The Influence of Individual, Contextual, and Social Factors on Perceived Behavioral Control of Information Technology: A Field Theory Approach

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ABSTRACT: Organizations are increasingly concerned about ensuring that workers have sufficient sense of control over the information technology (IT) that they use.

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However, we know little about the antecedents of the end user's perceived behavioral control (PBC) with respect to IT. Drawing on Kurt Lewin's field theory, the present study responds to this concern by formulating and testing a model whereby individual, contextual, and social forces influence PBC directly and indirectly via computer anxiety. In order to test the model, a survey was conducted in France with IT end users enrolled in professional training programs. The results show that increasing autonomy, offering appropriate managerial support, reducing work overload, and perceived innovativeness with IT can together reduce computer anxiety and increase PBC. These findings emphasize the forces that managers can manipulate in order to foster users' feelings of control with respect to IT in the workplace. Following this, the paper makes three main contributions to research. First, it increases our knowledge of the nomological net surrounding PBC by shedding light on the joint influences of internal, external, and social forces on this variable. Second, it reveals the role of computer anxiety, emphasizing that it is an important conduit through which these forces influence workers' PBC. Third, the paper shows how Lewin's field theory can help to create richer and less fragmented models in order to capture more fully the determinants of IT adoption and adaptation. The practical implications regarding the actions that managers can take in order to increase workers' PBC are discussed.

KEY WORDS AND PHRASES: autonomy, computer anxiety, control over IT, demand-control model, field theory, managerial support, perceived behavioral control, personal innovativeness with IT, work environment, work overload.

"THESE TOOLS TEND TO PILE UP LIKE A TOWER OF BABEL" [6, p. 17]. According to a recent magazine article, this is a common view among business managers of the information technologies (IT) used in French companies. When the 35-hour workweek law was introduced in France in 2000 (decreasing the former 39-hour workweek), some companies saw IT as a means of increasing work productivity. However, offering workers an extensive and diverse IT portfolio (i.e., fax, text messaging, e-mail, smartphone, videoconferencing, office technologies, intranet-embedded tools), often without considering individual characteristics and the work environment, has tended to increase job demands and complexity. The ironic result is that workers frequently feel overwhelmed by the plethora of IT applications on offer. This sentiment can itself impair a worker's ability to cope with those job demands and other critical work issues. This situation can produce computer anxiety, reduce a user's sense of control regarding IT, and ultimately foster IT-related negative cognitions and increase overall job stress [73, 91]. Arguably, chief information officers (CIOs) cannot promote business productivity and cost reduction—their primary concern in 2009, according to a recent survey [56]—if workers do not feel in control of the IT that they use. Therefore, the purpose of this study is to improve our understanding of the influence of individual traits, personality, and the work environment on perceived behavioral control (PBC) with respect to IT. In doing so, it emphasizes the role played by computer anxiety in that process.

PBC is an important but understudied construct in information systems (IS) research. A further assessment of its determinants is desirable for several reasons. First, according to the theory of planned behavior (TPB) [3], PBC is an important determinant of actual behavior. It has been defined as "the perceived ease or difficulty of performing the behavior" [4, p. 665]. Previous research indicates that PBC is a relevant predictor of effective system usage [92, 99, 101], a measure that reflects IS success [26]. Therefore, greater awareness of the determinants of PBC may provide insights into how to influence system usage in the workplace.

Second, researchers have mainly studied PBC's *effects* on IT adoption, and have paid little attention to its key *antecedents.* So, despite prior research that found, for example, that self-efficacy and resource-facilitating conditions affect PBC [93], we know very little about precisely how individual characteristics, the work environment, and social factors influence this variable.

Third, perceived control over IT is a key factor in explaining the behavioral and cognitive efforts that individuals make to adapt to new and/or disruptive IT implementations. For example, Beaudry and Pinsonneault [11] developed the coping model of user adaptation (CMUA), where control appraisal appears to be a key factor in the way in which users adapt to IT disruptions. Indeed, depending on the amount of control that users have over IT and its context, they will implement more or less effective adaptation strategies, which can significantly affect IT outcomes [11]. Furthermore, those users who have control also demonstrate a greater ability to develop positive emotions toward IT use. In this context, control allows an individual to better exploit the benefits or to mitigate the negative consequences of IT on themselves. Hence, PBC is a major determinant of user-adaptive efforts in IT contexts.

