely stop using the technology, but rather change their behavioral pattern.

9 LIMITATIONS AND FUTURE RESEARCH

As with all research, our findings are limited in several ways. First, the non-usage phase was limited in time, so some individuals may have opted out of learning, switching and using alternatives to replace the functionalities of Facebook. It is possible that the limited experimental phase resulted in an underestimation of the influence of switching-exhaustion and alternative-exhaustion on intention to change. Second, we focus on the voluntary use of Facebook (Brown and Venkatesh, 2005), so findings may differ if mandatory technology usage is investigated (Venkatesh et al., 2003), for example in user resistance research in an organizational setting during. However, individuals have no possibility in such usage settings so that a voluntary usage research setting was most appropriate for our research questions. Here, future research might repeat this in organizational settings when IT usage is mandatory. For example, this might be done during an organizational IT change. Applying our research approach in this area may lead to a better understanding of whether the exhaustion induced by the old technology (techno-exhaustion), the switching process (switching-exhaustion), or the new alternative (alternative-exhaustion) is the principle cause of resistance behavior. Third, the participants of our

experiment were not connected to each other via Facebook. Results may differ if a closed group does not use SNS, because then no individual is the only one not using the SNS and hence no one would perceive being isolated or fears of missing information.

10 CONCLUSION

This research introduces multifaceted psychological strain objects and behavior change in technostress research. We theorize and empirically validate that human behavior is influenced by intention to change, which is in turn influenced by techno-exhaustion, switching-exhaustion and alternative-exhaustion. Notably, techno-exhaustion, the focus in prior IS stress research, does influences user behavior far less than switching-exhaustion. We also identify switching-stress and alternative-stress creators, concluding that although using a particular technology could be a source of stress, switching to and using alternatives could be perceived as even more stressful and therefore influence our actions more. The Clash sang about the technostress conundrum in 1982 – should I stay with the old technology or go to another:

Should I stay or should I go now?

If I go there will be trouble

And if I stay it will be double

As our results indicate, The Clash may not be right about this. As the saying goes and our results indicates, that "*better the devil you know than the devil you don't*".

11 REFERENCES

Agarwal, R., Animesh, A., and Prasad, K., 2009. Social Interactions and the "Digital Divide": Explaining Variations in Internet Use. Information Systems Research (20:2), pp. 277–294.

Ajzen, I., 1985. From intentions to actions: A theory of planned behavior. In: Action control: From cognition to behavior. Kuhl, J. (ed.). Springer, Berlin.

Ajzen, I., 1991. The theory of planned behavior. Organizational Behavior and Human Decision Processes (50:2), pp. 179–211.

Ajzen, I., 2005. Attitudes, personality and behavior, 2. ed. Open Univ. Press, Maidenhead.

Amichai-Hamburger, Y., Kingsbury, M., and Schneider, B. H., 2013. Friendship: An old concept with a new meaning? Computers in Human Behavior (29:1), pp. 33–39. doi: 10.1016/j.chb.2012.05.025.

Andrews, G., Schonell, M., and Tennant, C., 1977. The relation between physical, psychological, and social morbidity in a suburban community. American Journal of Epidemiology (105:4), pp. 324–329.

Ayyagari, R., Grover, V., and Purvis, R., 2011. Technostress: Technological Antecedents and Implications. MIS Quarterly (35:4), pp. 831–858.

Bagozzi, R. P., 1979. The Role of Measurement in Theory Construction and Hypothesis Testing: Toward a Holistic Model. In: Conceptual and theoretical developments in marketing. Ferrell, O. C., Brown, S. W., Lamb, C. W. (eds.), pp. 15–32. American Marketing Assoc., Chicago, Ill.

Bakker, A. B., Boyd, C. M., Dollard, M., Gillespie, N., Winefield, A. H., and Stough, C., 2010. The role of personality in the job demands-resources model: A study of Australian academic staff. Career Development International (15:7), pp. 622–636. doi: 10.1108/13620431011094050.

Bansal, H. S., Taylor, S. F., and James, Y. S., 2005. "Migrating" to New Service Providers: Toward a Unifying Framework of Consumers' Switching Behaviors. Journal of the Academy of Marketing Science (33:1), pp. 96–115. doi: 10.1177/0092070304267928.

Bem, D., 1972. Self-Perception Theory. In: Advances in experimental social psychology. Berkowitz, L. (ed.), pp. 1–62. Academic Press, New York.

Bhattacherjee, A., 2001. Understanding Information Systems Continuance: An Expectation-Confirmation Model. MIS Quarterly (25:3), pp. 351–370.

Bhattacherjee, A., and Premkumar, G., 2004. Understanding Changes in Belief and Attitude toward Information Technology Usage: A Theoretical Model and Longitudinal Test. MIS Quarterly (28:2), pp. 229–254.

Brown, S. A., 2008. Household Technology Adoption, Use, and Impacts: Past, Present, and Future. Information Systems Frontiers (10:4), pp. 397–402.

Brown, S. A., and Venkatesh, V., 2005. Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Life Cycle. MIS Quarterly (29:3), pp. 399–426.

Campell, D. T., and Fiske, D. W., 1959. Convergent and discriminant validation by the multitrait-multimethod matrix. Psychological Bulletin (56:2), pp. 81–105.

Carmines, E. G., and Zeller, R. A., 2008. Reliability and validity assessment, Sage Publ., Newbury Park, Calif.

Cenfetelli, R. T., and Schwarz, A., 2011. Identifying and Testing the Inhibitors of Technology Usage Intentions. Information Systems Research (22:4), pp. 808–823.

Chin, W. W., 1998a. Issues and Opinion on Structural Equation Modeling. MIS Quarterly (22:1), pp. xii-xvi.

Chin, W. W., 1998b. The Partial Least Squares Approach to Structural Equation Modeling. In: Modern methods for business research. Marcoulides, G. A. (ed.), pp. 295–336. Erlbaum, Mahwah N.J.

Chin, W. W., and Newsted, P. R., 2000. Structural Equation Modeling analysis with Small Samples Using Partial Least Squares. In: Statistical strategies for small sample research. Hoyle, R. H. (ed.), pp. 307–341. Sage Publ., Thousand Oaks, Calif.

Cooper, C. L., Dewe, P., and O'Driscoll, M. P., 2001. Organizational stress: A review and critique of theory, research, and applications. Sage, Thousand Oaks, Calif.

Curran, M., and Meuter, M., 2007. Encouraging Existing Customers to Switch to Self-Service Technologies: Put a Little Fun in Their Lives. Journal of Marketing Theory and Practice (15:4), pp. 283–298.

Dabholkar, P. A., 1994. Incorporating Choice into an Attitudinal Framework: Analyzing Models of Mental Comparison Processes. Journal of Consumer Research (21:1), p. 100. doi: 10.1086/209385.

Davis, F. D., 1989. Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology. MIS Quarterly (13:3), pp. 319–340.

Davis, F. D., Bagozzi, R. P., and Warshaw, P. R., 1989. User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. Management Science (35:8), pp. 982–1003.

Dunbar, R. I. M., 1993. Coevolution of neocortical size, group size and language in humans. Behavioral and Brain Sciences (16:4), p. 681. doi: 10.1017/S0140525X00032325.

Fahlman, S. A., Mercer-Lynn, K. B., Flora, D. B., and Eastwood, J. D., 2013. Development and Validation of the Multidimensional State Boredom Scale. Assessment (20:1), pp. 68–85. doi: 10.1177/1073191111421303.

Ferneley, E. H., and Sobreperez, P., 2006. Resist, comply or workaround? An examination of different facets of user engagement with information systems. European Journal of Information Systems (15:4), pp. 345–356.

Flanagan, J. C., 1954. The Critical Incident Technique. Psychological Bulletin (51:4), pp. 327–359.

Fornell, C., and Larcker, D. F., 1981. Evaluating Structural equation models with unobservable variables and measurement error. Journal of Marketing Research (18:1), pp. 39–50.

Gartner 2011. Gartner Survey Highlights Consumer Fatigue with Social Media http://www.gartner.com/it/page.jsp?id=1766814, accessed 7 September 2011.

Hair, J. F., Ringle, C. M., and Sarstedt, M., 2011. PLS-SEM: Indeed a Silver Bullet. The Journal of Marketing Theory and Practice (19:2), pp. 139–152. doi: 10.2753/MTP1069-6679190202.

Hou, A. C., Chern, C.-C., Chen, H.-G., and Chen, Y.-C., 2011. 'Migrating to a new virtual world': Exploring MMORPG switching through human migration theory. Computers in Human Behavior (27:5), pp. 1892–1903. doi: 10.1016/j.chb.2011.04.013.

Hulland, J. S., 1999. Use of partial least squares (PLS) in strategic management research: A review of four recent studies. Strategic Management Journal (20:2), pp. 195–204.

Ito, T. A., Larsen, J. T., Smith, N. K., and Cacioppo, J. T., 1998. Negative information weighs more heavily on the brain: The negativity bias in evaluative categorizations. Journal of Personality and Social Psychology (75:4), pp. 887–900.

Jones, Q., Ravid, G., and Rafaeli, S., 2004. Information Overload and the Message Dynamics of Online Interaction Spaces: A theoretical model and empirical exploration. Information Systems Research (15:2), pp. 194–210.

Junglas, I. A., Johnson, N., and Spitzmüller, C., 2008. Personality traits and concern for privacy: an empirical study in the context of location-based services. European Journal of Information Systems (17), pp. 387–402.

Karahanna, E., Straub, D. W., and Chervany, N. L., 1999. Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs. MIS Quarterly (23:2), pp. 183–213.

Khan, Z., and Jarvenpaa, S. L., 2010. Exploring temporal coordination of events with Facebook.com. Journal of Information Technology (25:2), pp. 137–151.

Kim, H.-W., and Kankanhalli, A., 2009. Investigating User Resistance to Information Systems Implementation: A Status Quo Bias Perspective. MIS Quarterly (33:3), pp. 567–582.

Kim, S. S., 2009. The integrative framework of technology use: An extension and test. MIS Quarterly (33:3), pp. 513–537.

Kim, S. S., and Malhotra, N. K., 2005. A Longitudinal Model of Continued IS Use: An Integrative View of Four Mechanisms Underlying Postadoption Phenomena. Management Science (51:5), pp. 741–755.

Koroleva, K., and Bolufé Röhler, A. J., 2012. Reducing Information Overload: Design and Evaluation of Filtering & Ranking Alorithms for Social Networking Sites. ECIS 2012 Proceedings.

Koroleva, K., Krasnova, H., and Günther, O., 2010. 'STOP SPAMMING ME!' - Exploring Information Overload on Facebook. AMCIS 2010 Proceedings.

Koroleva, K., Krasnova, H., Veltri, N., and Günther, O., 2011. It's all about networking! Empirical investigation of social capital formation on social network sites. Proceedings of the international conference on information systems.

Krasnova, H., Kolesnikova, E., and Günther, O., 2011. One size fits all? Managing trust and privacy on social networking sites in russia and germany. European Conference on Information Systems.

Krasnova, H., Spiekermann, S., Koroleva, K., and Hildebrand, T., 2010. Online social networks: why we disclose. Journal of Information Technology (25:2), pp. 109–125.

Lampe, C., Ellison, N. B., and Steinfield, C., 2008. Changes in use and perception of facebook. Proceedings of the 2008 ACM conference on Computer supported cooperative work, pp-721–730.

Lankton, N. K., and McKnight, H. D., 2012. Examining Two Expectation Disconfirmation Theory Models: Assimilation and Asymmetry Effects. Journal of the Association for Information Systems (13:2), pp. 88–115.

Laumer, S., Maier, C., and Weinert, C., 2013. The Negative Side Of ICT-Enabled Communication: The Case Of Social Interaction Overload In Online Social Networks. ECIS 2013 Proceedings.

Lavee, Y., McCubbin, H. I., and Olson, D. H., 1987. The Effect of Stressful Life Events and Transitions on Family Functioning and Well-Being. Journal of Marriage and Family (49:4), pp. 857–873.

Liang, H., Saraf, N., Hu, Q., and Xue, Y., 2007. Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management. MIS Quarterly (31:1), pp. 59–87.

Liao, C., Chen, J.-L., and Yen, D. C., 2007. Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-service: An integrated model. Computers in Human Behavior (23:6), pp. 2804–2822.

Ljungberg, F., and Sørensen, C., 1998. Are you "pulling the plug" or "pushing up the daisies"? Proceedings of the 31st Hawaii International Conference on System Sciences.

Ljungberg, F., and Sørensen, C., 2000. Overload: From transaction to interaction. Planet Internet, pp. 113–136.

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T., 2012. Online Social Networks as a Source and Symbol of Stress: An Empirical Analysis. Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL).

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T., 2014. Giving too much Social Support: Social Overload on Social Networking Sites. European Journal of Information Systems, forthcoming.

Manago, A. M., Taylor, T., and Greenfield, P. M., 2012. Me and my 400 friends: The anatomy of college students' Facebook networks, their communication patterns, and well-being. Developmental Psychology (48:2), pp. 369–380. doi: 10.1037/a0026338.

McElroy, J. C., Hendrickson, A. R., Townsend, A. M., and DeMarie, S. M., 2007. Dispositional Factors in Internet Use: Personality Versus Cognitive Style. MIS Quarterly (31:4), pp. 809–820.

Moore, J. E., 2000. One Road to Turnover. An Examination of Work Exhaustion in Technology Professionals. MIS Quarterly (24:1), pp. 141–168.

Morris, M. G., and Venkatesh, V., 2010. Job Characteristics and Job Satisfaction: Understanding the Role of Enterprise Resource Planning System Implementation. MIS Quarterly (34:1), pp. 143–161.

Oliver, R., 1977. Effect of Expectation and Disconfirmation on Postexposure Product Evaluations: An Alternative Interpretation. Journal of Applied Psychology (62:4), pp. 480–486.

Oliver, R., 1980. A Cognitive Model for the Antecedents and Consequences of Satisfaction. Journal of Marketing Research (17:4), pp. 460–469.

Oreg, S., 2003. Resistance to Change: Developing an Individual Differences Measure. Journal of Applied Psychology (88:4), pp. 680–693.

Oreg, S., Vakola, M., and Armenakis, A., 2011. Change Recipients' Reactions to Organizational Change: A 60-Year Review of Quantitative Studies. The Journal of Applied Behavioral Science (47:4), pp. 461-524.

Pempek, T. A., Yermolayeva, Y. A., and Calvert, S. L., 2009. College students' social networking experiences on Facebook. Journal of Applied Developmental Psychology (30:3), pp. 227–238.

Podsakoff, N. P., LePine, J., and Lepine, M. A., 2007. Differential Challenge Stressor–Hindrance Stressor Relationships With Job Attitudes, Turnover Intentions, Turnover, and Withdrawal Behavior: A Meta-Analysis. Journal of Applied Psychology (92:2), pp. 438–454.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., and Podsakoff, N. P., 2003. Common Method Biases in Behavioral Research: A Critical Review and Recommended Remedies. Journal of Applied Psychology (83:5), pp. 879–903.

Polites, G. L., and Karahanna, E., 2012. Shackled to the status quo: The inhibiting effects of incumbent system habit, switching costs, and inertia on new system acceptance. MIS Quarterly (36:1), pp. 21-42.

Posey, C., Lowry, P. B., Roberts, T. L., and Ellis, T. S., 2010. Proposing the online community self-disclosure model: the case of working professionals in France and the U.K. who use online communities. European Journal of Information Systems (19:2), pp. 181–195. doi: 10.1057/ejis.2010.15.

Powell, M., and Ansic, D., 1997. Gender differences in risk behaviour in financial decision-making: An experimental analysis. Journal of Economic Psychology (18:6), pp. 605–628.

Preacher, K. J., and Hayes, A. F., 2004. SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behavior Research Methods, Instruments, & Computers (36:4), pp. 717–731.

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., and Qiang, T., 2008. The Consequences of Technostress for End Users in Organizations: Conceptual Development and Empirical Validation. Information Systems Research (1:4), pp. 417–433.

Rammstedt, B., and John, O. P., 2007. Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. Journal of Research in Personality (41:1), pp. 203–212. doi: 10.1016/j.jrp.2006.02.001.

Riedl, R., 2013. On the Biology of Technostress: Literature Review and Research Agenda. The DATABASE for Advances in Information Systems (44:1), pp. 18–55.

Riedl, R., Kindermann, H., Auinger, A., and Javor, A., 2012. Technostress from a Neurobiological Perspective - System Breakdown Increases the Stress Hormone Cortisol in Computer Users. Business & Information Systems Engineering (4:2), pp. 61–69.

Ringle, C. M., Wende, S., and Will, A., 2005. SmartPLS, 2.0 (beta). University of Hamburg.

Roca, J., Chiu, C.-M., and Martínez, F., 2006. Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. International Journal of Human-Computer Studies (64:8), pp. 683–696.

Ryan, T., and Xenos, S., 2011. Who uses Facebook? An investigation into the relationship between the Big Five, shyness, narcissism, loneliness, and Facebook usage. Computers in Human Behavior (27:5), pp. 1658–1664. doi: 10.1016/j.chb.2011.02.004.

Samuelson, W., and Zeckhauser, R., 1988. Status quo bias in decision making. Journal of Risk and Uncertainty (1:1), pp. 7–59. doi: 10.1007/bf00055564.

Sheldon, P., 2008. The Relationship Between Unwillingness-to-Communicate and Students' Facebook Use. Journal of Media Psychology: Theories, Methods, and Applications (20:2), pp. 67–75. doi: 10.1027/1864-1105.20.2.67.

Shu, Q., Tu, Q., and Wang, K., 2011. The Impact of Computer Self-Efficacy and Technology Dependence on Computer-Related Technostress: A Social Cognitive Theory Perspective. International Journal of Human-Computer Interaction (27:10), pp. 923–939. doi: 10.1080/10447318.2011.555313.

Spector, P. E., 2006. Method Variance in Organizational Research: Truth or Urban Legend? Organizational Research Methods (9:2), pp. 221–232. doi: 10.1177/1094428105284955.

Sun, H., 2013. A longitudinal study of herd behavior in the adoption and continued use of technology. MIS Quarterly (4:37), pp. 1013–1041.

Tarafdar, M., Tu, Q., Ragu-Nathan, B., and Ragu-Nathan, T., 2007. The Impact of Technostress on Role Stress and Productivity. Journal of Management Information Systems (24:1), pp. 301–328. doi: 10.2753/MIS0742-1222240109.

Tarafdar, M., Tu, Q., and Ragu-Nathan, T. S., 2010. Impact of Technostress on End-User Satisfaction and Performance. Journal of Management Information Systems (27:3), pp. 303–334.

Tarafdar, M., Tu, Q., Ragu-Nathan, T. S., and Ragu-Nathan, B. S., 2011. Crossing to the Dark Side: Examining Creators, Outcomes, and Inhibitors of Technostress. Communications of the ACM (54:9), pp. 113–120.

Tow, W., Dell, P., and Venable, J., 2010. Understanding information disclosure behaviour in Australian Facebook users. Journal of Information Technology (25:2), pp. 126–136.

Tu, Q., Wang, K., and Shu, Q., 2005. Computer-related technostress in China. Communications of the ACM (48:4), p. 77. doi: 10.1145/1053291.1053323.

Turel, O., and Serenko, A., 2012. The benefits and dangers of enjoyment with social networking websites. European Journal of Information Systems (21:5), pp. 512–528. doi: 10.1057/ejis.2012.1.

Turel, O., Serenko, A., and Giles, P., 2011. Integrating Technology Addiction and Use: An Empirical Investigation of Online Auction Users. MIS Quarterly (35:4), pp. 1043–1061.

Venkatesh, V., and Morris, M. G., 2000. Why don't men ever stop to ask for directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behavior. MIS Quarterly (24:1), pp. 115–139.

Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D., 2003. User Acceptance of Information Technology: Toward a unified View. MIS Quarterly (27:3), pp. 425–478.

Wang, K., Shu, Q., and Tu, Q., 2008. Technostress under different organizational environments: An empirical investigation. Computers in Human Behavior (24:6), pp. 3002–3013.

Webb, T. L., and Sheeran, P., 2006. Does Changing Behavioral Intentions Engender Behavior Change? A Meta-Analysis of the Experimental Evidence. Psychological Bulletin (132:2), pp. 249–268. doi: 10.1037/0033-2909.132.2.249.

Williams, L. J., Edwards, J., and Vandenberg, R., 2003. Recent Advances in Causal Modeling Methods for Organizational and Management Research. Journal of Management (29:6), pp. 903–936.

Williams, M. D., Dwivedi, Y. K., Lal, B., and Schwarz, A., 2009. Contemporary trends and issues in IT adoption and diffusion research. Journal of Information Technology (24:1), pp. 1–10.

Wilson, R. E., Gosling, S. D., and Graham, L. T., 2012. A Review of Facebook Research in the Social Sciences. Perspective on Psychological Science (7:3), pp. 203–220.

Xu, C., Ryan, S., Prybutok, V., and Wen, C., 2012. It is not for fun: An examination of social network site usage. Information & Management (49:5), pp. 210–217. doi: 10.1016/j.im.2012.05.001.

Ye, C., Seo, D., Desouza, K. C., Sangareddy, S. P., and Jha, S., 2008. Influences of IT substitutes and user experience on post-adoption user switching: An empirical investigation. Journal of the American Society for Information Science and Technology (59:13), pp. 2115–2132. doi: 10.1002/asi.20921.

12 APPENDIX

12.1 PRIOR RESEARCH IN THE FIELD OF TECHNOSTRESS

The following table includes the main articles published in the research domain of technostress.

Article	Research context	Antecedents*	Techno-stressors	Psychological and behavioral strain*	Controls
Tu et al. 2005	Organi-zation		Overload, Invasion, Complexity, Insecurity, Uncertainty	Productivity	Age, Computer literacy, Task complexity, Reward
Tarafdar et al. 2007	Organi-zation		Overload, Invasion, Complexity, Insecurity, Uncertainty	Productivity, Role stress (Role conflict, Role overload)	
Ragu-Nathan et al. 2008	Organi-zation	Individual characteristics (Age, Gender, Education, Computer confidence)	Overload, Invasion, Complexity, Insecurity, Uncertainty	Job satisfaction, Organizational commitment⓪, Continuance commitment⓪	Inhibiting mechanisms
Wang et al. 2008	Organi-zation	Individual characteristics (Age, Gender, Education), Organizational characteristics (Centralization, Innovation)	Overload, Invasion, Complexity, Insecurity, Uncertainty		
Tarafdar et al. 2010	Organi-zation	Organizational characteristics (Innovation Support⓪,Involvement Facilitation)	Overload, Invasion, Complexity, Insecurity, Uncertainty	End-user satisfaction, End-user performance	
Ayyagari et al. 2011	Organi-zation	Technology characteristics (usability features, dynamic features, intrusive features)	Work-home conflict, Invasion of privacy, Work overload, Role ambiguity, Job insecurity	Emotional exhaustion	Technology usage, Negative affectivity
Tarafdar et al. 2011	Organi-zation	Individual characteristics (Age, Gender, Education, Computer efficacy and confidence, Experience using computers), Inhibiting mechanisms (Technical support provision, Technology involvement facilitation, Innovation support)	Overload, Invasion, Complexity, Insecurity, Uncertainty	Job satisfaction, Organizational commitment, Role conflict, Role overload, Employee innovation, Employee productivity, End-user satisfaction	
Shu et al. 2011	Organi-zation	Organizational characteristics (Technology dependency), Individual characteristics (Computer self-efficacy)	Overload, Invasion, Complexity, Insecurity, Uncertainty		Age, Gender, Education
Riedl et al. 2012	Organi-zation		System breakdown	Stress hormone cortisol	
Maier et al. 2012	Private		Invasion, Complexity, Uncertainty, Pattern, Disclosure	Satisfaction, Continuous usage intention	Attitudinal beliefs (Utilitarian outcomes, Hedonic outcomes, Social outcomes), Normative beliefs (Social Influence), Control beliefs (Perceived difficulty of use), Disconfirmation
Maier et al. 2014	Private	Individual characteristics (Age, Gender), Usage characteristics (Extent of usage, Number of virtual friends), Relationship characteristics (Type, Subjective social support norm)	Social overload	Exhaustion, Satisfaction, Discontinuous usage intention	

*: ⓪ means that an indirect effect from the antecedent variable on the techno-stressor or from the techno-stressor to the strain variable is studied, but not a direct effect.

Table 10: Technostress review in IS research

12.2 DEFINITIONS

Construct	Definition	References
Complexity	Reflects a negative perception that SNS/technological alternatives are difficult to handle.	Ragu-Nathan et al., 2008; Maier et al., 2012
Uncertainty	Reflects a negative perception that SNS/technological alternatives are constantly changed and updated.	
Invasion	Reflects a negative perception that SNS/technological alternatives becomes a central part in and invades daily life.	
Information Overload	Reflects a negative perception of SNS usage when a user receives more information in SNS from virtual friends than desired.	Jones et al., 2004
Communication overload	Reflects a negative perception of SNS usage when a user is involved in more interactions in SNS with virtual friends than desired.	Ljungberg and Sørensen, 2000
Social overload	Reflects a negative perception of SNS usage when users receive too many social support requests and feel they are giving too much social support to other individuals in their virtual social network.	Maier et al., 2014
Transition costs	Includes the time and effort required to adapt to a new situation.	Polites and Karahanna, 2012
Sunk costs	Reflects an individual's reluctance to "cut their losses," and a tendency to justify previous commitments to a course of action by making subsequent commitments.	
Replacement overload	Reflects a negative perception when an individual has to use too many different (non-)technological alternatives to replace the functionalities of a certain technology.	Self-developed
Information underload	Reflects a negative perception when an individual receives less information than desired.	
Communication underload	Reflects a negative perception when an individual is involved in less interactions than desired.	
Social exclusion	Reflects a negative perception when the number of social contacts becomes low and one has the sense of not being well-embedded in the social network.	
Boredom	Reflects that an individual has nothing to do and does not know what to do with oneself.	
Techno-exhaustion	Reflects an individual's psychological response to stressors caused by using a technology	Ayyagari et al., 2011; Cooper et al., 2001
Switching-exhaustion	Reflects an individual's psychological response to switching-induced stressors	
Alternative-exhaustion	Reflects an individual's psychological response to stressors caused by using alternatives	
Intention to change	Reflects an individual's intention to change his/her behavior by no longer using a technology and by using alternatives instead.	Curran and Meuter, 2007
Behavior change	Reflects if an individuals has changed his/her behavior by not longer using a technology and by using alternatives instead.	

Table 11: Definitions of central concepts

12.3 DEMOGRAPHICS OF PARTICIPANTS OF INTERVIEWS AND DIARY METHOD

	Interview		Diary entry	
Gender	52% female, 48% male		34% female, 66% male	
Age (mean 25.4; mean 25.8)	<20	10.8%	<20	8.3%
	20-29	70.3%	20-29	66.7%
	30-39	16.2%	30-39	16.7%
	>39	2.7%	>39	8.3%
Number of friends in SNS (mean 300; mean 245)	<100	8.1%	<100	8.3%
	100-199	29.7%	100-199	33.3%
	200-299	24.3%	200-299	25.0%
	300-399	18.9%	300-399	16.7%
	400-499	10.8%	400-499	8.3%
	>499	8.1%	>499	8.3%

Table 12: Characteristics of individuals participating in interviews and diary method

12.4 SELECTED QUOTATIONS FROM INTERVIEWS AND DIARY ENTRIES

#	Quotation	Classification*			
		IU	CU	SE	B
1	"Since I am not using Facebook at the moment, I have extra free time every day, which I cannot kill. As a result, I fall into a kind of boredom, which I cannot manage. And this is excruciating."				x
2	"I used to use Facebook on my Smartphone frequently on the toilet – but now I have no idea what to do there."				x
3	"Not using Facebook has made some parts of my day just boring."				x
4	"For me, Facebook is a tool to kill time but this is not possible at the moment so that I tried to use other things, such as launching my own blog, to pass time but as I cannot chat a little with my friends, I always think 'Aw man' and it is just boring."				x
5	"When I am bored I frequently go to Facebook to read posted messages, but now I notice that I have no password to log in."	x			x
6	"For example, I was at home on the weekend and had nothing to do. In such situations I sit in front of my laptop and I think to myself 'There is actually nothing at all I can do, so why am I sitting at my laptop?' So you see that Facebook is my main use of the Internet and that's similar for many of my friends. So it's just: Facebook, Facebook, Facebook! But being excluded and not being part of the circus is kind of funny; or even frustrating."			x	x
7	"My cousin is expecting a child and he posted it on Facebook, as I have heard from my uncle. But since I have no access to the platform I didn't know until my family told me some days later via WhatsApp. … Though it is fine to get this information from his relatives, it concerns me that I have not heard about other things."	x			
8	"Something really stupid happened to me last Saturday. I met a really sweet girl, we got along really well, but then she asks for my Facebook name instead of my phone number because she doesn't have a smartphone at the moment. I felt excluded and feared that I would never see her again."		x	x	
9	"I think in a week I will be happy that I have [Facebook] again because you are simply isolated when you don't have it. For example, when you get to know people, lots of them just ask for your Facebook and add you as friend."			x	
10	"If I knew now that Facebook does not exist anymore, that would be okay for me, because I know nobody can use it, but now I am the only one who is isolated from everybody. […] I sense extremely that you are simply ignored by others [if you don't have Facebook], you just fall into oblivion."			x	
11	"It is just a feeling like the world keeps turning but I am not part of this world, because some of my friends have surely posted something in Facebook and I cannot join and do not know anything. … In addition, I missed the opportunity to predrink, because my friends coordinated this in a group on Facebook."	x		x	

12	"I have the feeling that I have vanished into thin air just because I do not use [Facebook] at the moment."			x	
13	"The exclusion makes itself felt in two ways: I cannot join conversations with friends about current news posted on Facebook and I am informed about things just before the end."	x	x	x	
14	"I did not get what others post in groups, so that I already feel partially excluded, even though we could communicate through other channels."	x	x	x	
15	"The group function on Facebook is really nice. We have an own group for our football club and the whole team is part of this group to share information and coordinate everything. Then, last Saturday, I drove home to play football and I was surprised that we have a new coach. I was flabbergasted that the coach was fired the week before and missed this because it was only discussed in our Facebook group. Although I took this situation with humor, I was annoyed that I was not using Facebook at that time."	x	x		
16	"So I will not miss out on important information. Somehow I get them, but in a relatively cumbersome manner and too late, with many sidetrips and detours."	x			
17	"In Facebook I'm just friends with foreigners and now the amount of information sent and received has been reduced to a minimum. In sum, I think that the quantity of received information decreased and with it the quality as well."	x	x		
18	"So now the time here in Malta [as semester abroad], my biggest problem is in university, because a lot, if not all, information will be exchanged via Facebook. Information about classes is posted to Facebook and also group work is coordinated there, because no one uses email, Dropbox or anything. I also have a lecture in which notes are distributed solely via Facebook."	x			
19	"Although a lot of meaningless information is posted to Facebook, I am particularly stressed because I also miss some key information that others have since told me."	x			
20	"A negative thing for me personally is that I can no longer stalk my ex-girlfriend; Of course it is a disadvantage that this is not possible at the moment because can't see whether she is celebrating again or whatever."	x			
21	"One of my friends was not able to contact me, but as she knows that I am not using Facebook at the moment, so she wrote me a letter instead of a message on Facebook. Although this is very beautiful and surprising, it will now take some days until she gets the answers to her questions."		x		
22	"Though I used a lot of alternative for maintaining communication quantity, I frequently use Facebook to chat while doing something else. I miss these conversations a lot."		x		
23	"The accessibility of distant contacts has declined. As I have no phone number, email etc. I have no possibility to communicate with them so I would say the quality and quantity of communication has gotten worse. It is a strange negative feeling to lose this fictitious connectivity."		x		
24	"My communication with foreigners has been placed on hold, which makes me sad and quite unhappy."		x		
25	"Communication has gotten less intense because I used to communicate a lot via Facebook as it is more comfortable and faster than via smartphone."		x		
26	"The number of people I communicate with has decreased."		x		
27	"Facebook is quite handy to communicate with a group of friends. Using email to do that is a little more complicated."		x		
28	"The volume of my communication has decreased because I have to pay money to use alternatives such as SMS or meeting at a café."		x		
29	"So I have a friend who currently doesn't have a phone, so we were only talking on Facebook. Of course that is very unfavorable at the moment."		x		
30	"One is simply more informed [when using Facebook] … and now gathering all this information about alternatives and communicating in different ways is sometimes really awkward."	x	x		
31	"One adverse aspect in not using Facebook is that I have to use outmoded communication mediums, such as SMS or phone, to stay in contact with friends without smartphones and this is a great reduction in comfort levels."		x		
32	"Today, I wanted to ask another fellow student for the homework for tomorrow morning. I could have done this in a matter of seconds using Facebook. However, I could not bring myself to write an e-mail and wait for an answer, so I skipped it."		x		
33	"Although there are some alternatives to Facebook for chatting, communicating and so on, you are restricted and it is somehow awkward."		x		

34	"Some days ago, I always used my smartphone to bridge a few minutes while I had nothing to do. I guess these are the minutes in which others light a cigarette or big coffee drinkers have a coffee. Since I am neither a smoker nor a big coffee drinker, I would probably use these minutes for a short visit to Facebook. Now, it seems that I do not know what I should do in these small gaps."				x
35	"Only one thing for which I have found no alternative: My friend and I are vegans and active members of a regional group named "Vegetarian Society of Bamberg. Almost all information on projects, events and meetings are exchanged via Facebook. Without Facebook, it is not easy to stay in touch with the Bamberger vegan community and that is a shame. "	x	x		
36	"The almost obsessive feeling to check Facebook several times a day annoys me incredibly. It almost seems that this dictates my daily routine. For example, it seems that I have to check Facebook for new information regularly and chat with so-called friends. So I would say that I am really stressed by all of the responsibilities that stem from using Facebook."	Different sources of strain			
37	"Since I use Facebook in my spare time, I actually claim that it gives me pleasure. But in reality, using it frequently stresses me."				
38	"So, I feel responsible to a degree that my friends can stay in contact when I do not use Facebook. Hence I have to make some preparations, such as using alternatives that I have not used before, such as WhatsApp. I have to enter all my contacts, and this is a change that requires extra effort. However since I currently have no time for such additional effort, this annoys me tremendously."				
39	"The use of alternative technologies is one thing. That works out somehow. But all the changes brought about by the move from Facebook to alternatives is annoying. For example, I only know through Facebook when a friend has birthday. I have everything set up so nice on my calendar on my phone, but this has all been wasted effort. I must now organize them differently because it's important to me that I congratulate my friends."				
40	"Although there are various ways to do without Facebook, they annoy me because my social life and my free time have been turned upside down, and indeed in a negative way."				
41	"Currently, I am very stressed about using WhatsApp since I am always available. Now, others write me many more messages and expect me to write back immediately. [One day later, the participant wrote:] Today I am again strongly stressed by using WhatsApp because the light on my phone is almost constantly on."				
*: IU = Information underload, CU = Communication underload, SE = Social exclusion, B = Boredom					

Table 13: Quotations from interviews and diary entries

12.5 MEASUREMENT ITEMS

Construct	Items	Wording	Loadings
Complexity (Tec)	CompTec1	I need a long time to understand and use Facebook.	0.820
	CompTec2	I do not find enough time to upgrade my technology skills to use Facebook.	0.731
	CompTec3	Younger people are better at using Facebook than I am.	0.708
	CompTec4	I often find Facebook too complex to use.	0.914
Uncertainty (Tec)	UncTec1	There are always new terms and conditions on Facebook.	0.828
	UncTec2	There are constant changes in Facebook apps.	0.867
	UncTec3	Overall, there are constant changes of Facebook.	0.917
Invasion (Tec)	InvTec1	I am too much in touch with my Facebook friends over Facebook even during my vacation.	0.943
	InvTec2	I feel my personal life is being invaded by Facebook.	0.933
Information overload	InfO1	There is more information on Facebook than I can digest.	0.809
	InfO2	The information on Facebook overextend me.	0.868
	InfO3	It is difficult for me to focus on the essential information on Facebook.	0.882
	InfO4	The amount of information on Facebook makes me overlook important information.	0.879
	InfO5	I am faced with too much irrelevant information on Facebook.	0.785
	InfO6	I receive too much information on Facebook.	0.786

Communication overload	ComO1	I receive more messages (chat, private messages), notifications and announcements (timeline, news-feed) on Facebook than I can respond to.	0.845
	ComO2	I am overextended from the messages (chat, private messages), notifications and announcements (timeline, news-feed) I receive on Facebook.	0.891
	ComO3	The amount of trivial communication on Facebook is too high.	0.761
	ComO4	I forget to respond to messages (chat, private messages), notifications and announcements (timeline, news-feed) on Facebook.	0.824
	ComO5	I receive too many messages (chat, private messages), notifications and announcements (timeline, news-feed) on Facebook.	0.746
Social overload	SO1	I take too much care of my friends' well being on Facebook.	0.865
	SO2	I deal too much with my friends' problems on Facebook.	0.938
	SO3	My sense of being responsible for how much fun my friends have on Facebook is too strong.	0.918
	SO4	I am too often caring for my friends on Facebook.	0.894
	SO5	I pay too much attention to posts of my friends on Facebook.	0.866
	SO6	I congratulate Facebook-friends as a consequence of the birthday reminder, although I would not congratulate them in real life.	0.713
Techno-exhaustion	TExhaustion1	I feel drained from activities that require me to use Facebook.	0.823
	TExhaustion2	I feel tired from my Facebook activities.	0.858
	TExhaustion3	Using Facebook is a strain for me.	0.870
	TExhaustion4	I feel burned out from my Facebook activities.	0.746
Sunk costs	SCost1	I have already invested a lot of time and effort to set up Facebook on my needs and preferences, so that I only see relevant information.	0.911
	SCost2	I have already invested a lot of time and effort to personalize my profile in Facebook.	0.950
	SCost3	I have already invested a lot of time and effort to convey a positive image of me via Facebook.	0.919
	SCost4	I have already invested a lot of time and effort to cultivate friendships via Facebook.	0.846
Transition costs	TCost1	It takes much time to maintain the extent of my information exchange with my social environment about other alternatives than Facebook.	0.789
	TCost2	It takes much time to maintain the extent of my communication with my social environment about other alternatives than Facebook.	0.915
	TCost3	Overall, it takes much time to maintain the established extent of socializing with my social environment.	0.825
	TCost4	Replacing Facebook by one or more alternatives is easy for me.	0.877
Switching-exhaustion	SExhaustion1	Switching from Facebook to one or more alternatives stresses me out.	0.924
	SExhaustion2	I feel tired by switching from Facebook to one or more alternatives.	0.903
	SExhaustion3	Switching from Facebook to one or more alternatives is a strain for me.	0.941
	SExhaustion4	I feel burned out from activities required while switching from using Facebook to one or more alternatives.	0.952
Replacement overload	RepO1	I have to use too many different alternatives in order to interact in the usual extent with my social environment.	0.936
	RepO2	I have to use too many different alternatives in order to stay in touch with my social environment.	0.930
	RepO3	I have to use too many different alternatives in order to get information from my social environment.	0.902
	RepO4	I have to use too many different alternatives in order to forward information to my social environment.	0.905

Complexity (Alt)	CompAlt1	I need a long time to understand and use the technological alternatives to Facebook.	0.961
	CompAlt2	I do not find enough time to upgrade my technology skills to use the technological alternatives to Facebook.	0.913
	CompAlt3	Younger people are better at using the technological alternatives to Facebook than I am.	0.824
	CompAlt4	I often find the technological alternatives to Facebook too complex to use.	0.953
Uncertainty (Alt)	UncAlt1	There are always new terms and conditions on the technological alternatives to Facebook.	0.845
	UncAlt2	There are constant changes in the technological alternatives to Facebook apps.	0.993
	UncAlt3	Overall, there are constant changes of the technological alternatives to Facebook.	0.880
Invasion (Alt)	InvAlt1	I am in touch with my the technological alternatives to Facebook friends over the technological alternatives to Facebook even during my vacation.	0.862
	InvAlt2	I feel my personal life is being invaded by the technological alternatives to Facebook.	0.880
Information underload	InfU1	The non-usage of Facebook has led to the fact that I do not notice all the news from my social environment.	0.859
	InfU2	The non-usage of Facebook has led to the fact that I get too less information.	0.903
	InfU3	The non-usage of Facebook has led to the fact that I miss important news.	0.929
	InfU4	The non-usage of Facebook has led to the fact that I miss important information.	0.888
	InfU5	The non-usage of Facebook has led to the fact that I do not get enough information.	0.815
	InfU6	The non-usage of Facebook has led to the fact that the variety of information declines.	0.846
Communication underload	ComU1	The non-usage of Facebook has led to the fact that I communicate too less with my social environment.	0.845
	ComU2	The non-usage of Facebook has led to the fact that desired talks/conversations can no longer take place at any time.	0.832
	ComU3	The non-usage of Facebook has led to the fact that I have to communicate too often at inappropriate times with my social environment.	0.818
	ComU4	The non-usage of Facebook has led to the fact that I communicate with less individuals than I want to.	0.830
	ComU5	The non-usage of Facebook has led to the fact that I communicate with too few individuals.	0.889
	ComU6	Overall, the-non usage of Facebook has led to the fact that the communication deteriorates between me and my social environment.	0.850
	ComU7	Overall, the-non usage of Facebook has led to the fact that I communicate fewer than I want to with my social environment.	0.890
Social exclusion	SExcl1	The non-usage of Facebook has led to the fact that I feel socially excluded.	0.968
	SExcl2	The non-usage of Facebook has led to the fact that I feel lonely.	0.959
	SExcl3	The non-usage of Facebook has led to the fact that I feel let out socially.	0.972
Boredom	Bor1	Because I do not use Facebook, I sometimes feel bored.	0.888
	Bor2	Because I do not use Facebook, I do not know from time to time what to do with the additional time.	0.923
	Bor3	Because I do not use Facebook, my life is uneventfully.	0.902
	Bor4	Because I do not use Facebook, my life is sometimes too deserted.	0.930
	Bor5	Overall, the non-usage of Facebook has contributed to the fact that I feel from time to time bored.	0.922