Finally, recent research has emphasized the potentially adverse effects of IS use in the workplace that, for example, may result in negative cognitions such as technostress [73, 91]. *Technostress* is a relatively common phenomenon in organizations today, one with considerable adverse effects on end-user productivity [73, 91] and satisfaction [90]. It is "a condition resulting from the inability of an individual or organization to adapt to the introduction and operation of new technology" [18, p. 754]. Specifically, PBC has the potential to mitigate IT users' stress, and to foster feelings that they can benefit from newly implemented IT. According to Brod [18], for example, perceived control over new tasks and the organizational climate are two factors that may either hinder or foster technostress among IT end users. Brod further argues, "[n]ot only do employees appreciate learning about the content of the work changes, but they will immediately begin to sense increased control over task-specific behaviors" [18, p. 756]. So, by fostering end-user PBC, organizations may be able prevent this phenomenon [18].

Given the potential significance of the role of PBC, we need to better understand its formation with respect to IT in the workplace. Accordingly, this paper addresses the theoretical gaps surrounding PBC by answering the following research questions:

RQ1: What factors can explain IT end-users' perceptions of PBC in the workplace?

RQ2: What are the influences of broad work environment factors, managerial support, and personality traits on PBC? Do these factors influence each other, and, if so, how?

To answer these questions, we rely on field theory, a theory that deals with the determinants of individuals' behaviors [51]. Recent literature has emphasized its relevance for understanding contemporary change phenomena [20]. This theory suggests that individual behavior is a function of internal forces (pertaining to the person) and external forces (from the social environment). Together, these interdependent forces shape how an individual envisages a situation and constructs a response to it. In the context of the current study, this overarching theoretical framework helps us to examine how certain factors may foster or hinder behavioral control perceptions in IT contexts. We posit that personality (personal innovativeness with IT), the work context (autonomy, overload) [44, 45], and social forces (managerial support) shape the way in which IT end users evaluate the extent to which they have control over the IT they use. We also suggest that these effects are partially mediated by computer anxiety, a "state anxiety" defined as "the tendency of an individual to be uneasy, apprehensive, or fearful about the current or future use of computers in general" [39, p. 375]. The current study has implications for both research and practice. For research, it offers a precise view of the nature and strength of key determinants of PBC with respect to IT. Specifically, it shows that some of these determinants stem from individuals' traits, personality, and work environment. A key strength of this conceptualization is that it accounts for the entire *field* rather than for a narrow set of IT-specific forces. As a result, field theory can be useful to complement IS adoption and success models, which explain behaviors and attitudes toward IS using mainly IS beliefs or characteristics (e.g., IS success model or technology acceptance model). This paper also contributes to the emerging literature on the determinants of IT-related negative cognitions in the workplace (e.g., [73, 91]) by extending our knowledge of PBC, a key factor in the development of these cognitions.

In practice, this study can help companies to more successfully implement IS change initiatives because it emphasizes the relevant forces that companies can leverage to influence PBC. Interestingly, the CIO function is often principally focused on technical decisions. However, this study emphasizes that other nontechnical factors, which have traditionally been the responsibility of operational managers or human resource (HR) departments, should fall within a CIO's remit, in a more transversal and comprehensive approach. Such an approach is important because the human factors that relate to IS remain among the most critical for understanding the failure to realize IS benefits and for preventing IS implementation failure in general [66].

The study is organized as follows. In the next section, we introduce field theory, which serves as a theoretical anchor for our research model and hypotheses. We then introduce the methodology and analyses. We conducted a survey of 724 IT end users attending courses in a large professional training company in France. A discussion of the results, contributions, and limitations of the study follows. Finally, we conclude with the key lessons of the study, and an agenda for future research.