Alternative-exhaustion	AExhaustion1	I feel drained from activities that require me to use alternatives.	0.958
	AExhaustion2	I feel tired from activities associated with using alternatives.	0.856
	AExhaustion3	Using alternatives is a strain for me.	0.938
	AExhaustion4	I feel burned out from using alternatives.	0.875
Social influence	SI1	My social environment thinks that I should use Facebook.	0.829
	SI2	My social environment expects me to use Facebook.	0.923
	SI3	People, who are important to me, think that I should use Facebook.	0.894
	SI4	People, who are important to me, expect me to use Facebook.	0.910
Perceived enjoyment	PE1	Using Facebook is enjoyable.	0.798
	PE2	Using Facebook is pleasurable.	0.862
	PE3	Using Facebook is fun.	0.921
	PE4	Using Facebook is exciting.	0.769
	PE5	Using Facebook is interesting.	0.897
Perceived usefulness	PU1	Using Facebook is useful to stay in contact with friends.	0.846
	PU2	Using Facebook is useful to communicate with friends.	0.839
	PU3	Overall, using Facebook is useful.	0.813
Imitating others	IO1	It seems that Facebook is the dominant social networking site; therefore, I would like to use it as well.	0.755
	IO2	I follow others in accepting Facebook.	0.886
	IO3	I would choose to accept Facebook because many other people are already using it.	0.788
Satisfaction	SAT1	I am pleased with my use of Facebook	0.744
	SAT2	I am contented with my use of Facebook.	0.825
	SAT3	I am delighted with my use of Facebook.	0.872
	SAT4	I am satisfied with my use of Facebook.	0.794
	SAT5	Overall, I have a positive opinion about Facebook.	0.817
Intention to change	CInt1	I prefer using alternatives instead of Facebook.	0.978
	CInt2	In the future, I prefer to use alternatives instead of Facebook.	0.968
	CInt3	I prefer to use alternatives instead of continue using Facebook.	0.966
Dispositional resistance to change	DRTC1	I generally consider changes to be a negative thing.	0.883
	DRTC2	I like to do the same old things rather than try new and different ones.	0.931
	DRTC3	I'd rather be bored than surprised.	0.839
	DRTC4	If I were to be informed that there's going to be a significant change regarding the way things are done at work, I would probably feel stressed.	0.764
	DRTC5	When I am informed of a change of plans, I tense up a bit.	0.757
	DRTC6	When things don't go according to plans, it stresses me out.	0.772
	DRTC7	If my boss changed the criteria for evaluating employees, it would probably make me feel uncomfortable even if I thought I'd do just as well without having to do any extra work.	0.814
	DRTC8	Changing plans seems like a real hassle to me.	0.740
	DRTC9	Often, I feel a bit uncomfortable even about changes that may potentially improve my life.	0.817
	DRTC10	When someone pressures me to change something, I tend to resist it even if I think the change may ultimately benefit me.	0.777
	DRTC11	I sometimes find myself avoiding changes that I know will be good for me.	0.818
	DRTC12	I often change my mind.	0.852
	DRTC13	Once I've come to a conclusion, I'm not likely to change my mind.	0.947
	DRTC14	I don't change my mind easily.	0.843
	DRTC15	My views are very consistent over time.	0.865

Neuroticism	Neuro1	I see myself as someone who is relaxed, handles stress well.	0.977
	Neuro2	I see myself as someone who gets nervous easily.	0.769
Extraversion	Extra1	I see myself as someone who is reserved.	0.902
	Extra2	I see myself as someone who is outgoing, sociable.	0.942
Behavior change	CBeh1	I use one or more alternatives instead of Facebook.	0.918
	CBeh2	I use the alternatives I have used for 2 weeks during the experiment instead of Facebook.	0.880
	CBeh3	I use Facebook's over other alternatives. (*reverse*)	0.944
	CBeh4	I use Facebook rather than one or more alternatives. (*reverse*)	0.938

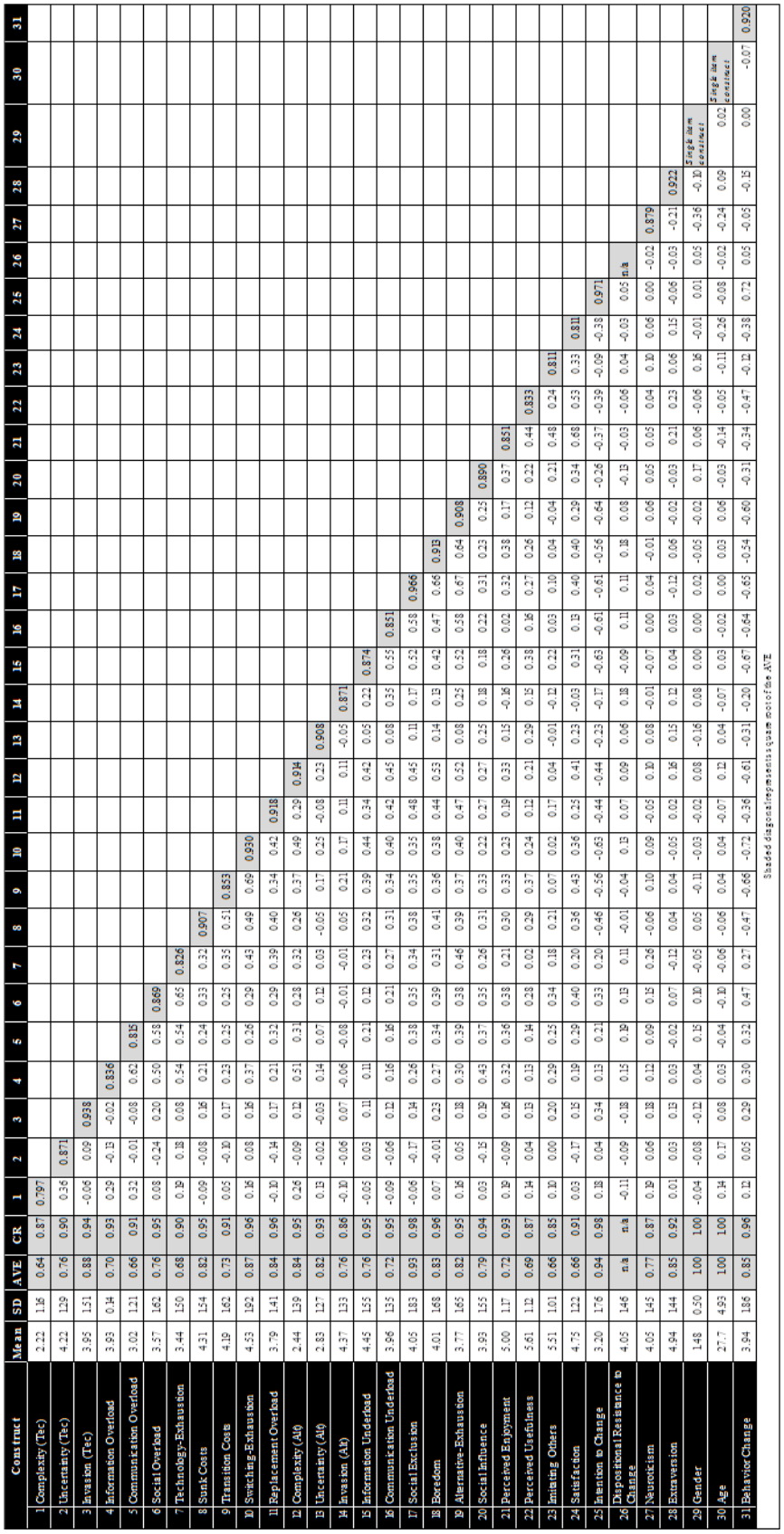
Table 14: Measures

12.6 VALIDATION OF THE SECOND-ORDER AGGREGATE CONSTRUCT RESISTANCE TO CHANGE

Construct	Dimension	Weight
Dispositional resistance to change	Routine seeking	0.331***
	Emotional reaction	0.372***
	Short-term thinking	0.424***
	Cognitive rigidity	0.280**

Table 15: Weights for aggregate constructs

12.7 MODEL VALIDATION



Construct	Mean	SD	AVE	CR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1 Complexity (Tec)	2.22	1.16	0.64	0.87	0.797																														
2 Uncertainty (Tec)	4.22	1.29	0.76	0.90	0.36	0.871																													
3 Invasion (Tec)	3.95	1.51	0.88	0.94	-0.06	0.09	0.938																												
4 Information Overload	3.93	1.14	0.70	0.93	0.29	-0.15	-0.02	0.836																											
5 Communication Overload	3.02	1.21	0.66	0.91	0.32	-0.01	-0.08	0.62	0.815																										
6 Social Overload	3.57	1.62	0.76	0.95	0.08	-0.24	0.20	0.50	0.58	0.869																									
7 Technology-Exhaustion	3.44	1.50	0.68	0.90	0.18	0.18	0.08	0.54	0.54	0.65	0.826																								
8 Sunk Costs	4.31	1.54	0.82	0.95	-0.09	-0.08	0.16	0.21	0.24	0.33	0.32	0.907																							
9 Transition Costs	4.19	1.62	0.73	0.91	0.05	-0.10	0.17	0.23	0.25	0.25	0.35	0.51	0.853																						
10 Switching-Exhaustion	4.53	1.92	0.87	0.96	0.16	0.08	0.16	0.37	0.26	0.29	0.43	0.49	0.69	0.930																					
11 Replacement Overload	3.79	1.41	0.84	0.96	-0.10	-0.14	0.17	0.21	0.32	0.29	0.39	0.40	0.34	0.42	0.918																				
12 Complexity (Att)	2.44	1.39	0.84	0.95	0.26	-0.09	0.12	0.51	0.31	0.28	0.32	0.26	0.37	0.49	0.29	0.934																			
13 Uncertainty (Att)	2.83	1.27	0.82	0.93	0.13	-0.02	-0.03	0.14	0.07	0.12	0.03	-0.05	0.17	0.25	-0.08	0.23	0.908																		
14 Invasion (Att)	4.37	1.33	0.76	0.86	-0.10	-0.06	0.07	-0.06	-0.08	-0.01	-0.01	0.05	0.21	0.17	0.11	0.11	-0.05	0.871																	
15 Information Underload	4.45	1.55	0.76	0.95	-0.05	0.03	0.11	0.11	0.21	0.12	0.23	0.32	0.39	0.44	0.34	0.42	0.05	0.22	0.874																
16 Communication Underload	3.96	1.35	0.72	0.95	-0.09	-0.06	0.12	0.16	0.16	0.21	0.27	0.31	0.34	0.40	0.42	0.45	0.08	0.35	0.55	0.851															
17 Social Exclusion	4.05	1.83	0.93	0.98	-0.06	-0.17	0.14	0.26	0.38	0.35	0.34	0.38	0.35	0.35	0.48	0.45	0.11	0.17	0.52	0.58	0.966														
18 Boredom	4.01	1.68	0.83	0.96	0.07	-0.01	0.23	0.27	0.34	0.39	0.31	0.41	0.36	0.38	0.44	0.53	0.14	0.13	0.42	0.47	0.66	0.913													
19 Alternative-Exhaustion	3.77	1.65	0.82	0.95	0.16	0.05	0.18	0.30	0.39	0.38	0.46	0.39	0.37	0.40	0.47	0.52	0.08	0.25	0.52	0.58	0.67	0.64	0.908												
20 Social Influence	3.93	1.55	0.79	0.94	0.03	-0.15	0.19	0.43	0.37	0.35	0.26	0.31	0.33	0.22	0.27	0.27	0.25	0.18	0.18	0.22	0.31	0.23	0.25	0.890											
21 Perceived Enjoyment	5.00	1.17	0.72	0.93	0.19	-0.09	0.16	0.32	0.36	0.38	0.21	0.30	0.33	0.23	0.19	0.33	0.15	-0.16	0.26	0.02	0.32	0.38	0.17	0.37	0.851										
22 Perceived Usefulness	5.61	1.12	0.69	0.87	0.14	0.04	0.15	0.13	0.14	0.28	0.02	0.29	0.37	0.24	0.12	0.21	0.29	0.15	0.38	0.16	0.27	0.26	0.12	0.22	0.44	0.833									
23 Imitating Others	5.51	1.01	0.66	0.85	0.10	0.00	0.20	0.29	0.25	0.34	0.18	0.21	0.07	0.02	0.17	0.04	-0.01	-0.12	0.22	0.03	0.10	0.04	-0.04	0.21	0.48	0.24	0.811								
24 Satisfaction	4.75	1.22	0.66	0.91	0.03	-0.17	0.15	0.19	0.29	0.40	0.20	0.36	0.43	0.36	0.25	0.41	0.23	-0.03	0.31	0.15	0.46	0.40	0.29	0.34	0.68	0.53	0.33	0.811							
25 Intention to Change	3.20	1.76	0.94	0.98	0.18	0.04	0.34	0.13	0.21	0.33	0.20	-0.46	-0.56	-0.63	-0.44	-0.44	-0.23	-0.17	-0.63	-0.61	-0.61	-0.56	-0.64	-0.26	-0.37	-0.39	-0.09	-0.38	0.971						
26 Dispositional Resistance to Change	4.05	1.46	n.a	n.a	-0.11	-0.09	-0.18	0.15	0.19	0.13	0.11	-0.01	-0.04	0.13	0.07	0.09	0.06	0.18	-0.09	0.11	0.11	0.18	0.08	-0.13	-0.03	-0.06	0.04	-0.03	0.05	n.a					
27 Neuroticism	4.05	1.45	0.77	0.87	0.19	0.06	0.18	0.12	0.09	0.15	0.26	-0.06	0.10	0.09	-0.05	0.10	0.08	-0.01	-0.07	0.00	0.04	-0.01	0.06	0.05	0.05	0.04	0.10	0.06	0.00	-0.02	0.879				
28 Extraversion	4.94	1.44	0.85	0.92	0.01	0.03	0.13	0.03	-0.02	0.07	-0.12	0.04	0.04	-0.05	0.02	0.16	0.15	0.12	0.04	0.03	-0.12	0.06	-0.02	-0.03	0.21	0.23	0.06	0.15	-0.06	-0.03	-0.21	0.922			
29 Gender	1.48	0.50	100	100	-0.04	-0.08	-0.12	0.04	0.15	0.10	-0.05	0.05	-0.11	-0.03	-0.02	0.08	-0.16	0.08	0.00	0.00	0.02	-0.05	-0.02	0.17	0.06	-0.06	0.16	-0.01	0.01	0.05	-0.36	-0.10	Single item construct		
30 Age	27.7	4.93	100	100	0.14	0.17	0.08	0.03	-0.04	-0.10	-0.06	-0.06	0.04	0.04	-0.07	0.12	0.04	-0.07	0.03	-0.02	0.00	0.03	0.06	-0.03	-0.14	-0.05	-0.11	-0.26	-0.08	-0.02	-0.24	0.09	0.02	Single item construct	
31 Behavior Change	3.94	1.86	0.85	0.96	0.12	0.05	0.29	0.30	0.32	0.47	0.27	-0.47	-0.66	-0.72	-0.36	-0.61	-0.31	-0.20	-0.67	-0.64	-0.65	-0.54	-0.60	-0.31	-0.34	-0.47	-0.13	-0.38	0.72	0.05	-0.05	-0.15	0.00	-0.07	0.920

Shaded diagonal represents square root of the AVE

Table 16: Measurement model validation and bivariate correlation coefficients

3.

Chapter III

Technostress and user addiction

Paper VII

THE DUALITY OF THE NEGATIVE SIDE OF SOCIAL NETWORKING SITES:

THEORIZING EXHAUSTION AND ADDICTION AS OPPOSING FACTORS INFLUENCING IT NON-USAGE

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THE DUALITY OF THE NEGATIVE SIDE OF SOCIAL NETWORKING SITES:

THEORIZING EXHAUSTION AND ADDICTION AS OPPOSING FACTORS INFLUENCING IT NON-USAGE

Abstract

This paper analyzes the positive and negative side of social networking sites (SNS) on the behavior of SNS users. Therefore, we focus initially on the formation of discontinuous usage intentions by theorizing techno-exhaustion, addiction, and satisfaction as direct influencing factors that enable and/or inhibit them. Secondly, we theorize that addiction moderates whether users transfer discontinuous usage intentions into non-usage behavior. To validate the subsequent research model we conduct two surveys with 490 SNS users. The results validate the moderation effect of addiction and the influence of addiction on discontinuous usage intention. Furthermore, the results reveal that techno-exhaustion causes dissatisfaction and discontinuous usage intentions. These results reveal the duality of the negative side of SNS, as on the one side techno-exhaustion inhibits technology usage and on the other side addiction amplifies it.

Keywords: Addiction, Satisfaction, Strain, Discontinuous usage intention, Non-usage behavior, Intention-behavior gap

1 INTRODUCTION

The popularity of social networking sites (SNS) has generated a stream of research on the different effects that SNS might have on an individual user (Wilson et al., 2012). From a positive side using SNS provide both pleasure (Turel and Serenko, 2012) and benefits (Xu et al., 2012). However, it has also a negative side as an increasing number of users become addicted (Turel and Serenko, 2012) and feel stressed (Maier et al., 2012). So there are positive and negative factors influencing whether individuals continuously use SNS such as Facebook. In contrast to mandatory IT usage in organizations, which also has negative and positive effects, the decision to use Facebook continuously is voluntary. Thus, perceiving such a negative side of SNS should make a user think about not using it anymore, which one could not do when perceiving the negative side of a mandatory technology. So the question arises, do users really stop using a technology because of its negative side? An answer to this question can only be provided in a voluntary usage context, where users are free to decide whether to stop or to continue using a technology.

Through a lens of post-acceptance theory (e.g., Lankton and McKnight, 2012), one would expect that the positive side should always foster continuous usage, whereas the negative side of IT usage foster discontinuous usage (Cenfetelli and Schwarz, 2011). However, when focusing on the negative side in detail, one might argue that stress causes users to stop using SNS (Maier et al., 2012), but addiction distorts perceptual beliefs (Turel et al., 2011) and hence fosters the effect that individuals have no intention to stop using SNS. Therefore, the negative side might have a diverse effect. As a consequence this research theorizes the impact of both the positive and the diverse impacts of the negative side of SNS usage on post-acceptance behavior, and aims to respond to the following research question:

What is the influence of the positive and negative side of SNS on whether individuals use SNS continuously or stop using it?

To respond to this research question, we set up a research design with two surveys within a period of six months. Results of this article are based on 490 individuals and indicate that SNS users who register exhaustion are less satisfied and develop discontinuous usage intentions. Moreover, addiction distorts discontinuous usage intentions, so that addicts do not intend to discontinue using a technology. Notably, results of binary regression analysis show that addiction moderates the influence of discontinuous usage intention on non-usage behavior in a way that addicts have higher thresholds beyond the point that discontinuous usage intentions are transferred in non-usage behavior compared to non-addicts.

We structure the article as follows. In the next section we explain the research background of the positive and negative side of SNS usage. Afterwards we develop the hypotheses by basing them on theories and findings from post-acceptance, technostress, and user addiction research. Then we explain our research methodology and provide research results by using partial least squares methods and regression analysis. Finally the results are discussed and implications are presented.

2 RESEARCH BACKGROUND: SOCIAL NETWORKING SITES

In recent years, SNS, which are web-based services that enable users to create a profile and to connect with other users, have an increasing impact on individuals (Wilson et al., 2012). Currently, the most widely used SNS platform is Facebook with more than one billion users, and in which the usage activities vary widely. From a general point of view, individuals use Facebook to communicate with friends, to increase their virtual social network, to browse the profiles of other users, and to passively read the newsfeed or actively post, comment or 'like' thoughts in the newsfeed (Koroleva et al., 2011). To do so, users are virtually connected with lots of individuals. A study posits that users have a median number of 300 virtual friends, but this number might also go up into the thousands (Ellison et al., 2011).

Notably, research reveals that these activities and virtual relationships in SNS might have both a positive and negative side, so we next deliberate these various aspects of SNS as they have been discussed in recent SNS research.

2.1 THE POSITIVE SIDE OF SNS: USEFULNESS AND ENJOYMENT

Prior research frequently discusses the benefits of using SNS through the lens of social capital theory that posits the idea that users might gain benefits by maintaining and establishing social relationships with others (Bourdieu, 1986). Among others, Koroleva et al. (2011) reveals four particular benefits from using SNS. First, emotional support refers to SNS users' perception of

being supported by Facebook-friends. This means that being friends with others on Facebook conveys the impression that these friends are always there for one and so that nothing can go wrong. For example, pregnant and mothering teens use online communities for perceptions of social support (Sherman and Greenfield, 2013). Second, individuals using Facebook benefit as it increases their participation in offline events, such as taking part in parties or other social events. One rationale for that might be that individuals use Facebook to coordinate and organize events (Khan and Jarvenpaa, 2010). Third, users consider Facebook as a network that facilitates access to the resources of others. This means that users might ask their virtual friends to do something for them easily or that virtual friends are the first contact person whenever one needs advice or information. Among others, users particularly benefit from the perceived social support of using Facebook (Manago et al., 2012). Fourth, due to users' excessive self-disclosure behavior (Posey et al., 2010; Krasnova et al., 2012), individuals benefit from Facebook as it enlarges an individual's scope, as Facebook is a source for trying or learning new things, such as new music. From a more general point of view, these benefits indicate that Facebook is used because it is helpful in maintaining and establishing virtual social relationships (Xu et al., 2012). In addition to articles emphasizing the usefulness of Facebook, other articles posit Facebook as a source of fun and pleasure (Krasnova et al., 2010; Turel and Serenko, 2012), as among others, users might play virtual online games or applications in Facebook.

In summary, as indicated by prior research SNS such as Facebook provide its users with benefits and pleasure, so that SNS are predominantly used by individuals based on the two well-known perceptual beliefs (1) perceived usefulness (Davis, 1989) and (2) perceived enjoyment (van der Heijden, 2004).

2.2 THE NEGATIVE SIDE OF SNS: EXHAUSTION AND ADDICTION

In addition to the positive side of SNS, recent research also discussed a negative one. The usage of SNS is a potential source of stress causing exhaustion (Maier et al., 2012, 2013). Here, five SNS-specific stressors are identified that are grounded in technological characteristics, such as complexity or uncertainty, a changing information disclosure behavior, or the changed role of technology in one's daily lives, such as being forced to adapt new behavioral patterns or use a technology in everyday situations (Maier et al., 2012). In addition to that, the fact of giving too much social support to others who are embedded in one's SNS-enabled network is identified as a source of stress (Maier et al., 2013). Based on renowned stress theories, whereupon stressors cause psychological and behavioral strain reactions (e.g., Cooper et al., 2001; Podsakoff et al., 2007; Tarafdar et al., 2010), it is then theorized that individuals who perceive stressful stimuli are exhausted by using SNS, are dissatisfied, and have low intentions to use SNS continuously (Maier et al., 2013).

Next to that, recent research in the field of SNS also focuses on user addiction and thus identifies another negative side of SNS usage (for an overview, see: Kuss and Griffiths, 2011). Here, SNS addiction is a form of behavioral addiction which is defined as a compulsion to repeatedly engage in an action (Shaffer, 1996) and does not involve an intake of substances. The latter form of addiction is called chemical addiction (Sellman, 2010), which is not the focus of studies investigating SNS or any other form of IT addiction (Schultz, 1998; Rihet et al., 2002). By focusing on SNS addiction as one particular form of behavioral addiction, Turel and Serenko (2012) posit how SNS addiction occurs. They theorize how habit – which in turn is influenced by age, past usage behavior, and perceived enjoyment – is the main cause of pathological SNS addition. Afterwards, Xu and Tan (2012) also theorize habit as the major influencing factor for SNS addiction and extend this by theorizing message characteristics in terms of message richness and message synchronicity as a moderator of this relation. Hence, it is argued that habit only

induces user addiction when photos and videos are posted in SNS instead of pure text, as well as when post messages are answered promptly.

Taken together, exhaustion and addiction are two aspects of the negative side of SNS.

3 THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

To develop our research model and hypotheses we base on the theoretical lens of post-acceptance theory (e.g., Lankton and McKnight, 2012). In contrast to theories and models focusing on initial technology adoption, post-acceptance theories focus on individuals who have already decided to use a technology and reflect on whether to use a technology continuously (Dwivedi et al., 2008; Williams et al., 2009). This means that individuals are not biased by first impressions (Lim et al., 2000) but base their decisions on confirmations of initial expectations and particularly on actual experiences with the technology (Kim, 2009; Lankton and McKnight, 2012).

We aim to identify the diverse impact of the negative side of SNS in terms of exhaustion and addiction on whether individuals stop using a technology such as SNS. As such we base our approach on post-acceptance theory and develop our research model respectively. More precisely, we focus on discontinuous usage intentions, which reflect whether users intend to stop using SNS altogether (e.g., Sun, 2013), and how these intentions are transferred in non-usage behavior. Moreover, we theorize how beneficial aspects, such as perceived enjoyment and usefulness, have an influence on whether individuals use technologies continuously. Then we theorize the effect of the negative side in terms of exhaustion and addiction on discontinuous usage.

3.1 DISCONTINUOUS USAGE INTENTION AND NON-USAGE BEHAVIOR

A shared feature of existing technology usage models is that they are intention-based and assume that individuals develop behavioral intentions which are subsequently transferred into behaviors (Davis, 1989; Venkatesh et al., 2003; Williams et al., 2009). The rationale for this is that an individual's intention to use, reflects one's interest in using IT in the future. This intention is transferred into actual behavior at a later point of time, which is reflected in one's usage behavior. From a general point of view, this means that individuals with high behavioral intentions to use a particular IT will use it at a later time with a greater probability than individuals with low intentions.

Applying this to discontinuous usage intentions in a SNS context, we theorize that users with high discontinuous usage intentions stop using SNS. This behavior of stop using SNS is subsequently named non-usage behavior. Hence, this means that individuals with high discontinuous usage intentions transfer these in non-usage behavior, whereupon individuals with low discontinuous usage intentions use SNS continuously. Based on that we hypothesize that:

H1: High discontinuous usage intentions cause individuals to not use the technology anymore.

3.2 THE INFLUENCE OF THE POSITIVE SIDE ON DISCONTINUOUS USAGE INTENTION

As discussed above, SNS usage might be beneficial and provides fun for its user. We now theorize how this positive side has an influence on whether individuals use SNS continuously. Therefore, we also focus on satisfaction, which is central for understanding post-acceptance behavior. Eventually, based on recent findings in post-acceptance research, we theorize the influence of users' past usage behavior to understand users' behavior overall.

3.2.1 The influence of perceptual beliefs and satisfaction on discontinuance intention

In one of the first research articles in the stream of continuous usage, Bhattacherjee (2001) uses expectation-disconfirmation theory (EDT) (Oliver, 1977; 1980) – that theorizes expectations, confirmations, and performances as the main influencing factors for satisfaction – to develop a Post-Acceptance Model of IS Continuance. Aligned with EDT, this model posits perceived usefulness as one particular perceptual belief and disconfirmation as antecedents of satisfaction, which represents the overall evaluation of an individual's experience in using a technology. This evaluation then impacts continuance intention (Bhattacherjee, 2001). Based on this initial approach to using EDT in IS research, it was subsequently used in many other articles by focusing on specific relationships between expectations, disconfirmation, performance, and satisfaction (for a review, see Lankton and McKnight, 2012, p. 112). Notably, these articles share the recognition that satisfaction is considered to be a main influencing factor for continuance intention.

Based on these general post-acceptance findings, research in the stream of SNS also uses this theoretical lens to investigate continuous usage intention and posits that satisfaction directly influences the intentions of an individual to use SNS continuously (Shi et al., 2010; Maier et al., 2012). This means that the overall evaluation of using SNS determines whether users develop intentions to continue or discontinue. While satisfied users have the intention to continue using SNS, dissatisfied users are instead inclined to stop using the technology (Alam and Wagner, 2013). In line with this we assume that SNS users with high levels of satisfaction have low intentions to discontinue using SNS and vice versa:

H2: The higher the satisfaction, the lower the discontinuous usage intention.

Next to that, research in the stream of SNS also theorizes the influence of different perceptual beliefs on post-acceptance behavior (Shi et al., 2010; Maier et al., 2012; Li et al., 2013). In more detail, perceived usefulness and perceived enjoyment have been identified as the two most influential co-determining beliefs (Turel and Serenko, 2012; Xu et al., 2012), in which their impact is mediated on intention through satisfaction (Maier et al., 2012) that reflects an individual's overall negative or positive evaluation about using SNS. This means that an individual is satisfied with using SNS when perceiving its usage as useful (Xu et al., 2012) and when SNS provides pleasure (Turel and Serenko, 2012). Consequently, we assume that:

H3: The higher the perceptual beliefs in terms of a) perceived usefulness and b) perceived enjoyment, the higher the satisfaction.

3.2.2 The influence of usage on discontinuance intention

In addition, Kim and Malhotra (2005) extend the understanding of how continuous intentions are developed, by emphasizing the importance of the extent of an individual's past technology usage behavior. Based on self-perception theory (Bem, 1972), which posits that past usage behavior causes beliefs and intentions, it is theorized that individuals have not formed

them up to the point in time when they are asked to evaluate their behavior and if they intend to use the technology continuously. Instead the resulting beliefs and intentions are derived from observing the individual's own past usage behavior, so that beliefs and intentions will be influenced by the extent of past usage behavior. This means that individuals using a technology extensively develop better beliefs and higher continuous intentions (Kim and Malhotra, 2005; Kim, 2009).

Research in the field of SNS usage identified that individuals spent different amounts of time on SNS and use different functionalities (e.g., Koroleva et al., 2011; Turel and Serenko, 2012). In this context, Maier et al. (2013) revealed the extent of past SNS usage as antecedent of SNS-specific perceptions, so that here we extend this by basing it on self-perception theory (Bem, 1972) and theorizing that the extent of SNS usage influences beliefs and intentions. In detail, an individual using SNS extensively associates more positive memories with SNS and thus evaluates SNS-specific beliefs more positively than individuals that seldom use SNS. This means that these power users evaluate the SNS as being more useful and as a source of fun so that they have higher levels of usefulness and enjoyment. Consequently, we hypothesize that:

H4: The higher the extent of past usage behavior, the higher the perceptual beliefs in terms of a) perceived usefulness and b) perceived enjoyment.

In addition, past usage behavior also influences intentions (Kim and Malhotra, 2005; Kim, 2009). This means that for post-acceptance research in the field of SNS, individuals form continuous intentions based on their past usage behavior in a way that power users form high continuous usage intentions. With respect to discontinuous usage intentions, individuals who seldom use SNS develop such intentions more often than individuals with high usage extents. The rationale for this is that self-perception theory posits that individuals only intend to reproduce their past usage behavior, so that we hypothesize that:

H5: The lower the extent of past usage behavior, the higher the discontinuous usage intention.

3.3 THE INFLUENCE OF THE NEGATIVE SIDE ON DISCONTINUANCE INTENTION

3.3.1 The influence of exhaustion on emotions and behavioral responses

Recently, technostress, which identifies stress caused by using technologies, attracted attention in IS research (see Riedl, 2013). In this process, recent research posits that stressors are the starting point of the overall techno-induced stress process. Such stressors are environmental stimuli, events, or demands that are encountered by individuals (Ragu-Nathan et al., 2008). As a consequence of these adverse stimuli, individuals then react psychologically by becoming exhausted or dissatisfied (Cooper et al., 2001; Ragu-Nathan et al., 2008; Ayyagari et al., 2011), whereby this reaction is given the generic term psychological strain (Tarafdar et al., 2010). Next to that, individuals also react behaviorally to stressors and psychological strain by changing behavior (Ahuja et al., 2007; Tarafdar et al., 2010). Based on this theoretical lens, the literature posits that exhaustion – as one specific psychological strain variable (Ayyagari et al., 2011) – is a source for dissatisfaction and intention (Ahuja et al., 2007; Rutner et al., 2008).

In SNS research this means that techno-exhaustion, as a specific psychological strain variable related to technology usage, is a breeding ground for dissatisfaction and discontinuous usage intention. In more detail, individuals who feel exhausted from using SNS are less satisfied and develop intentions to stop using SNS. Consequently, we hypothesize that:

H6: The higher the techno-exhaustion, the lower the satisfaction.

H7: The higher the techno-exhaustion, the higher the discontinuous usage intention.

3.3.2 The influence of addiction on cognitions, emotions, and behavioral responses

Next to technostress, the influence of addiction has been theorized in technology usage. User addiction is defined as a user's "*maladaptive psychological state of dependency on the IT use which is manifested through an obsessive pattern of IT-seeking and IT-use behaviors that take place at the expense of other important activities and infringe normal functioning*" (Turel and Serenko, 2012, p. 3). It is established as a form of behavioral addiction, which does not involve any intake of a substance. Instead, it indicates that addicts have developed a behavioral pattern of frequently repeating a specific behavior related to IT usage which might have negative consequences for an individual in terms of physical, social, emotional, or financial well-being (Stein et al., 2010).

The reason a user becomes addicted to a technology is because the addiction is often established through a process of positive reinforcement and neural sensitization (Robinson and Berridge, 2003). Different technologies have been identified as a source of behavioral addiction as they provide pleasure or satisfy socio-psychological needs in users' lives, so that users have a compulsive and pathological need to use IT (Young, 1998a; 1998b; 2010; Turel and Serenko, 2012). Consequently, the usage of technologies like the internet in general (Young, 1996; Davis, 2001), email (Turel and Serenko, 2010), instant messaging (Huang and Leung, 2009), video games (Xu et al., 2011), online shopping and auctioning (LaRose and Eastin, 2002; Turel et al., 2011), and online social networks (Andreassen et al., 2012; Turel and Serenko, 2012) are identified as addictive.

In the context of technology usage research, Turel et al. (2011) theorized that user addiction distorts users' perceptual beliefs, so that addicted individuals consider the usage of a technology as more useful, easier to use, and providing more fun than is perceived by non-addicted individuals. This means for continuous usage of SNS that addicted users perceive the usefulness and enjoyment as higher than non-addicted individuals, so we hypothesize that:

H8: The higher the addiction, the higher the perceptual beliefs in terms of a) perceived usefulness and b) perceived enjoyment.

Moreover, addicted individuals use a technology excessively (Xu et al., 2011). Thereby, addicts use a technology with the aim of satisfying their personal needs, such as having or building up social relationships and hence having friends to talk to about personal issues (Young, 1998a; 1998b; 2010; Turel and Serenko, 2012; Xu et al., 2011). In particular, as the perceptual beliefs of addicts are distorted and more positive than perceived by non-addicts, addicts perceive that usage of a technology satisfies their needs completely. Consequently, the overall affective attitude towards the technology is positive, which reflects that an addict is satisfied with using a technology. Therefore we theorize that addiction has a positive influence on satisfaction. This means for SNS addiction that addicts are more satisfied with using SNS than non-addicted users, so that we hypothesize that:

H9: The higher the addiction, the higher the satisfaction.

Next to the hypothesized consequences of addiction on perceptual beliefs and satisfaction, we also theorize that it influences intentions about whether or not a technology is used continuously. Here, prior research posits that negative information weighs more heavily on the brain than positive information (Ito et al., 1998; Cenfetelli and Schwarz, 2011). This means that for the development of usage intentions particularly adverse aspects related to using a technology cause discontinuous usage intentions. In more detail, individuals who are confronted with negative perceptions while using a technology develop intentions to discontinue using the

technology. However, since addicts distorts these perceptions (Turel et al., 2011), they are seldom confronted with negative perceptions, so that addicts do not develop discontinuous usage intentions.

In the research context of SNS, this means that addicts perceive using SNS as useful and enjoyable, so they have low intentions to discontinue using SNS. Whereas non-addicts also include negative perceptions that are caused by using SNS in developing intentions, so that non-addicts develop higher discontinuous usage intentions. Consequently, we hypothesize that:

H10: The higher the addiction, the lower the discontinuous usage intention.

3.3.3 The influence of addiction on the intention-behavior relation

Despite the fact that intention-based models are widely used and accepted, previous research struggles with inconsistencies between behavioral intentions and actual usage behaviors. The influence of hypothetical intentions on actual behaviors is indeed significantly lower than expected (Sheeran, 2002; Bhattacherjee and Sanford, 2009). This phenomenon is called the intention-behavior-gap.

The rationale here is that some individuals have high behavioral intentions to perform a certain behavior but do not transfer these into actual usage behavior. This is because behavioral intentions tend to overestimate intended behaviors by ignoring costs and risks that are associated with the behavior (Ajzen, 1991). It appears that individuals have individually different intention thresholds that need to be reached before an intention turns into an action (Ajzen, 2002; Allen et al., 2005). Analogously, only at certain threshold levels will discontinuous usage intentions turn into non-usage behavior. This means that some individuals will have to develop higher discontinuous usage intentions than others to stop using a technology and hence show non-usage behavior. We theorize that addiction has an influence on the level of this threshold, which will be theorized in detail subsequently.

We posit that user addiction is one particular influencing factor for whether or not SNS users transfer discontinuous usage intentions into actual non-usage behavior. The underlying argument is that addicted users only transfer very high discontinuous usage intentions into non-usage behaviors because addicted IT-users have the compulsive and pathological need to use IT continuously (Turel et al., 2011; Turel and Serenko, 2012). Hence, the thoughts of addicted IT users are always focusing on the usage of IT (Turel et al., 2011) so that it is difficult to escape from this deeply-rooted behavior. Thus, addicted IT users will have high thresholds to overcome compulsive behavior and stop using IT. In contrast, non-addicted users who do not have this kind of pathological behavior (Turel and Serenko, 2012) have no need to behave differently from their behavioral intentions. With respect to the threshold discussed above, we expect that addicted users have significantly higher thresholds than non-addicted users.

For SNS usage addiction, this means that addicted users have developed pathological usage behavior patterns (Turel and Serenko, 2012; Xu and Tan, 2012) by compulsively integrating SNS into their daily life (Maier et al., 2012) for providing pleasure, satisfying socio-psychological needs (Young, 1998a; 1998b; 2010; Xu et al., 2011), establishing long-term digital relationships, or escaping from real life problems (Schwarz et al., 2011; Xu et al., 2011). Thus, addicted users have a higher threshold above which discontinuous usage intentions are transferred into non-usage behavior than non-addicted users (Turel and Serenko, 2012). Consequently, we assume that less addicted SNS users transfer discontinuous usage intentions into non-usage behavior even when these intentions are lower than the discontinuous usage intentions of addicted SNS users. Consistently, we hypothesize that:

H11: Addiction moderates the influence of discontinuous usage intention on usage behavior to the extent that addicts will less often transfer a certain level of discontinuous usage intentions into non-usage behavior compared to non-addicts.

3.4 CONTROL VARIABLES

As prior research posits that further factors might influence intentions and behaviors, we included alternative explanations as control variables in our research model. Table 1 presents the influence of our control variables and the rationale.

Control	Rationale
C1: The lower the **Habit** (with using the technology), the higher the intention to discontinue using the technology.	Prior research posits that habit is central for whether technologies are used continuously (e.g., Limayem and Hirt, 2003; Ortiz de Guinea and Markus, 2009). Hence, we assume that habit avoids that users develop discontinuous usage intentions as well as stopping using technologies.
C2: The lower the **Habit** (with using the technology), the more an individual stops using the technology.	
C3: The lower the **Social Influence** (to use the technology), the higher the intention to discontinue using the technology.	People in an individual's reference group (Roca et al., 2006; Liao et al., 2007) influence whether one intends to use a technology. This means that an individual, who perceives that lots of friends want one to use a technology, seldom develops intentions to discontinue using this technology.
C4: The **Older** an individual, the more an individual stops using the technology.	Prior research reveals that age is central to understand an individual's reaction to technologies (Agarwal et al., 2009). As SNS are used more frequently by younger individuals, we assume that elderly people stop using SNS more frequently as younger ones do.
C5: **Men** will rather stop using the technology than women.	Prior research posits that technologies are used differently by men and women (Venkatesh and Morris, 2000). We assume that men stop using SNS more often as they tend to be more risk seeking (Powell and Ansic, 1997).
C6: The lower the **Neuroticism** the more an individual stops using the technology.	Predispositions are attributes that determine whether or not individuals, just as in nature, use technologies. Notably, research in the field of SNS posits that neurotics and extraverted individuals do use SNS (Ryan and Xenos, 2011; Moore and McElroy, 2012).
C7: The lower the **Extraversion** the more an individual stops using the technology.	
C8: The higher the **Number of Friends**, the less an individual stops using the technology.	Prior research posits that SNS are used to connect and reconnect with existing friends but also to establish new relationships (Subrahmanyam et al., 2008; Wilson et al., 2012; Amichai-Hamburger et al., 2013). Hence users have a high number of social relations in SNS, and as they want to maintain these in the long-run, they do not stop using SNS.
C9: The longer the **Usage Period** of a technology, the lower the intention to discontinue using the technology.	We assume that individuals using SNS for a long period will neither develop discontinuous usage intentions nor stop using the technology (Kim, 2009).
C10: The longer the **Usage Period** of a technology, the less an individual stops using the technology.	