Theoretical Development

Overview of Field Theory

MUCH OF THE RESEARCH ON IT ADOPTION AND USE has focused on the IT-related antecedents of system usage behaviors in the workplace. On the whole, however, few researchers have attempted to conceptualize the joint influence of general work environment factors and individual factors on users' IT-related perceptions and behaviors.

According to Lewin [55], behaviors are influenced by individual, contextual, and social forces. Lewin is especially well known in social psychology for his research on social change. He also developed *field theory* [55], a theory that helps to "identify the forces within and between groups and show how individuals behave in response to these" [20, p. 997]. According to Lewin, psychological phenomena occur in a given field, defined as "a totality of coexisting facts which are conceived of as mutually interdependent" [53, p. 338]. The related behavior can be viewed as a change in the state of the individual within a given period of time. According to Lewin [52]:

> Whether or not a certain type of behavior occurs depends not on the presence or absence of one fact or of a number of facts as viewed in isolation but upon the constellation (structure and forces) of the specific field as a whole. [52, p. 306]

Moskowitz further pointed out that "the way in which people respond, while they often fail to recognize its influence on them, lies in the power of the social situation" [64, p. 29]. In practical terms, this means that multiple forces are at work in the workplace, and these influence individuals' behaviors and perceptions in the course of IT usage, but that those individuals are not always conscious of these influences. Relying on field theory, we conceptualized a model that identifies the relevant forces that drive PBC, which, in an IT context, are partially mediated by computer anxiety.

Field Forces

Lewin's key assumption is thus that groups and individuals face limitations imposed by the structure of their world. Indeed, humans must conform to *laws,* be these biological, social, or physical. Together, these psychological and non-psychological forces influence behaviors and perceptions. For example, it has been shown that personality traits such as negative affect and trait anxiety [94], but also individual differences such as gender, age, and IT experience [29, 60, 108], influence IT-related behaviors. The same is true of the social norm, such as peer support or managerial support [50, 100], and the work environment [2]. A fundamental assumption in Lewin's approach is given by the equation $B = F\,[P, E]$, with B = behavior, P = person, and E = environment [51]. *Internal forces* (or forces stemming from the person) include, for example, preferences, norms, and expectations, which modify attention and judgment—in short, subjectivity [64]. *External forces* (or forces stemming from the context) can be found in the context in which an individual acts and makes decisions. These forces, which surround the experienced IT context, can alter individual perceptions [64].

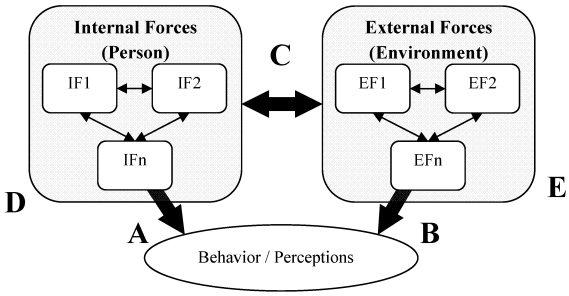

Figure 1. Force Interdependency in Field Theory

Notes: IF = internal force; EF = external force. The behavior is a function of internal forces (A) and external forces (B). Internal and external forces are mutually dependent (C). Likewise, internal forces are mutually dependent on one another (D), like external forces (E).

Rather than being independent, internal and external forces have a mutual influence on one another. According to Lewin, "the state of the person and that of his environment are not independent of each other" [53, p. 337]. Mutual influences between *P* and *E* variables, but also influences among *P* variables and among *E* variables can thus be expected. Lewin further argues that "the person and his environment have to be considered as *one* constellation of interdependent factors" [53, p. 338]. Lewin calls this totality of coexisting facts the "life space" (LSp) of the individual, and considers that $B = F(P, E) = F(LSp)$. The life space is considered "the person and the psychological environment as it exists for him" [52, p. 306]. Lewin further suggests that "we usually have this field in mind if we refer to needs, motivation, mood, goals, anxiety, ideals" [52, p. 306]. The constellation of field forces as influencing behaviors or perceptions is represented in Figure 1.