Table 1: The influence of control variables

The resulting research model is included in Figure 1, and the methodology to validate the model is presented in the following section.

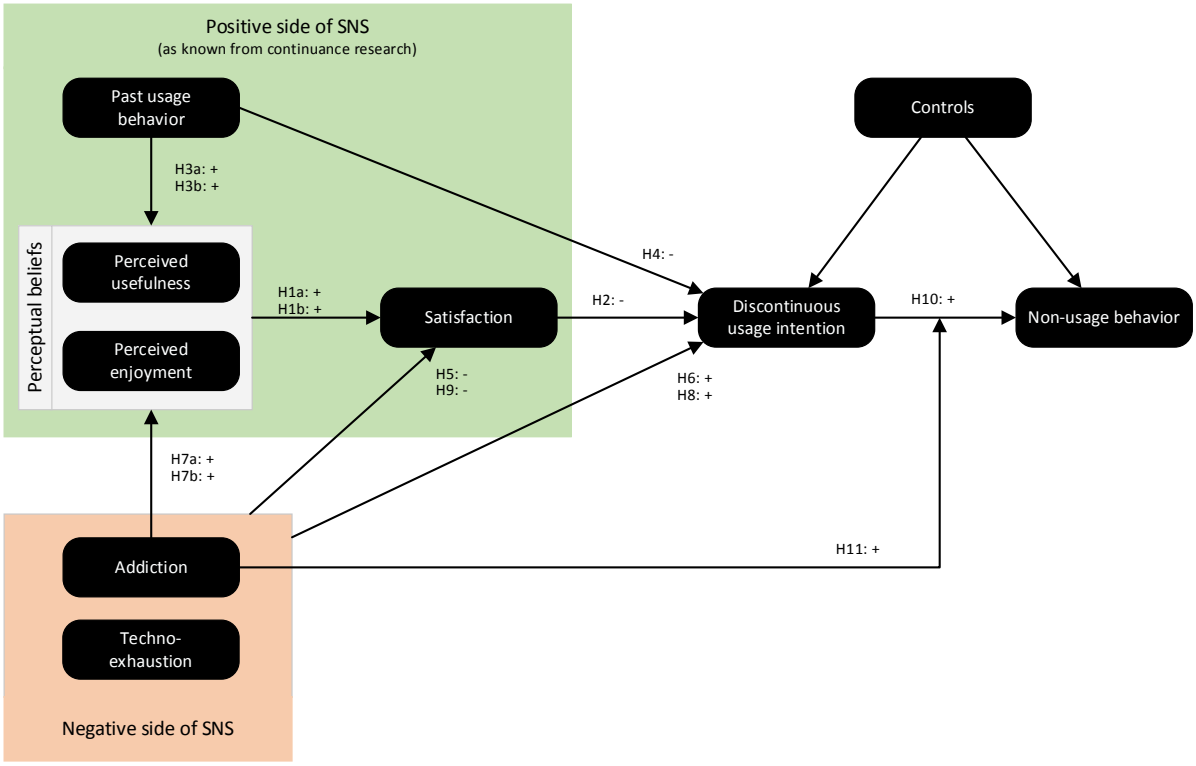

Figure 1: Research model

4 RESEARCH METHODOLOGY

This research aims to examine how the positive and the negative side of SNS usage influence a user's discontinuous usage intention and non-usage behavior. In order to evaluate these effects, a research setting with two surveys is necessary to capture behavioral intentions and actual behavior separately in distinct surveys.

Each was set up as an online survey to reach a large quantity of SNS users. Participants were invited based on surveys we had conducted in the past which had focused on different topics, such as human resource management or usage of IT in the recruiting and job seeking process. For these surveys, participants were invited using customer databases of different industry partners. At the end of each survey, participants were asked whether we can contact them again in subsequent surveys. One particular advantage of this is that we had different information about the individuals in this data pool, such as age, gender and whether individuals use SNS, so that we could identify SNS users and send out e-mail invitations to a large number of individuals to ask them to take part in our new research project.

Based on this pool of individuals, we sent out 1,548 e-mails to SNS users. The first survey began on January 15th and participants could take part within a period of two weeks. This survey covered perceptual beliefs, techno-exhaustion, satisfaction, addiction, discontinuous usage intention, past usage behavior and all the control variables required for evaluating the proposed research model. 719 individuals filled out the first survey without any missing values. However, about five percent were non-users of SNS and hence could not evaluate feelings of being satisfied with, exhausted by, or addicted to SNS, so we removed these from our final data sample.

Six months later, on July 15th, we again sent out e-mail invitations to each individual participated in the first survey. Within the following two weeks, 490 individuals completed the second survey that consisted of the same items as in the first survey and also a variable of usage behavior that captured individuals' non-usage behavior at this later point in time. To motivate participants to fill out our surveys, a Google Nexus 7 was raffled amongst the participants in each survey round.

The demographics of all participants are presented in Table 2. Moreover, we can state that the mean value of minutes that our participants spend on Facebook is 55.57 minutes a day (SD=74.1) and they have on average 197.4 friends in Facebook (SD=191.0) and like 50.1 fan-pages (SD=229.0).

Demographics		
Gender	Men	44.7%
	Women	55.3%
Age (mean=38.5; SD=10.5)	<19	9.9%
	19-29	21.1%
	30-39	21.4%
	40-49	28.4%
	50-59	16.7%
	>59	2.5%

Table 2: Demographics of the 490 participants

5 MEASUREMENT ITEMS

The items included in both surveys are all based on items that have been used in other recent research articles and are adapted to the SNS context. This is explained in detail below.

Past usage behavior. Koroleva et al. (2011) propose a list of five different actions that can be performed when using Facebook. Based on this, we use five items to measure participants' past usage behavior (α=0.83).

Perceptual beliefs and satisfaction. The perceptual beliefs perceived usefulness (Venkatesh and Brown, 2001, α=0.88) and perceived enjoyment (Turel and Serenko, 2012, α=0.96) are measured with three and five items respectively. For satisfaction, we base on the scale of Bhattacherjee (Bhattacherjee, 2001) and measure it using five items (α=0.90).

Addiction and techno-exhaustion. In order to capture an individual's perception of techno-exhaustion (α=0.93), our items used are based on general technostress (Ayyagari et al., 2011) as well as on SNS-specific stress research (Maier et al., 2013). For measuring SNS addiction (α=0.88), we use five items as proposed by Turel and Serenko (2012).

Discontinuous usage intention and non-usage behavior. To capture discontinuous usage intention (α=0.76), we use three items such as 'In the future, I will use Facebook far less than today' and based on Maier et al. (2013) and Sun (2013). Moreover, non-usage behavior is captured in the second survey by using the item 'Currently, I do not use Facebook' to determine whether the participant is a user or non-user of Facebook (Hsieh et al., 2011).

Control variables and individual differences. An individual's habit is measured with four items based on Turel and Serenko (2012, α=0.90). The other control variable social influence is

measured based on Brown and Venkatesh (2005) and two items (α=0.93). We also control our results with respect to the individual period of usage, as everyone has an individual starting point when individuals register on Facebook. This reflects the number of months a participant uses Facebook. Moreover, we also asked individuals concerning their number of virtual friends in Facebook. We asked participants their age and sex. Moreover, the personality traits neuroticism (α=0.77) and extraversion (α=0.96) are measured based on two items each as proposed by Rammstedt and John (2007).

6 RESEARCH RESULTS

Based on 490 individuals, who took part in our two surveys, we evaluate the presented research model in two steps. First, we use the partial least squares (PLS) method and SmartPLS 2.0 M3 (Ringle et al., 2005) to evaluate the linear relations between two constructs (H1 to H10). We select this method, because our research model includes negative variables, such as techno-exhaustion, addiction, and discontinuous usage intention, that produce skewed distributions for which PLS is more suitable than other methods requiring normally distributed data (Turel et al., 2011). In a second step we concentrate on the hypothesized moderation effects (H11). Since the dependent variable non-usage behavior is binary, depending on whether participants still use the SNS at the time of the second survey, we perform and present the results of a binary regression analysis.

6.1 COMMON METHOD BIAS

Prior research posits common method bias (CMB) as one particular problem of self-reported data (Podsakoff et al., 2003), particularly, when measuring dependent and independent variable in one survey. Although we use two surveys to capture data for evaluating our research model, we conduct a statistical analysis using PLS to reveal the extent of CMB (Williams et al., 2003). Therefore, we include a CMB factor in our PLS-model. This factor contains every indicator of the origin model. In addition, each remaining factor is transformed into single-item-constructs. We then compare the ratio of R^2 with CMB factor to R^2 without CMB factor. Results indicate that the factor explains a delta of R^2 of 0.003 and the R^2 without this factor is 0.789, so that the ratio is 1:263. By comparing this with prior research calculating this ratio, we conclude that we cannot see any signs of CMB influence (Liang et al., 2007).

6.2 MEASUREMENT MODEL

A consequence of the reflective indicators of the used measures, content validity, indicator reliability, construct reliability, and discriminant validity will be validated to ensure a valid measurement model.

6.2.1 Content validity

The section measurement items explains in detail that all indicators are robust ones used in prior research.

6.2.2 Indicator reliability

The rate of the variance of an indicator that comes from the latent variable is underlined by the indicator of reliability and has to be at least 50 percent. This corresponds to a value of 0.707 or more (Carmines and Zeller, 2008). As illustrated in Table 5, this condition is fulfilled. In

addition, we perform a bootstrap method with 5,000 samples, which indicates that each loading is significant.

6.2.3 Construct reliability

Composite reliability (CR) and average variance extracted (AVE) are used for determining the quality at construct level (Fornell and Larcker, 1981). CR has to be at least 0.7 and AVE at least 0.5 so that Table 6 posits that these criteria are fulfilled.

6.2.4 Discriminant validity

Discriminant validity describes the extent to which measurement items differ from one another (Campell and Fiske, 1959). We therefore include the square root of AVE on the diagonal of latent variable correlation in Table 6. Then these values should be greater than the corresponding construct correlations (Fornell and Larcker, 1981; Hulland, 1999). Hence, we can conclude that this requirement has been fulfilled and the measurement model is valid at all.

6.3 STRUCTURAL MODEL

We use coefficient of determination (R^2) and path coefficients to evaluate the structural model. Results posit that ten hypotheses can be confirmed. In detail, past usage behavior influences the perceptual beliefs of usefulness and enjoyment significantly. Moreover, both perceptual beliefs have an impact on satisfaction, which is also influenced by techno-exhaustion. Then, satisfaction, techno-exhaustion, and addiction are influencing factors for whether discontinuous usage intentions are developed, which in turn influences non-usage behavior. However, we have to conclude that past usage behavior does not influence discontinuous usage intention and addiction has neither a significant effect on the two perceptual beliefs nor on satisfaction.

Concerning the coefficient of determination, we can state that 27.1 percent of the variance of perceived usefulness and 27.1 percent of perceived enjoyment is explained by past usage behavior and addiction. Further, 70.8 percent of the variance of satisfaction, 35.8 percent of discontinuous usage intention, and 28.8 percent of non-usage behavior is explained in the research model.

Finally, Table 3 presents the influence of the control variables. Results show that only neuroticism and number of friends have an influence on non-usage behavior. The results of the structural model as well as the results of the moderation analyses, which are presented in the next section, are illustrated by Figure 2.

Influence of … on discontinuous usage intention		Influence of … on non-usage behavior	
Habit	0.032^{NS}	Age	-0.002^{NS}
Social influence	-0.040^{NS}	Gender	0.034^{NS}
Period of usage	0.044^{NS}	Number of friends	-0.141**
		Neuroticism	-0.117**
		Extraversion	0.013^{NS}
		Habit	-0.013^{NS}
		Period of usage	-0.008^{NS}

Table 3: Research results: The influence of control variables

6.4 MODERATION ANALYSES

We hypothesize that addiction moderates the intention-behavior gap, so that addicts have higher thresholds above which discontinuous usage intentions are transferred in non-usage behavior than non-addicts. The dependent variable non-usage behavior is binary so that individuals either use a technology or not. Consequently, a hierarchical binary logistic regression analysis is run. To do so, we first center discontinuous usage intention, addiction, and the interaction term to remove multicollinearity (Cohen et al., 2002). Then, we enter the seven control variables of age, gender, number of friends, neuroticism, extraversion, habit, and period of usage, the independent variable discontinuous usage intention, the moderator addiction, and the interaction term into the model (see Table 4). Results show that discontinuous usage intention, addiction, as well as the interaction term have a significant effect on non-usage behavior. This model explains 64.9 percent of the variance of non-usage behavior and the significant interaction term indicates that addicted users have significantly higher thresholds of discontinuous usage intention which are transferred into non-usage behavior than non-addicts.

Variable		B	Exp(B)
Controls	Age	-0.15	0.86^{NS}
	Gender	0.79	2.20^{NS}
	Number of friends	-1.76	0.17^{NS}
	Period of usage	-88.96	0.00^{NS}
	Extraversion	0.44	1.55^{NS}
	Neuroticism	-0.34	0.71^{NS}
	Habit	0.03	1.03^{NS}
Independent variable	Discontinuous usage intention	1.59	4.91***
Moderator	Addiction	-1.35	0.26**
Interaction term	Addiction x discontinuous usage intention	1.49	4.44***
	Constant	-0.86	0.42
	R^2	0.649	
Note: *: p<0.05; **: p < 0.01; ***: p < 0.001			

Table 4: Linear regression analysis of the influence of addiction on the relation between discontinuous usage intention and non-usage behavior

6.5 SUMMARY OF RESEARCH RESULTS

In summary, Figure 2 presents the research model as well as the research results. Moreover, we calculate the effect size of factors influencing satisfaction and discontinuous usage intention. Results show that perceived enjoyment has a strong (f^2=0.431), perceived usefulness a medium (f^2=0.195), techno-exhaustion a low (0.062), and addiction no effect (f^2=0.000) effect on satisfaction. Next to that, techno-exhaustion has a medium (f^2=0.152), satisfaction (0.137) as well as addiction (0.028) a low, and past usage behavior no effect on discontinuous usage intention. Moreover, addiction as a moderator has a strong effect on non-usage (f^2=1.03).

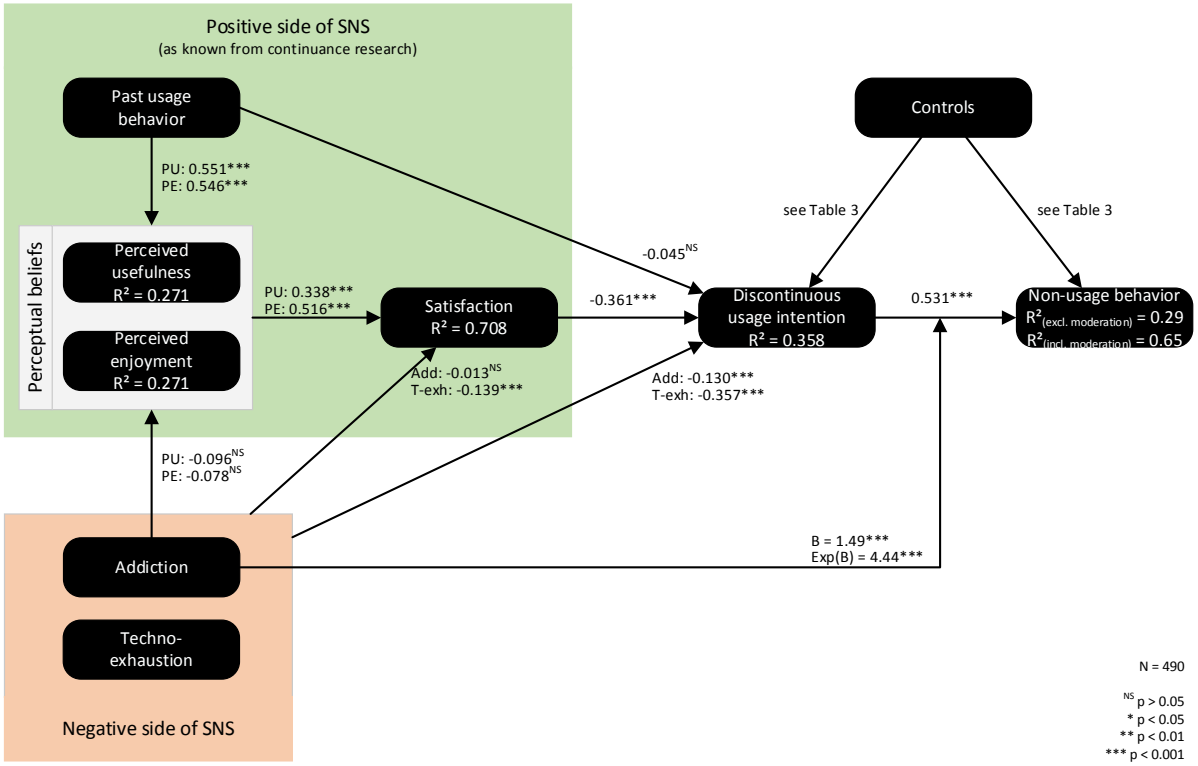

Figure 2: Research results based on PLS and binary regression analysis

6.6 POST-HOC ANALYSIS: THE INSIGNIFICANT EFFECT OF ADDICTION ON PERCEPTUAL BELIEFS

Our research results indicate that addiction does not influence the two perceptual beliefs of perceived usefulness and perceived enjoyment. This is somewhat unexpected as recent research in the field of addiction posits that addiction significantly distorts perceptual beliefs (Turel et al., 2011). In contrast to the results of Turel et al. (2011), who solely focus on the influence of addiction on perceptual beliefs, our research model also includes past usage behavior as an additional influencing factor for perceptual beliefs. As addiction and both perceptual beliefs correlate to an extent which is unequal to zero (see Table 6), we investigate in more detail the relation of addiction to the two perceptual beliefs in this post-hoc analysis.

First, we remove past usage behavior to investigate whether addiction influences perceptual beliefs when aligned with the model suggested by Turel et al. (2011). Here, research results indicate that addiction significantly distorts both the beliefs of perceived usefulness (β=0.123, $p<0.005$) and perceived enjoyment (β=0.140, $p<0.005$).

Second, we solely focus on the impact of past usage behavior on addiction. Our findings indicate that past usage behavior has a significant direct effect on user addiction (β=0.403, $p<0.001$).

Third, we include the path of addiction on perceptual beliefs so that on the one hand we have a model in which past usage behavior has an influence on addiction and on the other hand addiction influences the two perceptual beliefs. Findings indicate that past usage behavior influences addiction (β=0.401, $p<0.001$), which in turn significantly influences perceived usefulness (β=0.112, $p<0.005$) and perceived enjoyment (β=0.133, $p<0.005$).

Fourth, we specified the complete model of past usage behavior influencing perceptual beliefs and addiction, and addiction influencing perceptual beliefs. Our results indicate that the impact of past usage on perceived usefulness (β=0.553, $p<0.001$), perceived enjoyment (β=0.547, $p<0.001$), and addiction (β=0.398, $p<0.001$) is significant but the influence of addiction on perceived enjoyment (β=-0.084, $p>0.05$) and perceived usefulness (β=-0.108, $p>0.05$) is insignificant.

Hence, our post-hoc analysis reveals that when only focusing on the well-known relationships (addiction on perceptual beliefs, Turel et al., 2011), we also evaluate a significant path coefficient. However, when analyzing the impact of past usage behavior as theorized in post-acceptance theory (Kim and Malhotra, 2005; Kim, 2009) our results provide different results, so that further theorizing and analyses are needed which will be discussed in the following.

7 DISCUSSION OF RESEARCH RESULTS

This research article focuses on the positive and negative side of technologies in the context of post-acceptance research and hence aims to theorize how and why individuals develop discontinuous usage intention and stop using a technology. We therefore theorize that next to renowned factors studied in prior post-acceptance research, such as perceptual beliefs, satisfaction, and past usage behavior, the two SNS-specific negative side phenomena addiction and techno-exhaustion are central for understanding discontinuous usage intentions and non-usage behavior.

7.1 PAST USAGE BEHAVIOR INFLUENCES PERCEPTUAL BELIEFS DIRECTLY; ADDICTION ONLY WITHOUT CONSIDERING PAST USAGE BEHAVIOR

The presented research model assumes past usage behavior and addiction as influencing factors for perceptual beliefs. Our research results reveal that past usage behavior influences perceived usefulness (H3a: β=0.551, $p<0.001$) and perceived enjoyment (H3b: β=0.546, $p<0.001$) significantly; however, addiction has neither a significant impact on perceived usefulness (H7a: β=-0.096, $p>0.05$) nor on perceived enjoyment (H7b: β=-0.078, $p>0.05$). In addition to that, results show that 27.1 percent of the variance of both perceived usefulness and perceived enjoyment is explained by past usage behavior.

Although addiction does not have an impact on the perceptual beliefs, results of a post-hoc analysis posit that addiction distorts perceived usefulness and perceived enjoyment when removing past usage from our research model or when specifying an effect of past usage behavior through addiction on perceptual beliefs.

7.2 PERCEPTUAL BELIEFS AND TECHNO-EXHAUSTION INFLUENCE SATISFACTION; ADDICTION DOES NOT

The proposed research model hypothesizes that perceived usefulness, perceived enjoyment, techno-exhaustion, and addiction have an influence on satisfaction. Altogether, these four factors explain 70.8 percent of the variance of satisfaction. However, findings of the research model confirm that only perceived usefulness (H1a: β=0.338, $p<0.001$), perceived enjoyment (H1b: β=0.516, $p<0.001$), and exhaustion (H5: β=-0.139, $p<0.001$) have a significant impact. This means that addiction does not have a significant direct effect on satisfaction (H8: β=-0.013, $p>0.05$).

7.3 SATISFACTION, TECHNO-EXHAUSTION, AND ADDICTION INFLUENCE DISCONTINUOUS USAGE INTENTION

More than thirty-five percent of the variance of discontinuous usage intention is explained by satisfaction, techno-exhaustion, addiction, past usage behavior as well as the three control variables social influence, habit, and period of usage. Apart from the three controls and past usage behavior (H4: β=-0.045, $p>0.05$), which have no significant influence on whether individuals develop discontinuous usage intentions, satisfaction (H2: β=-0.361, $p<0.001$), techno-exhaustion (H6: β=0.357, $p<0.001$), and addiction (H9: β=-0.130, $p<0.001$) have a significant impact.

7.4 ADDICTION MODERATES THE EFFECT OF DISCONTINUOUS USAGE INTENTION AND NON-USAGE BEHAVIOR

Eventually the research model posits that discontinuous usage intention and the control variables, extraversion, neuroticism, age, gender, number of friends, period of usage, and habit are antecedents of non-usage behavior. Here results indicate that discontinuous usage intention has a significant positive impact on non-usage behavior (H10: β=0.531, $p<0.001$). Concerning the control variables, only neuroticism and number of friends have a significant negative effect, so that users with fewer friends as well as users who are emotionally stable and less neurotic, stop using SNS.

Moreover, the model also argues that addiction has an impact on the influence of discontinuous usage intention on non-usage behavior. Results of a binary regression analysis confirm that addiction moderates the discontinuous usage intention non-usage behavior relation. The results reveal that non-addicts transfer lower discontinuous usage intentions in non-usage behavior than addicts (H11: B=1.49, Exp(B)=4.44, $p<0.001$). In more detail, discontinuous usage intention and the control variables explain 28.8 percent of the variance of non-usage behavior. Notably, entering addiction as a moderator of the influence of discontinuous usage intention on non-usage behavior increases the explained variance by up to 64.9 percent. According to Chin (1998) addiction has a strong moderation effect.

8 THEORETICAL AND PRACTICAL CONTRIBUTIONS

Based on the results presented above we can derive several implications for theory and practice which will be discussed in the following.

8.1 NON-ADDICTS TRANSFER LOWER DISCONTINUOUS USAGE INTENTIONS IN NON-USAGE BEHAVIOR THAN ADDICTS

Although some recent articles in IS research focus on user addiction (e.g., Turel and Serenko, 2012; Wilson et al., 2012; Xu and Tan, 2012) only Turel et al. (2011) integrate addiction in a technology usage model. Notably, even though this article theorizes that addiction distorts perceptual beliefs and thus might have a mediating influence on behavioral intention, the influence of addiction on non-usage behavior remains unclear. This is a particularly problematic issue, because prior research identifies an intention-behavior gap that reflects that there is a discrepancy between intentions and behavior (Sheeran, 2002; Sniehotta et al., 2005). This means that although some individuals develop intentions to do something, they do not act in line with these intentions. The rationale for this might be that individuals have different thresholds above which intentions are transferred to behavior.

Within our research model, we focus on discontinuous usage intentions and non-usage behavior and results indicate that this kind of intention and seven control variables explain less than thirty percent and have consequently only a weak explanation power (Chin, 1998; Henseler et al., 2009). As a consequence of that, we theorize that addiction moderates the relation between discontinuous usage intentions and non-usage behavior. Results confirm that addiction influences the intention-behavior relation and in more detail, entering addiction as moderator increases the R^2 value up to 64.9 percent.

This means that addicts need significantly higher discontinuous usage intention above the level that these intentions are transferred in non-usage behavior than non-addicts. The rationale for this high threshold is that addicts have a pathological and compulsive need to use SNS continuously, so that it is difficult for them to escape from their deeply-rooted behavior. Consequently, we can contribute the finding that addiction has a significant influence on the relation between discontinuous usage intention and non-usage behavior, so that addiction is one possible answer to the intention-behavior gap.

This research finding contributes to particular research calls in recent articles. Among others, Brown et al. (Brown et al., 2012) state that the relation between beliefs and usage behavior might differ for different individuals and Kim (2009) posits that prior research is limited as it mostly focuses on linear relations between variables. Based on the results and the contribution presented above, we can respond to both calls by arguing that the relation between discontinuous usage intention and non-usage behavior is not linear as it depends on whether or not users are addicted. Moreover, the enhancement of the R^2 value in non-usage behavior after entering the moderator, confirms that moderator variables are of great value as they increase the explanatory power significantly (Sun and Zhang, 2006).

8.2 THE DIVERSE IMPACT OF ADDICTION ON BELIEF DISTORTION

Although Turel et al. (2011) reveal addiction as a source of distorted beliefs, we can only partially confirm this result. Even though the results of a post-hoc analysis show that addiction distorts perceptual beliefs, this effect diminishes when also considering the research results of Kim (2009), whereby past usage behavior has an impact on perceptual beliefs. This means that the findings of our research indicate that addiction does not distort perceived usefulness and perceived enjoyment when including the influence of past usage behavior on perceptual beliefs.

Hence, we identify that the distorting effect of addiction on perceptual beliefs is diverse. Nonetheless, this raises the question of what factors might influence whether addiction distorts beliefs. By comparing the setting of Turel et al. (2011) and our research setting, the diverse impact might be explained due to some aspects. First, this research focuses on the usage of SNS, whereas Turel et al. (2011) investigate the influence of addiction on users of online auctions. This means that addiction might have different effects depending on the technology that is used. Second, SNS are used as they provide pleasure (Turel and Serenko 2012) and due to its usefulness (Xu et al., 2012), but online auctions are particularly used due to its high usefulness when selling products, so that addiction might has a diverse effect concerning whether a technology is used because of its usefulness and/or enjoyment. Third, Turel et al. (2011) conduct two surveys with different measures, whereby we only focus on one particular measurement of addiction that has been used in a recent article that focuses on SNS addiction (Turel and Serenko, 2012). Fourth, the mean value of addiction of both articles differs. The mean addiction value of this research is 2.28 (7-point Likert-scale) which is similar to other SNS addiction studies (2.27; Turel and Serenko, 2012). The mean value of Turel et al. (2011) varies from 1.42 (5-point Likert-scale, study 1 and study 2) over 1.53 (7-point Likert-scale, study 2) to higher values (1.71, 1.72, 2.21; 7-point Likert-scale, study 2) when considering addiction as second-order construct. This indicates that the different number of addicted individuals that are included in each data sample

might explain the diverse impact of addiction on perceptual beliefs. Here, future research might focus on different context variables and aim to identify why addiction only distorts perceptual beliefs in some research settings. Nonetheless, we can contribute the finding that the addiction-induced distorting effect on perceptual beliefs depends on the research setting.

8.3 THE DUALITY OF THE NEGATIVE SIDE: ADDICTION AS AN AMPLIFIER AND TECHNO-EXHAUSTION AS AN INHIBITOR OF TECHNOLOGY USAGE

For classifying factors influencing technology usage Cenfetelli (2004) introduces the concepts of enablers and inhibitors. Enablers refer to positive "*external beliefs regarding the design and functionality of a system that either encourage or discourage usage, dependent on valence*" (Cenfetelli, 2004, p.475), while inhibitors are negative "*perceptions held by a user about a system's attributes with consequent effects on a decision to use a system. They act solely to discourage use*" (Cenfetelli, 2004, p.475). Transferred to our research model, the positive side factors represent enablers and techno-exhaustion is an example of an inhibitor. Perceived usefulness, enjoyment, satisfaction, and past usage behavior can either encourage or discourage usage, whereas techno-exhaustion only discourage usage as inhibitors "*are only meaningful at the negative end*" (Cenfetelli, 2004, p. 477).

However, addiction cannot be classified as either of these as it does not have the same effects as enablers or inhibitors. Addiction only encourages usage, as it only has psychological meaning at the positive end of the spectrum. This means that only when an individual is addicted addiction has an influence on technology usage. However, the negative end of the spectrum does not discourage usage as when an individual is not addicted addiction has no influence on technology usage. Thus, it is neither an enabler nor an inhibitor. We define factors that only have meaning at the positive end as 'amplifiers'. Thus focusing on factors like addiction and defining them as amplifiers extends the categorization provided by Cenfetelli (2004) by introducing a new category of factors important in technology acceptance research. Besides addiction, further examples of amplifiers are flow (Trevino and Webster, 1992; Agarwal and Karahanna, 2000) and habit (Limayem and Hirt, 2003; Limayem et al., 2007).

Moreover, Cenfetelli and Schwarz (2011) theorize that enabler and inhibitor have different influencing processes on intention and usage behavior. Enablers have a direct influence on intention whereas inhibitors have an influence on enablers and intention as well. We can also conclude that amplifiers have an additional different influencing process compared to enablers and inhibitors as theorized by Cenfetelli and Schwarz (2011). Amplifiers influence the intention and they moderate the intention behavior relation. Consequently, our results contribute to technology acceptance research in general by introducing amplifiers as an additional category for factors influencing usage behavior and by empirically demonstrating their different influencing process in terms of moderating the intention behavior relation.

8.4 ADDICTS DO NOT INTENT TO DISCONTINUE USING SNS

Recently, Turel et al. (2011) posit that addiction distorts the perceptual beliefs of users in a way that addicts perceive a technology as more useful, easier to use, and more enjoyable. As Turel et al. (2011) aim to theorize and reveal the influence of addiction on perceptual beliefs, the effect of user addiction on other variables has not been researched so far, so that they come to the conclusion that future research should identify whether satisfaction or intentions are also influenced by user addiction (Turel et al., 2011, p. 1057).

To contribute to that stream of research, we theorize that addiction has an impact on SNS-specific beliefs but also on satisfaction and intentions. Here we contribute the finding that addiction influences discontinuous usage intentions, so that addicts have lower discontinuous

usage intentions than non-addicts. This means that we extend the recent findings of Turel et al. (2011) whereby – next to the distortion of perceptual beliefs – addiction also influences behavioral intentions in post-acceptance research.

8.5 PERCEIVING TECHNO-EXHAUSTION CAUSES ADVERSE PSYCHOLOGICAL REACTIONS IN POST-ACCEPTANCE USAGE

Recent research in the field of technostress research posits antecedents of techno-exhaustion caused by using technologies and discusses that future research might to open the black box of consequences of techno-exhaustion (Ayyagari et al., 2011, p. 851/852). Based on our research results we can contribute to this research stream by identifying that techno-exhaustion influences satisfaction as well as discontinuous usage intentions. This means that individuals, who are exhausted from using a technology, are less satisfied with a technology and have higher intentions to discontinue using a technology.

Hence, we can conclude that techno-exhaustion is of significance in post-acceptance research as it causes low levels of satisfaction and high intentions to stop using a technology. As a consequence, future research in the field of post-acceptance research (e.g., Bhattacherjee, 2001) should include techno-exhaustion in order to understand in more detail the interplay between technology characteristics, satisfaction, and behavioral intentions.

8.6 ENJOYMENT HAS A HIGHER IMPACT ON SNS SATISFACTION THAN USEFULNESS

Prior research discusses enjoyment as central perceptual belief in the context of SNS usage (e.g., Maier et al., 2012; Li et al., 2013). In contrast, Xu et al. (2012) postulate that SNS usage is particularly grounded in whether or not individuals consider the usage of SNS as useful, so that the question arises whether usefulness or enjoyment determines individuals' SNS usage behavior. Here, we contribute to this ongoing discussion as in our study enjoyment provides a higher explanatory power of satisfaction than perceived usefulness. Consequently, future research should at least include enjoyment as an additional perception to usefulness when attempting to explain SNS-specific satisfaction.

8.7 PAST USAGE BEHAVIOR DOES INFLUENCE SNS-SPECIFIC BELIEFS, BUT DOES NOT WHETHER SNS USER DEVELOP DISCONTINUOUS USAGE INTENTIONS

Based on IS post-acceptance research, past usage behavior influences perceptual beliefs as well as behavioral intentions (Kim, 2009), so that individuals using a technology frequently have more positive beliefs and higher intentions than individuals using a technology seldom. However, we can only partially confirm these results in the context of SNS usage. Even though past usage influences whether SNS are perceived as useful and provide fun to its users, it has no influence on discontinuous usage intention. One particular difference from this research to the research of Kim (2009) is that this research focuses on using a voluntary technology in private settings and Kim (2009) uses data from the organizational context where technology usage is mandated. As a consequence, we can contribute the finding that past usage behavior might have different impacts on behavioral intentions depending on the respective usage settings.

Moreover, research in the stream of SNS identifies past usage behavior as an antecedent of habit (Turel and Serenko, 2012). This means that individuals using SNS excessively use them habitually. Here, we extend this finding by identifying that past usage behavior also influences

SNS-specific perceptual beliefs. In summary, the results of prior research (Turel and Serenko, 2012) as well as our results indicate that past usage behavior influences habit as well as perceptual beliefs.

8.8 ADDICTS NEED HELP TO ESCAPE FROM THE STATUS QUO; NON-ADDICTS SHOULD BE AWARE OF THE ADVERSE CONSEQUENCE

From a user's perspective, our research results are also of practical importance. The distortion of users' discontinuous usage intention means that addicts have lower intentions to stop using Facebook and, even more important, addicts do not transfer high discontinuous usage intentions in non-usage behavior. Consequently, it is almost impossible for addicts to stop using Facebook. However, as addiction is a negative consequence from an individual's and the societal perspective it is necessary for addicts to escape from the adverse status quo. But as this is – due to the low discontinuous usage intentions and the fact that high discontinuous usage intentions are not transferred in non-usage behavior – not possible for addicts, they need external help. This means that the social environment of addicts has to call their attention to the fact that they use Facebook too extensively and neglect important things in their real lives. This might help addicts question their usage behavior and so escape their status quo as addicts.

Moreover, as it is difficult to change behavior when addicted, and so it is essential to prevent non-addicts becoming addicted. Teachers, parents, or employers among others, should raise the issue that although Facebook increasingly plays a role in individuals' lives as well as organizations' processes it might have adverse outcomes, in order for users to be aware of this.

8.9 DIMINISHING USERS PERCEIVED TECHNO-EXHAUSTION TO SATISFY THEM AND TO DECREASE INTENTIONS TO STOP USING SNS

From the perspective of SNS providers, the presented results indicate that techno-exhaustion is one particular parameter of whether users are satisfied with and whether users intend to stop using SNS. As SNS providers wish to have high numbers of satisfied users, they should ensure that their users do not experience techno-exhaustion when using SNS. Here, prior research in the field of SNS as well as in general technostress research reveals factor that cause users perception of techno-exhaustion (Ragu-Nathan et al., 2008; Ayyagari et al., 2011; Maier et al., 2012). Here, potentially stressful stimuli, such as a high complexity or the uncertainty caused by constant changes in SNS, applications, or terms and conditions, are potential parameters for satisfying users, so that they do not intend to stop using SNS.

8.10 LIMITATION AND FUTURE RESEARCH

The results presented and discussed in this research are limited due to certain points. One, the participants of the two surveys registered in Facebook at different dates. Hence, these different starting points for using Facebook means that participants might have collected different levels of experience. Although results might differ when focusing on a group of individuals who are just starting to use SNS at the same point in time, we included the control variable period of usage in our research model (Table 3). This indicates the number of months an individual uses Facebook. Results show that this has no significant influence on any variable studied in this research model, so that this should not influence our results significantly. Two, this research aims to contribute to the stream of post-acceptance research when using voluntary technology in private settings (e.g., van der Heijden, 2004; Turel et al., 2011; Turel and Serenko, 2012). Nonetheless, focusing on contributing to this stream of research, the results are limited as these cannot be transferred to post-acceptance research when using technologies mandated in

organizations. Three, all participants have the same cultural background. This might limit the results as SNS users from another culture might differ in their susceptibility to perceiving techno-exhaustion from or being addicted to using SNS. Moreover, the consequences of techno-exhaustion and addiction on perceptual beliefs, satisfaction, discontinuous usage intentions or the intention-behavior relation might differ for individuals from other cultural backgrounds.

Our research results offer a wide range of different future research possibilities. Among others, a deeper understanding of the relations between past usage, addiction, and perceptual beliefs is necessary to explain theoretically why the significant influence of addiction on perceptual beliefs becomes insignificant when including the fact that past behavior has an impact on perceptual beliefs (Kim, 2009). Other fruitful areas of research might be possible when focusing on the stream of user personality. Although we control the results concerning the impact of user personality on non-usage behavior as proposed by McElroy et al. (2007), Devaraj et al. (2008) identify predispositions as moderator of belief-intention relations. Here, future research might focus on the role of user personality on relations between addiction and techno-exhaustion on satisfaction or discontinuous usage intention respectively, to understand whether the effects of these two negative sides of SNS usage depend on user personality.

9 CONCLUSION

Recent research in the field of SNS research indicates that the usage of SNS has both a positive side and a negative side. Although the influence of beneficial aspects of IT usage, such as the usefulness and enjoyment, on post-acceptance usage is well researched, the influence of negative effects remains unclear. Therefore, this research reveals that techno-exhaustion causes users to become dissatisfied and develop intentions to discontinue using SNS. Moreover, addicts do not develop discontinuous usage behavior. Notably, although discontinuous usage intentions are widely transferred into non-usage behavior, addicts have significantly higher thresholds above which discontinuous usage intentions are transferred in non-usage behavior. Based on these results our research makes a contribution by theorizing and evaluating this moderation effect, by analyzing and discussing the diverse impact of addition on belief distortion, and by introducing the concept of amplifiers to distinguish the factors influencing technology usage that only have a positive end from the well-known categories of enablers and inhibitors.

10 REFERENCES

Agarwal, R., Animesh, A., and Prasad, K., 2009. Social Interactions and the "Digital Divide": Explaining Variations in Internet Use. Information Systems Research (20:2), pp. 277–294.

Agarwal, R., and Karahanna, E., 2000. Time flies when you're having fun: Cognitive Absorption and beliefs about information technology usage. MIS Quarterly (24:4), pp. 665–694.

Ahuja, M. K., Chudoba, K. M., Kacmar, C. J., McKnight, H. D., and George, J. F., 2007. IT Road Warriors: Balancing work-family conflict, job autonomy, and work overload to mitigate turnover intentions. MIS Quarterly (31:1), pp. 1–17.

Ajzen, I., 1991. The theory of planned behavior. Organizational Behavior and Human Decision Processes (50:2), pp. 179–211.

Ajzen, I., 2002. Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. Journal of Applied Social Psychology (32:4), pp. 665–683.

Alam, M. M., and Wagner, C., 2013. "Facebook Distress": A Model to Investigate Discontinuation of Social Networking Site Use. PACIS 2013 Proceedings. Paper 179.