In more precise terms, in field theory, a *force* characterizes "the direction and strength of the tendency to change" [53, p. 349]. Field forces can exert themselves in opposite directions. For example, while perceived IT threats may result in resistance to IT adoption [11, 47, 60], managerial support is often expected to be positively related with greater levels of IT usage [50, 100]. Lewin calls *resultant force* the combination of the forces acting in a given field at a given time. Two outcomes may result from a *resultant force* that differs from zero: either a *locomotion* in the direction of the given force, or an equivalent change in cognitive structure [53]. This means that in responding to any given situation or force, since the field is a psychological construction, an individual may either change his or her behavior because of the situation (locomotion), or modify his or her perception of the situation (change in cognitive structure).[1]

A further distinction among field forces is that between driving and restraining forces. *Driving forces* lead to locomotion. These forces promote change in behaviors and perceptions. Conversely, *restraining forces* refer to the physical or social obstacles that may hinder *locomotion.* These forces act as a barrier to the individual.[2] Importantly, however, individuals will respond differently to specific parameters, including within the context of IT usage. Lewin argues that within the life space, "the same social or

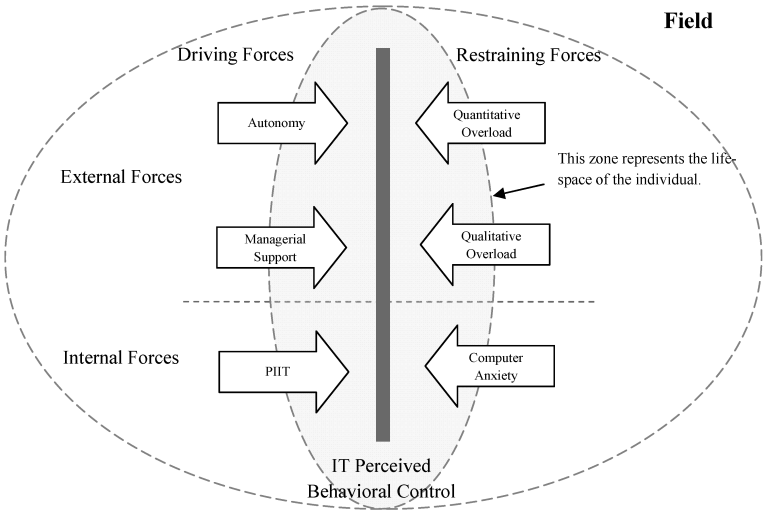

Figure 2. Field Forces Retained in Our Model

Note: PIIT = personal innovativeness with IT.

physical obstacle corresponds, therefore, to different restraining forces for different individuals" [53, p. 352]. These concepts from field theory, as applied to our study, are detailed in the next section and Figure 2.

Model Formulation

ALTHOUGH FIELD THEORY HIGHLIGHTS TWO BROAD CATEGORIES OF FORCES (internal/external) that influence human behaviors, it does not indicate which of them are the most relevant in IT contexts. Figure 2 depicts the forces that we included in our research model in order to conceptualize the development of PBC with respect to IT in the workplace.

Internal and external forces drive or restrain behavior, as depicted in Figure 2. External forces include the work environment variables found in Karasek's demand-control model [44, 45]. The *work environment* includes job control (autonomy) and job demands (quantitative and qualitative overload). The *social factor,* which is also present in extensions of Karasek's earlier works [45, 107], is examined through the lens of managerial support. Finally, partly drawing on the work of Thatcher and Perrewé [94], individual characteristics are examined through the lens of the stable, situation-specific trait of personal innovativeness with IT (PIIT), and that of computer anxiety, an IT-specific individual difference. We would expect PBC to result from the combination of these internal and external driving and restraining forces. The research model depicted in Figure 3 shows the relationships between field forces and PBC, and how they would be expected to influence each other.

The rationale for the 11-model hypotheses is expounded below.