Allen, D. G., Weeks, K. P., and Moffitt, K. R., 2005. Turnover Intentions and Voluntary Turnover: The Moderating Roles of Self-Monitoring, Locus of Control, Proactive Personality, and Risk Aversion. Journal of Applied Psychology (90:5), pp. 980–990.

Amichai-Hamburger, Y., Kingsbury, M., and Schneider, B. H., 2013. Friendship: An old concept with a new meaning? Computers in Human Behavior (29:1), pp. 33–39. doi: 10.1016/j.chb.2012.05.025.

Andreassen, C. S., Torsheim, T., Brunborg, G. S., and Pallesen, S., 2012. Development of a Facebook addiction scale. Psychological Reports (110:2), pp. 501–517. doi: 10.2466/02.09.18.PR0.110.2.501-517.

Ayyagari, R., Grover, V., and Purvis, R., 2011. Technostress: Technological Antecedents and Implications. MIS Quarterly (35:4), pp. 831–858.

Bem, D., 1972. Self-Perception Theory. In: Advances in experimental social psychology. Berkowitz, L. (ed.), pp. 1–62. Academic Press, New York.

Bhattacherjee, A., 2001. Understanding Information Systems Continuance: An Expectation-Confirmation Model. MIS Quarterly (25:3), pp. 351–370.

Bhattacherjee, A., and Sanford, C., 2009. The intention–behaviour gap in technology usage: the moderating role of attitude strength. Behavior & Information Technology (28:4), pp. 389–401.

Bourdieu, P., 1986. The forms of capital. In: Handbook of theory and research for the sociology of education. Richardson, J. G. (ed.), pp. 241–258. Greenwood Press, New York.

Brown, S. A., and Venkatesh, V., 2005. Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Life Cycle. MIS Quarterly (29:3), pp. 399–426.

Brown, S. A., Venkatesh, V., and Goyal, S., 2012. Expectation Confirmation in Technology Use. Information Systems Research (23:2), pp. 1-14.

Campell, D. T., and Fiske, D. W., 1959. Convergent and discriminant validation by the multitrait-multimethod matrix. Psychological Bulletin (56:2), pp. 81–105.

Carmines, E. G., and Zeller, R. A., 2008. Reliability and validity assessment, Sage Publ., Newbury Park, Calif.

Cenfetelli, R. T., 2004. Inhibitors and Enablers as Dual Factor Concepts in Technology Usage. Journal of the Association for Information Systems (5:11-12), pp. 472–492.

Cenfetelli, R. T., and Schwarz, A., 2011. Identifying and Testing the Inhibitors of Technology Usage Intentions. Information Systems Research (22:4), pp. 808–823.

Chin, W. W., 1998. The Partial Least Squares Approach to Structural Equation Modeling. In: Modern methods for business research. Marcoulides, G. A. (ed.), pp. 295–336. Erlbaum, Mahwah N.J.

Cohen, J., Cohen, P., West, S. G., and Aiken, L. S., 2002. Applied Multiple Regression - Correlation Analysis for the Behavioral Sciences, 3rd edn. Lawrence Erlbaum, Mahwah, N.J.

Cooper, C. L., Dewe, P., and O'Driscoll, M. P., 2001. Organizational stress: A review and critique of theory, research, and applications. Sage, Thousand Oaks, Calif.

Davis, F. D., 1989. Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology. MIS Quarterly (13:3), pp. 319–340.

Davis, R. A., 2001. A cognitive-behavioral model of pathological Internet use. Computers in Human Behavior (17:2), pp. 187–195.

Devaraj, S., Easley, R. F., and Crant, J. M., 2008. How Does Personality Matter? Relating the Five-Factor Model to Technology Acceptance and Use. Information Systems Research (19:1), pp. 93–105.

Dwivedi, Y. K., Williams, M. D., and Venkatesh, V., 2008. Guest Editorial: A profile of adoption of Information & Communication Technologies (ICT) research in the household context. Information Systems Frontiers (10:4), pp. 385–390. doi: 10.1007/s10796-008-9101-8.

Ellison, N. B., Steinfield, C., and Lampe, C., 2011. Connection Strategies: Social Capital Implications of Facebook-enabled Communication Practices. New Media & Society (13:6), pp. 873–892.

Fornell, C., and Larcker, D. F., 1981. Evaluating Structural equation models with unobservable variables and measurement error. Journal of Marketing Research (18:1), pp. 39–50.

Henseler, J., Ringle, C. M., and Sinkovics Rudolf R., 2009. The use of partial least squares path modeling in international marketing. Advances in International Marketing (20), pp. 277–319.

Hsieh, J. J. P.-A., Rai, A., and Keil, M., 2011. Addressing Digital Inequality for the Socioeconomically Disadvantaged Through Government Initiatives: Forms of Capital That Affect ICT Utilization. Information Systems Research (22:2), pp. 233–253.

Huang, H., and Leung, L., 2009. Instant Messaging Addiction among Teenagers in China: Shyness, Alienation, and Academic Performance Decrement. CyberPsychology & Behavior (12:6), pp. 675–679. doi: 10.1089/cpb.2009.0060.

Hulland, J. S., 1999. Use of partial least squares (PLS) in strategic management research: A review of four recent studies. Strategic Management Journal (20:2), pp. 195–204.

Ito, T. A., Larsen, J. T., Smith, N. K., and Cacioppo, J. T., 1998. Negative information weighs more heavily on the brain: The negativity bias in evaluative categorizations. Journal of Personality and Social Psychology (75:4), pp. 887–900.

Khan, Z., and Jarvenpaa, S. L., 2010. Exploring temporal coordination of events with Facebook.com. Journal of Information Technology (25:2), pp. 137–151.

Kim, S. S., 2009. The integrative framework of technology use: An extension and test. MIS Quarterly (33:3), pp. 513–537.

Kim, S. S., and Malhotra, N. K., 2005. A Longitudinal Model of Continued IS Use: An Integrative View of Four Mechanisms Underlying Postadoption Phenomena. Management Science (51:5), pp. 741–755.

Koroleva, K., Krasnova, H., Veltri, N., and Günther, O., 2011. It's all about networking! Empirical investigation of social capital formation on social network sites. Proceedings of the international conference on information systems.

Krasnova, H., Spiekermann, S., Koroleva, K., and Hildebrand, T., 2010. Online social networks: why we disclose. Journal of Information Technology (25:2), pp. 109–125.

Krasnova, H., Veltri, N. F., and Günther, O., 2012. Self-disclosure and Privacy Calculus on Social Networking Sites: The Role of Culture. Business & Information Systems Engineering (4:3), pp. 127–135. doi: 10.1007/s11576-012-0323-5.

Kuss, D. J., and Griffiths, M. D., 2011. Online Social Networking and Addiction—A Review of the Psychological Literature. International Journal of Environmental Research and Public Health (8:12), pp. 3528–3552. doi: 10.3390/ijerph8093528.

Lankton, N. K., and McKnight, H. D., 2012. Examining Two Expectation Disconfirmation Theory Models: Assimilation and Asymmetry Effects. Journal of the Association for Information Systems (13:2), pp. 88–115.

LaRose, R., and Eastin, M. S., 2002. Is Online Buying Out of Control? Electronic Commerce and Consumer Self-Regulation. Journal of Broadcasting & Electronic Media (46:4), pp. 549–564. doi: 10.1207/s15506878jobem4604_4.

Li, H., Liu, Y., Xu, X., and Heikkila, J., 2013. Please stay with me! An empirical investigation on hedonic IS continuance model for social network games. Proceedings of the 34th International Conference on Information Systems.

Liang, H., Saraf, N., Hu, Q., and Xue, Y., 2007. Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management. MIS Quarterly (31:1), pp. 59–87.

Liao, C., Chen, J.-L., and Yen, D. C., 2007. Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-service: An integrated model. Computers in Human Behavior (23:6), pp. 2804–2822.

Lim, K. H., Benbasat, I., and Ward, L. M., 2000. The Role of Multimedia in Changing First Impression Bias. Information Systems Research (11:2), pp. 115–136.

Limayem, M., and Hirt, S. G., 2003. Force of Habit and Information Systems Usage: Theory and Initial Validation. Journal of the Association for Information Systems (4:1), pp. 65–97.

Limayem, M., Hirt, S. G., and Cheung, C. M., 2007. How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance. MIS Quarterly (31:4), pp. 705–737.

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T., 2012. Online Social Networks as a Source and Symbol of Stress: An Empirical Analysis. Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL).

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T., 2014. Giving too much Social Support: Social Overload on Social Networking Sites. European Journal of Information Systems. forthcoming.

Manago, A. M., Taylor, T., and Greenfield, P. M., 2012. Me and my 400 friends: The anatomy of college students' Facebook networks, their communication patterns, and well-being. Developmental Psychology (48:2), pp. 369–380. doi: 10.1037/a0026338.

McElroy, J. C., Hendrickson, A. R., Townsend, A. M., and DeMarie, S. M., 2007. Dispositional Factors in Internet Use: Personality Versus Cognitive Style. MIS Quarterly (31:4), pp. 809–820.

Moore, K., and McElroy, J. C., 2012. The influence of personality on Facebook usage, wall postings, and regret. Computers in Human Behavior (28:1), pp. 267–274.

Oliver, R., 1977. Effect of Expectation and Disconfirmation on Postexposure Product Evaluations: An Alternative Interpretation. Journal of Applied Psychology (62:4), pp. 480–486.

Oliver, R., 1980. A Cognitive Model for the Antecedents and Consequences of Satisfaction. Journal of Marketing Research (17:4), pp. 460–469.

Ortiz de Guinea, A., and Markus, M. L., 2009. Why Break the Habit of a Lifetime? Rethinking the Roles of Intention, Habit, and Emotion in Continuing Information Technology Use. MIS Quarterly (33:3), pp. 433–444.

Podsakoff, N. P., LePine, J., and Lepine, M. A., 2007. Differential Challenge Stressor–Hindrance Stressor Relationships With Job Attitudes, Turnover Intentions, Turnover, and Withdrawal Behavior: A Meta-Analysis. Journal of Applied Psychology (92:2), pp. 438–454.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., and Podsakoff, N. P., 2003. Common Method Biases in Behavioral Research: A Critical Review and Recommended Remedies. Journal of Applied Psychology (83:5), pp. 879–903.

Posey, C., Lowry, P. B., Roberts, T. L., and Ellis, T. S., 2010. Proposing the online community self-disclosure model: the case of working professionals in France and the U.K. who use online communities. European Journal of Information Systems (19:2), pp. 181–195. doi: 10.1057/ejis.2010.15.

Powell, M., and Ansic, D., 1997. Gender differences in risk behaviour in financial decision-making: An experimental analysis. Journal of Economic Psychology (18:6), pp. 605–628.

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., and Qiang, T., 2008. The Consequences of Technostress for End Users in Organizations: Conceptual Development and Empirical Validation. Information Systems Research (1:4), pp. 417–433.

Rammstedt, B., and John, O. P., 2007. Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. Journal of Research in Personality (41:1), pp. 203–212. doi: 10.1016/j.jrp.2006.02.001.

Riedl, R., 2013. On the Biology of Technostress: Literature Review and Research Agenda. The DATABASE for Advances in Information Systems (44:1), pp. 18–55.

Rihet, P., Possamai, C.-A., Micallef-Roll, J., Blin, O., and Hasbroucq, T., 2002. Dopamine and human information processing: a reaction-time analysis of the effect of levodopa in healthy subjects. Psychopharmacology (163:1), pp. 62–67.

Ringle, C. M., Wende, S., and Will, A., 2005. SmartPLS, 2.0 (beta). University of Hamburg.

Robinson, T. E., and Berridge, K. C., 2003. Addiction. Annual Review of Psychology (54:1), pp. 25–53.

Roca, J., Chiu, C.-M., and Martínez, F., 2006. Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. International Journal of Human-Computer Studies (64:8), pp. 683–696.

Rutner, P. S., Hardgrave, B. C., and McKnight, H. D., 2008. Emotional Dissonance and the Information Technology Professional. MIS Quarterly (32:3), pp. 635–652.

Ryan, T., and Xenos, S., 2011. Who uses Facebook? An investigation into the relationship between the Big Five, shyness, narcissism, loneliness, and Facebook usage. Computers in Human Behavior (27:5), pp. 1658–1664. doi: 10.1016/j.chb.2011.02.004.

Schultz, W., 1998. Predictive reward signal of dopamine neurons. Journal of Neurophysiology (80:1), pp. 1–27.

Schwarz, A., Schwarz, C., Jung, Y., Pérez, B., and Wiley-Patton, S., 2011. Towards an understanding of assimilation in virtual worlds: the 3C approach. European Journal of Information Systems (21:3), pp. 303–320. doi: 10.1057/ejis.2011.49.

Sellman, D., 2010. The 10 most important things known about addiction. Addiction (105:1), pp. 6–13. doi: 10.1111/j.1360-0443.2009.02673.x.

Shaffer, H. J., 1996. Understanding the means and objects of addiction: Technology, the internet, and gambling. Journal of Gambling Studies (12:4), pp. 461–469. doi: 10.1007/BF01539189.

Sheeran, P., 2002. Intention-Behavior Relations: A Conceptual and Empirical Review. European review of social psychology (12:1), pp. 1–36. doi: 10.1080/14792772143000003.

Sherman, L. E., and Greenfield, P. M., 2013. Forging friendship, soliciting support: A mixed-method examination of message boards for pregnant teens and teen mothers. Computers in Human Behavior (29:1), pp. 75–85. doi: 10.1016/j.chb.2012.07.018.

Shi, N., Lee, M. K., Cheung, C., and Chen, H., 2010. The Continuance of Online Social Networks: How to Keep People Using Facebook? Proceedings of the 43rd Hawaii International Conference on System Sciences.

Sniehotta, F. F., Scholz, U., and Schwarzer, R., 2005. Bridging the intention–behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. Psychology & Health (20:2), pp. 143–160. doi: 10.1080/08870440512331317670.

Stein, D. J., Hollander, E., and Rothbaum, B. O., 2010. Textbook of anxiety disorders, 2nd ed. American Psychiatric Pub., Washington, DC.

Subrahmanyam, K., Reich, S. M., Waechter, N., and Espinoza, G., 2008. Online and offline social networks: Use of social networking sites by emerging adults. Journal of Applied Developmental Psychology (29:6), pp. 420–433.

Sun, H., 2013. A longitudinal study of herd behavior in the adoption and continued use of technology. MIS Quarterly (4:37), pp. 1013–1041.

Sun, H., and Zhang, P., 2006. The role of moderating factors in user technology acceptance. International Journal of Human-Computer Studies (64:2), pp. 53–78. doi: 10.1016/j.ijhcs.2005.04.013.

Tarafdar, M., Tu, Q., and Ragu-Nathan, T. S., 2010. Impact of Technostress on End-User Satisfaction and Performance. Journal of Management Information Systems (27:3), pp. 303–334.

Trevino, L., and Webster, J., 1992. Flow in Computer-Mediated Communication: Electronic Mail and Voice Mail Evaluation and Impacts. Communication Research (19:5), pp. 539–573.

Turel, O., and Serenko, A., 2010. Is mobile email addiction overlooked? Communications of the ACM (53:5), p. 41. doi: 10.1145/1735223.1735237.

Turel, O., and Serenko, A., 2012. The benefits and dangers of enjoyment with social networking websites. European Journal of Information Systems (21:5), pp. 512–528. doi: 10.1057/ejis.2012.1.

Turel, O., Serenko, A., and Giles, P., 2011. Integrating Technology Addiction and Use: An Empirical Investigation of Online Auction Users. MIS Quarterly (35:4), pp. 1043–1061.

van der Heijden, H., 2004. User Acceptance of Hedonic information Systems. MIS Quarterly (28:4), pp. 695–704.

Venkatesh, V., and Brown, S. A., 2001. A Longitudinal Investigation of Personal Computers in Homes: Adoption Determinants and Emerging Challenges. MIS Quarterly (25:1), pp. 71–102.

Venkatesh, V., and Morris, M. G., 2000. Why don't men ever stop to ask for directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behavior. MIS Quarterly (24,1), pp. 115–139.

Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D., 2003. User Acceptance of Information Technology: Toward a unified View. MIS Quarterly (27:3), pp. 425–478.

Williams, L. J., Edwards, J., and Vandenberg, R., 2003. Recent Advances in Causal Modeling Methods for Organizational and Management Research. Journal of Management (29:6), pp. 903–936.

Williams, M. D., Dwivedi, Y. K., Lal, B., and Schwarz, A., 2009. Contemporary trends and issues in IT adoption and diffusion research. Journal of Information Technology (24:1), pp. 1–10.

Wilson, R. E., Gosling, S. D., and Graham, L. T., 2012. A Review of Facebook Research in the Social Sciences. Perspective on Psychological Science (7:3), pp. 203–220.

Xu, C., Ryan, S., Prybutok, V., and Wen, C., 2012. It is not for fun: An examination of social network site usage. Information & Management (49:5), pp. 210–217. doi: 10.1016/j.im.2012.05.001.

Xu, H., and Tan, B. C. Y., 2012. Why do I keep checking Facebook: Effects of message characteristics on the formation of social network services addiction. ICIS 2012 Proceedings.

Xu, Z., Turel, O., and Yuan, Y., 2011. Online game addiction among adolescents: motivation and prevention factors. European Journal of Information Systems (21:3), pp. 321–340. doi: 10.1057/ejis.2011.56.

Young, K., 2010. Internet addiction over the decade: a personal look back. World Psychiatry (9: 2), p. 91.

Young, K. S., 1996. Psychology of computer use: XL. Addictive use of the internet: A case that breaks the stereotype. Psychological Reports (79:3), pp. 899–902. doi: 10.2466/pr0.1996.79.3.899.

Young, K. S., 1998a. Caught in the net: How to recognize the signs of Internet addiction--and a winning strategy for recovery. J. Wiley, New York.

Young, K. S., 1998b. Internet Addiction: The Emergence of a New Clinical Disorder. CyberPsychology & Behavior (1:3), pp. 237–244. doi: 10.1089/cpb.1998.1.237.

11 APPENDIX A: MEASUREMENT ITEMS

Constructs		Loadings
PUB1	I participated in Facebook actively by posting and sharing thoughts, feelings, and impressions as well as by reacting to posts of friends.	0.761
PUB2	I participated in Facebook passively by following news and reading the newsfeed.	0.852
PUB3	I used Facebook to communicate (e.g., chat, private messages) with friends.	0.727
PUB4	I used Facebook to browse the profiles of friends or other users.	0.745
PUB5	I used Facebook to search for people and send friendship requests.	0.768
PU1	Using Facebook is useful to stay in contact with friends.	0.885
PU2	Using Facebook is useful to communicate with friends.	0.913
PU3	Overall, using Facebook is useful.	0.899
PE1	Using Facebook is enjoyable.	0.904
PE2	Using Facebook is pleasurable.	0.910
PE3	Using Facebook is fun.	0.933
PE4	Using Facebook is exciting.	0.885
PE5	Using Facebook is interesting.	0.923
SAT1	I am very pleased with using Facebook.	0.860
SAT2	I am very contented with using Facebook.	0.827
SAT3	I am very delighted with using Facebook.	0.883
SAT4	I am very satisfied with using Facebook.	0.810
SAT5	Overall, using Facebook is satisfactory.	0.832
Exh1	I feel drained from activities that require me to use Facebook.	0.902
Exh2	I feel tired from my Facebook activities.	0.925
Exh3	Using Facebook is a strain for me.	0.940
Exh4	I feel burned out from my Facebook activities.	0.884
ADD1	I sometimes neglect important things because of my interest in Facebook.	0.903
ADD2	My social life has sometimes suffered because of me interacting with Facebook.	0.831
ADD3	Using Facebook sometimes interfered with other activities.	0.910
ADD4	When I am not using Facebook, I often feel agitated.	0.719
ADD5	I have made unsuccessful attempts to reduce the time I interact with Facebook.	0.761
DisContInt1	I will unregister in Facebook.	0.823
DisContInt2	In the future, I will use another social network site.	0.868
DisContInt3	In the future, I will use Facebook far less than today.	0.789
SI1	My social environment thinks that I should use Facebook.	0.837
SI2	My social environment expects me to use Facebook.	0.996
HAB1	Using Facebook has become automatic to me.	0.928
HAB2	Using Facebook is natural to me.	0.908
HAB3	When I want to interact with friends and relatives, using Facebook is an obvious choice for me.	0.770
HAB4	When I want to have fun, using Facebook is an obvious choice for me.	0.897
EXTRA1	I see myself as someone who is reserved.	0.981
EXTRA2	I see myself as someone who is outgoing, sociable.	0.859
NEURO1	I see myself as someone who is relaxed, handles stress well.	0.857
NEURO2	I see myself as someone who gets nervous easily.	0.938

Table 5: Measures

12 APPENDIX B: MEASUREMENT VALIDATION

	Construct	Mean (SD)	AVE	CR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Past Usage Behavior	4.81 (0.76)	0.60	0.88	0.772															
2	Perceived Usefulness	5.43 (1.19)	0.81	0.93	0.51	0.899														
3	Perceived Enjoyment	5.11 (1.11)	0.83	0.96	0.52	0.60	0.911													
4	Satisfaction	4.68 (1.05)	0.71	0.92	0.43	0.62	0.69	0.843												
5	Techno-exhaustion	2.59 (1.41)	0.83	0.95	0.01	-0.25	-0.34	-0.41	0.913											
6	Addiction	2.28 (1.20)	0.69	0.92	0.40	0.12	0.14	0.05	0.39	0.828										
7	Discontinuous Usage Intention	2.85 (1.25)	0.68	0.87	-0.24	-0.40	-0.52	-0.49	0.44	-0.03	0.827									
8	Non-Usage Behavior	0.08 (0.28)	1.00	1.00	-0.12	-0.13	-0.26	-0.20	0.17	-0.20	0.49	*Single item construct*								
9	Social Influence	3.40 (1.57)	0.85	0.92	0.25	0.17	0.13	0.09	0.19	0.31	-0.05	-0.07	0.920							
10	Period of Usage	4.04 (1.70)	1.00	1.00	-0.11	-0.21	-0.12	-0.12	0.05	-0.09	0.12	0.02	0.00	*Single item construct*						
11	Habit	4.98 (1.37)	0.77	0.93	0.60	0.58	0.56	0.57	-0.19	0.34	-0.35	-0.15	0.21	-0.18	0.878					
12	Gender	1.45 (0.50)	1.00	1.00	0.00	-0.09	-0.16	-0.15	0.02	0.03	0.15	0.08	0.05	0.00	-0.12	*Single item construct*				
13	Age	38.5 (10.5)	1.00	1.00	-0.26	-0.30	-0.16	-0.11	-0.10	-0.26	0.06	0.02	-0.20	0.14	-0.30	0.06	*Single item construct*			
14	Number of Friends	197 (191)	1.00	1.00	-0.27	-0.30	-0.20	-0.19	0.13	-0.15	0.20	-0.04	-0.09	0.23	-0.32	-0.08	0.21	*Single item construct*		
15	Extraversion	4.66 (1.35)	0.85	0.92	0.14	0.13	0.08	0.04	-0.02	0.02	0.01	0.06	0.03	-0.08	0.13	-0.03	-0.11	-0.18	0.922	
16	Neuroticism	3.34 (1.35)	0.81	0.89	0.09	0.07	0.03	-0.06	0.24	0.29	-0.01	-0.13	0.16	0.05	0.06	-0.17	-0.19	0.07	-0.11	0.898

Note: Square Root of AVE is listed and highlighted on the diagonal of bivariate correlations

Table 6: Validation of PLS model

4.

Chapter IV

Technostress and user personality

Paper VIII

PERSONALITY WITHIN INFORMATION SYSTEMS RESEARCH:

A LITERATURE ANALYSIS

Christian Maier
University of Bamberg

Proceedings of the 20th European Conference on Information System (ECIS), Barcelona, Spain

http://aisel.aisnet.org/ecis2012/101

Paper IX

USING USER PERSONALITY TO EXPLAIN THE INTENTION-BEHAVIOR GAP AND CHANGES IN BELIEFS:

A LONGITUDINAL ANALYSIS

Christian Maier
University of Bamberg

Sven Laumer
University of Bamberg

Andreas Eckhardt
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Tim Weitzel
University of Bamberg

Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL), USA

http://aisel.aisnet.org/icis2012/proceedings/HumanBehavior/14/

5.

Chapter V

Psychophysiological reactions to technostress

Paper X

OBJECTIVE MEASURES OF IS USAGE BEHAVIOR UNDER CONDITIONS OF EXPERIENCE AND PRESSURE USING EYE FIXATION DATA

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http://aisel.aisnet.org/icis2013/proceedings/HumanBehavior/26/

Appendix

PUBLICATIONS

SCIENTIFIC JOURNALS (PEER REVIEWED)

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. (2014). Who really quits? A longitudinal analysis of voluntary turnover among IT personnel, The DATA BASE for Advances in Information Systems, forthcoming

Eckhardt, A., Laumer, S., Maier, C., and Weitzel, T. (2014). The effect of personality on IT personnel's job-related attitudes: Establishing a dispositional model of turnover intention across IT job types, Journal of Information Technology, forthcoming

Maier, C., Laumer, S., and Eckhardt A. (2014), Information technology as daily stressor: pinning down the causes of burnout, Journal of Business Economics, forthcoming

Laumer, S., Maier, C., and Eckhardt A. (2014), The Impact of Business Process Management and Applicant Tracking Systems on Recruiting Process Performance: An Empirical Study, Journal of Business Economics, forthcoming

Eckhardt, A., Laumer, S., Maier, C., and Weitzel, T. (2014), The Transformation of People, Processes, and IT in E-Recruiting: Insights from an Eight-year Case Study of a German Media Corporation, Employee Relations (36:4), 415 - 431.
doi: 10.1108/ER-07-2013-0079

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. (2014), Giving too much Social Support: Social Overload on Social Networking Sites, Forthcoming in: European Journal of Information Systems (EJIS).
doi: 10.1057/ejis.2014.3

Laumer, S., Beimborn, D., Maier, C., and Weinert, C. (2013), Enterprise Content Management, Business & Information Systems Engineering (BISE) (5:6), 449-452.
http://link.springer.com/article/10.1007/s12599-013-0291-3

Laumer, S., Beimborn, D., Maier, C., and Weinert, C. (2013), Enterprise-Content-Management, WIRTSCHAFTSINFORMATIK (WI) (55:6), 453-456.
http://link.springer.com/article/10.1007/s11576-013-0384-0

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. (2013), Analyzing the impact of HRIS implementations on HR personnel's job satisfaction and turnover intention, The Journal of Strategic Information Systems (JSIS) (22:3), 193-207.
http://dx.doi.org/10.1016/j.jsis.2012.09.001

Eckhardt, A., Laumer, S., Maier, C., and Weitzel, T. (2012), Bewerbermanagementsysteme in deutschen Großunternehmen: Wertbeitrag von IKT für dienstleistungsproduzierende Leistungs- und Lenkungssysteme, Zeitschrift für Betriebswirtschaft (ZfB) (Journal of Business Economics), Special Issue 04/2012, 47-75

CONFERENCE PROCEEDINGS (PEER REVIEWED)

Maier, C. and Laumer, S. (2014), Technostress-induced distorted pre-adoption beliefs, Proceedings of the Gmunden Retreat on NeuroIS 2014, Gmunden, Austria

Weinert, C., Maier, C., and Laumer, S. (2014), The Relationship between Psychological, Physiological, and Behavioral Strain towards Technostress, Proceedings of the Gmunden Retreat on NeuroIS 2014, Gmunden, Austria

Weinert, C., Maier, C., and Laumer, S. (2014), Technostress-induced Skin Conductance Response Patterns and Performance, Proceedings of the Gmunden Retreat on NeuroIS 2014, Gmunden, Austria

Laumer, S., Maier, C., and Eckhardt, A. (2014), The impact of human resources information systems and business process management implementations on recruiting process performance: A case study, Proceedings of the 20th Americas Conference on Information Systems (AMCIS), Savannah (GA)

Weinert, C., Maier, C., Laumer, S., and Weitzel, T. (2014), Does teleworking negatively influence IT professionals? An empirical analysis of IT personnel's telework-enabled stress, Proceedings of the 2014 ACM SIGMIS CPR Conference, Singapore

Illig, S., Laumer, S., Maier, C., and Weitzel, T. (2014), Why IS after all? An Explorative Analysis of Professionals' Letters of Study Motivation, Proceedings of the 47th Hawaii International Conference on System Sciences (HICSS), Big Island (HI)

Buettner, R., Daxenberger, B., Eckhardt, A., and Maier, C. (2013), Cognitive workload induced by Information Systems: Introducing an objective way of measuring based on pupillary diameter responses, Proceedings of the 12th Annual HCI/MIS Research Workshop (Pre-ICIS Workshop), Milan, Italy

Weinert, C., Maier, C., Laumer, S., and Weitzel, T. (2013), The influence of coping mechanisms on technostress, Proceedings of the Special Interest Group on Adoption and Diffusion of Information Technology (DIGIT) (Pre-ICIS Workshop), Milan, Italy

Maier, C., Laumer, S., and Weitzel, T. (2013), Although I am stressed, I still use IT! Theorizing the decisive impact of strain and addiction of social network site users in post-acceptance theory, Proceedings of the 34th International Conference on Information Systems (ICIS), Milan, Italy

Eckhardt, A., Maier, C., Hsieh, J.J., Chuk, T., Chan, A., Hsiao, J., and Buettner, R. (2013), Objective measures of IS usage behavior under conditions of experience and pressure using eye fixation data, Proceedings of the 34th International Conference on Information Systems (ICIS), Milan, Italy

Laumer, S., Maier, C., and Eckhardt, A. (2013), The Impact of Business Process Management and Applicant Tracking Systems on Recruiting Process Performance: A Representative Empirical Study with Germany's Top-1,000 Organizations, Erweiterte Zusammenfassung veröffentlicht im Tagungsband der 75. Wissenschaftlichen Jahrestagung des VHB, Würzburg

Maier, C., Laumer, S., and Eckhardt, A. (2013), Pinning Down the Sources of Burnout: The Role of Information Technology as Daily Stressor, Erweiterte Zusammenfassung veröffentlicht im Tagungsband der 75. Wissenschaftlichen Jahrestagung des VHB, Würzburg

Weinert, C., Laumer, S., Maier, C., and Weitzel, T. (2013), The Effect of Coping Mechanisms on Technology Induced Stress: Towards a Conceptual Model, Proceedings of the 19th Americas Conference on Information Systems (AMCIS), Chicago (IL)

Laumer, S., Maier, C., and Weinert, C. (2013), The negative side of ICT-enabled communication: the case of social interaction overload in online social networks, Proceedings of the 21st European Conference on Information System (ECIS), Utrecht, The Netherlands

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. (2012), The Role of Techno-Stressors and Techno-Exhaustion in Employees' Daily Work: An Empirical Analysis, Proceedings of the Special Interest Group on Adoption and Diffusion of Information Technology (DIGIT) (Pre-ICIS Workshop), Orlando (FL)

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. (2012), Online Social Networks as a Source and Symbol of Stress: An Empirical Analysis, Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL)

Eckhardt, A., Maier, C., and Buettner, R. (2012), The Influence of Pressure to Perform and Experience on Changing Perceptions and User Performance: A Multi-Method Experimental Analysis, Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL)

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. (2012), Using User Personality to explain the Intention-Behavior Gap and Changes in Beliefs: A Longitudinal Analysis, Proceedings of the 33rd International Conference on Information Systems (ICIS), Orlando (FL)

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. (2012), Conceptualization, Operationalization, and Empirical Evidence for an Individual's Dispositional Resistance to IT-Induced Changes, Proceedings of the 18th Americas Conference on Information Systems (AMCIS), Seattle (WA)

Weinert, C., Maier, C., and Laumer, S. (2012), The Shady Side Of Facebook: The Influence Of Perceived Information And Network Characteristics On The Attitude Towards Information Overload, Proceedings of the 18th Americas Conference on Information Systems (AMCIS), Seattle (WA)

Maier, C. (2012), Personality Within Information Systems Research: A Literature Analysis, Proceedings of the 20th European Conference on Information System (ECIS), Barcelona, Spain

Maier, C., Laumer, S., Eckhardt, A., and Weitzel, T. (2012), When Social Networking Turns to Social Overload: Explaining the Stress, Emotional Exhaustion, and Quitting Behavior from Social Network Sites' Users, Proceedings of the 20th European Conference on Information System (ECIS) (Best Paper Nomination), Barcelona, Spain

Laumer, S., Maier, C., Eckhardt, A., and Weitzel, T. (2012), Are we in the Right Profession? - Comparing Information Systems, Computer Science and other Disciplines' Professional's Perceptions of the Job Market, Proceedings of the 2012 ACM SIGMIS CPR Conference, Milwaukee (WI)

Laumer, S., Maier, C., Eckhardt, A., and Weitzel, T. (2012), The Implementation of Large-scale Information Systems in Small and Medium-Sized Enterprises - A Case Study of Work- and Health-related Consequences, Proceedings of the 45th Hawaii International Conference on System Sciences (HICSS), Maui (HI)

Maier, C., Laumer, S., and Eckhardt, A. (2011), Identifying Resistant User Groups during the Product Lifecycle of IT Innovations: Proposing a User Transformation Theory, Proceedings of the Special Interest Group on Adoption and Diffusion of Information Technology (DIGIT) (Pre-ICIS Workshop), Shanghai, China

Maier, C., Laumer, S., Weinert, C., and Eckhardt, A. (2011), Is Facebook Usage Becoming Stressful? Proposing and Validating a Theory of Stress-induced ICT Discontinuous Usage, Proceedings of the Special Interest Group on Adoption and Diffusion of Information Technology (DIGIT) (Pre-ICIS Workshop), Shanghai, China

Maier, C., Laumer, S., and Eckhardt, A. (2011), Dispositional Resistance to Change and Social Network Site Adopters' and Non-Adopters' Attitudinal Beliefs - An Empirical Analysis, Proceedings of the 19th European Conference on Information System (ECIS), Helsinki, Finland

Maier, C. (2011), Explaining the Influence of User Personality on the Evaluation of IT Usage Drivers and IT Usage Consequences, Proceedings of the 2011 ACM SIGMIS CPR Conference, San Antonio (TX)

Lang, S., Laumer, S., Maier, C., and Eckhardt, A. (2011), Drivers, Challenges and Consequences of E-Recruiting - A Literature Review, Proceedings of the 2011 ACM SIGMIS CPR Conference, San Antonio (TX)

Laumer, S., Maier, C., Eckhardt, A., and Weitzel, T. (2011), The Trend is our Friend - German IT Personnel's Perception of Job-related Factors before, during and after the Economic Downturn, Proceedings of the 2011 ACM SIGMIS CPR Conference, San Antonio (TX), Winner of the ACM SIGMIS Magid Igbaria Outstanding Conference Paper of the Year 2011 Award

Maier, C., Laumer, S., and Eckhardt, A. (2011), Technology Adoption by Elderly People - An Empirical Analysis of Adopters and Non-Adopters of Social Networking Sites, Tagungsband zur 10. Internationalen Tagung Wirtschaftsinformatik, Zürich, Schweiz

Laumer, S., Maier, C., and Eckhardt, A. (2010), Why do they resist? - An empirical analysis of an individual's personality trait resistance regarding the adoption of new information systems, Proceedings of the 18th European Conference on Information System (ECIS), Pretoria, South Africa

Laumer, S., Maier, C., and Eckhardt, A. (2009), Towards an Understanding of an Individual's Resistance to Use an IS - Empirical Examinations and Directions for Future Research, Proceedings of the Special Interest Group on Adoption and Diffusion of Information Technology (DIGIT) (Pre-ICIS Workshop), Phoenix (AZ)

Maier, C., Laumer, S., and Eckhardt, A. (2009), An Integrated IT-Architecture for Talent Management and Recruitment, Proceedings of the 3rd International Workshop on Human Resource Information Systems (HRIS 2009), Milan, Italy

Sandmann, W., and Maier, C. (2008), On the statistical accuracy of stochastic simulation algorithms implemented in Dizzy, Proceedings of the 5th International Workshop on Computational Systems Biology (WCSB 2008), Leipzig, Germany, 153–156

BOOK CHAPTERS

Maier, C., Laumer, S., and Eckhardt, A. (2011), Technology Adoption by Elderly People - An Empirical Analysis of Adopters and Non-Adopters of Social Networking Sites, In: Heinzl, A., Buxmann, P., Wendt, O., and Weitzel, T. (eds.): Theory-Guided Modeling and Empiricism in Information Systems Research, Physica-Verlag, Heidelberg, 85-110.
http://www.amazon.de/Theory-Guided-Modeling-Empiricism-Information-Research/dp/3790827800/ref=sr_1_1?ie=UTF8&qid=1317916027&sr=8-1

Eckhardt, A., Laumer, S., and Maier, C. (2011), Introducing a First Step towards a Holistic Talent Management System Architecture, In: Scupola, A. (ed.): Developing Technologies in E-Services, Self-Services, and Mobile Communication: New Concepts, IGI Global, Hershey (PA)
http://www.igi-global.com/bookstore/titledetails.aspx?titleid=47049
http://www.igi-global.com/bookstore/chapter.aspx?titleid=54968

OTHER PUBLICATIONS

Weinert, C., von Stetten, A., Laumer, S., Maier, C., Weitzel, T., and Eckhardt, A. (2014), Recruiting Trends 2014 Österreich - Eine empirische Untersuchung mit den 500 größten Unternehmen aus Österreich, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

von Stetten, A., Laumer, S., Maier, C., Weinert, C., Weitzel, T., Eckhardt, A., and Kraft, B. (2014), Recruiting Trends 2014 - Eine empirische Untersuchung mit den Top-1.000-Unternehmen aus Deutschland sowie den Top-300-Unternehmen aus den Branchen Health Care, IT und Maschinenbau, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

Maier, C., Laumer, S., Weinert, C., von Stetten, A., Weitzel, T., Eckhardt, A., and Kraft, B. (2014), Bewerbungspraxis 2014 - Eine empirische Studie mit über 10.000 Stellensuchenden und Karriereinteressierten im Internet, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

Weinert, C., Laumer, S., Maier, C., von Stetten, A., Weitzel, T., and Eckhardt, A. (2013), Recruiting Trends 2013 Österreich - Eine empirische Untersuchung mit den 500 größten Unternehmen aus Österreich, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

von Stetten, A., Laumer, S., Maier, C., Weitzel, T., Eckhardt, A., and Guhl, E. (2013), Recruiting Trends 2013 - Eine empirische Untersuchung mit den Top-1.000-Unternehmen aus Deutschland sowie den Top-300-Unternehmen aus den Branchen Automotive, Finanzdienstleistung und IT, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

von Stetten, A., Laumer, S., Maier, C., Weitzel, T., Eckhardt, A., and Guhl, E. (2013), Recruiting Trends im Mittelstand 2013 - Eine empirische Untersuchung mit 1.000 Unternehmen aus dem deutschen Mittelstand, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

Laumer, S., Maier, C., von Stetten, A., Weitzel, T., Eckhardt, A., and Guhl, E. (2013), Bewerbungspraxis 2013 - Eine empirische Studie mit über 6.000 Stellensuchenden und Karriereinteressierten im Internet, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

von Stetten, A., Laumer, S., Maier, C., Eckhardt, A., Weitzel, T., and Ganouchi, M. (2012), Recruiting Trends 2012 Suisse - Une étude empirique des 500 plus grandes entreprises suisses, Rapport de recherche, Université Otto-Friedrich de Bamberg et Université Goethe de Francfort-sur-le-Main

von Stetten, A., Laumer, S., Maier, C., Eckhardt, A., Weitzel, T., and Ganouchi, M. (2012), Recruiting Trends 2012 Schweiz - Eine empirische Untersuchung mit den Top-500-Unternehmen aus der Schweiz, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

Maier, C., Laumer, S., Eckhardt, A., von Stetten, A., and Weitzel, T. (2012), Recruiting Trends 2012 Österreich - Eine empirische Untersuchung mit den 500 größten Unternehmen aus Österreich, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

Weitzel, T., Laumer, S., Maier, C., Eckhardt, A., von Stetten, A., and Guhl, E. (2012), Recruiting Trends - Ein Rückblick auf 10 Jahre, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

von Stetten, A., Laumer, S., Maier, C., Weitzel, T., Eckhardt, A., and Guhl, E. (2012), Recruiting Trends 2012 - Eine empirische Untersuchung mit den Top-1.000-Unternehmen aus Deutschland sowie den Top-300-Unternehmen aus den Branchen Health Care, IT sowie Umwelt & Recycling, Research Report, Otto-e3Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

Laumer, S., von Stetten, A., Maier, C., Weitzel, T., Eckhardt, A., and Guhl, E. (2012), Bewerbungspraxis 2012 - Eine empirische Untersuchung mit über 10.000 Stellensuchenden und Karriereinteressierten im Internet, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main

Maier, C., Laumer, S., von Stetten, A., Weitzel, T., Eckhardt, A., and Guhl, E. (2012), Recruiting Trends im Mittelstand 2012 - Eine empirische Untersuchung mit 1.000 Unternehmen aus dem deutschen Mittelstand, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main