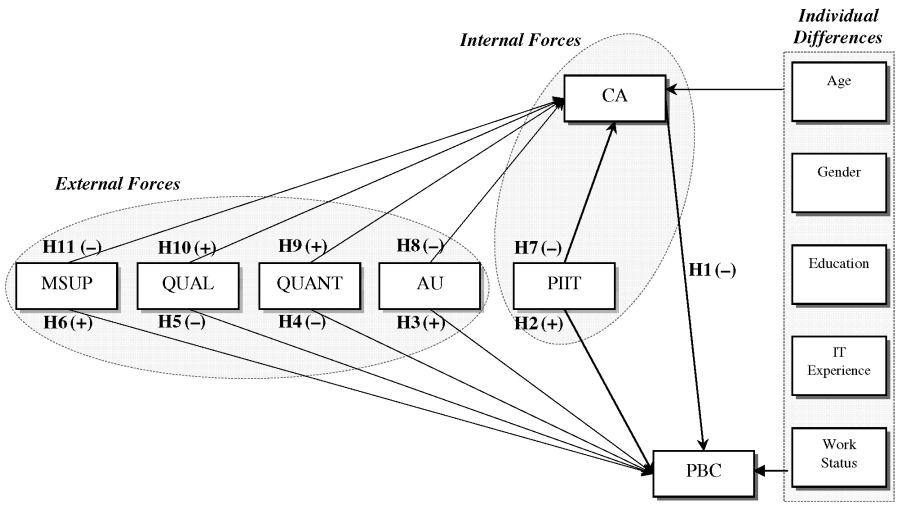

Figure 3. Research Model

Notes: CA = computer anxiety, AU = autonomy, PBC = perceived behavioral control, PIIT = personal innovativeness with IT, QUAL = qualitative overload, QUANT = quantitative overload, MSUP = managerial support.

Perceived Behavioral Control

The link between PBC and intentions to use IT has been extensively tested and confirmed by IS researchers [63, 99, 101]. PBC is a key construct of the TPB [30], which in contrast to the theory of reasoned action, envisages situations in which behaviors are not totally under the control of individuals [4]. It fosters the intention to perform a behavior since it helps individuals to gain greater confidence in their capacity to successfully perform the behavior in question. For Ajzen, "all else equal, a high level of perceived control should strengthen a person's intention to perform the behavior, and increase effort and perseverance. In this fashion, perceived behavioral control can affect behavior indirectly, by its impact on intention" [4, p. 667].

PBC has some similarities with self-efficacy in that both concepts refer to the perceived ability to perform a behavior [4, 58]. Ajzen suggested that "PBC simply denotes subjective degree of control over performance of the behavior itself," and that it should be labeled "perceived control over performance of a behavior" [4, p. 668]. Ajzen then argues that PBC should be viewed as an "overarching construct that is comprised of two lower-level components: self-efficacy and controllability" [4, p. 680]. PBC is thus a richer construct than self-efficacy or controllability alone because it encompasses both the availability of resources for performing a behavior and self-efficacy [93]. Consistent with field theory, we shall explain how internal and external forces influence PBC.

Internal Forces (Trait, Personality)

Internal forces include psychological and non-psychological variables. What are the relevant internal forces that hinder or foster the perceptions of PBC? In the IT domain, Zmud identified a number of cognitive styles, personality, and demographic/situational variables [108, p. 967] as individual factors that may significantly influence IS use and behavioral intentions. Among these parameters, computer anxiety is often considered to foster negative beliefs about IT, and PIIT positive ones [94]. Nonetheless, to date, little has been said about the influence of these factors over PBC.

Computer Anxiety

The first internal factor included in our model is computer anxiety. Computer anxiety pertains to the psychological field of the individual. While it has been measured in multiple ways [22], there is consensus across scholarly disciplines that it refers to an anxious state toward IT use. More specifically, computer anxiety is often presented as an emotive or affective reaction to IS use [88, 99]. In many respects, it presents similarities with *computer phobia,* which includes anxiety about interacting with computers and negative cognitions during interactions with computers [102]. Managers usually want to decrease computer anxiety. Indeed, researchers have found that computer anxiety is negatively related to IT adoption and use [12, 23, 29, 99], to end-user satisfaction and productivity [18, 73, 91], and to overall individual performance in working with computers [57]. It can lead to computer avoidance [22, 39, 57]. So, people who are anxious about computers are less likely than others to develop confidence in their ability to master the IT that they use over time. Computer anxiety will also negatively influence PBC because anxiety reduces perceived computer self-efficacy, which is a subdimension of PBC [34, 94]. Moreover, psychology research has shown that anxiety tends to jeopardize one's self-esteem and one's confidence in performing a behavior [81]. Thus, in an IT context, we would expect computer anxiety to reduce user perceptions of control over IT. Consequently, we hypothesize the following:

Hypothesis 1: Computer anxiety negatively influences PBC.

Personal Innovativeness with IT

The second internal factor included in our model is PIIT, an individual personality variable. It reflects individual readiness to adopt a new IT (e.g., [17, 69]). Agarwal and Prasad define PIIT as "the willingness to try out any new information technology" [1, p. 206]. It is considered to be a "situation-specific stable trait" [94, p. 385] and is acknowledged by IS researchers to be a key enabler of effective interactions with IT because it fosters positive beliefs about technology. For example, researchers have shown that PIIT is linked to the development of positive perceptions about the relative advantage of decision support systems [43], greater computer self-efficacy [94, 98], and beliefs such as ease of use [98, 106], usefulness, compatibility, and intention

to use new IT [106]. Individuals with high PIIT are, in fact, more likely to engage in risky behaviors [94]. Together, these prior findings suggest that the positive influence of PIIT on IT beliefs is likely to foster individuals' confidence in their ability to perform IT-related behaviors and, therefore, end-user PBC. Hence,

Hypothesis 2: Personal innovativeness with IT positively influences PBC.

External Forces (Work Environment)

In the present study, work autonomy, work or role overload, and the social norm are the contextual factors of interest. In Karasek's demand-control model [44], autonomy and overload relate to job decision latitude and job demands. For the researcher, "[t]hese two aspects of the job situation represent, respectively, the instigators of action (work load demands, conflicts or other stressors which place the individual in a motivated or energized state of 'stress') and the constraints on the alternative resulting actions" [44, p. 287]. In a later enriched model, the demand-control-support model, Karasek and other researchers [45, 107] include the role of social support as an inhibitor of job strain and anxiety. How then can we account for the influence of the work environment and the social factor in the nomological net surrounding PBC?

Autonomy

Autonomy (AU) refers to the practices that foster initiative and freedom in individuals' actions [85]. Autonomy is also frequently defined as a component of employee empowerment and self-confidence [85, 96]. From this perspective, the concept of autonomy is similar to self-determination, which "reflects autonomy over the initiation and continuation of work behavior and processes" [85, p. 484]. Furthermore, autonomy is considered as an enabling factor in the workplace, which is often related to greater work performance and job satisfaction [44]. Researchers argue that the introduction of new IT in the workplace has made work more not only constrictive but also more complex and demanding [41, 62]. In such contexts, autonomy is what enables individuals to cope effectively with changing work conditions, including those resulting from IT. With greater control over work, behavior, and processes, we may thus expect autonomy to favor greater levels of PBC in the workplace. Hence,

Hypothesis 3: Autonomy is positively related with PBC.

Overload

In contrast to autonomy, job demands, such as overload and specifically *role* overload, can be considered as impediments [2, 44] or restraining forces [53] in the workplace. Tarafdar et al. [91] show that, specifically, role overload (a component of *role stress),* together with *role conflict,* are related to lower productivity. Overload has been defined as "individuals' perception that they cannot perform a task because they lack critical

resources" [2, p. 435]. Following Sales [78], Ahuja and Thatcher [2] distinguished a quantitative and a qualitative dimension to overload in their study. The quantitative dimension of overload refers to what individuals cannot do because of environmental limitations. Arguably, people facing quantitative overload (QUANT) can dedicate less time and energy to increasing their capability to work with the multiple and complex IT at hand. Moreover, as argued by Tarafdar et al. [91], IT is introduced in organizations with expectations of increased productivity. In practice, "people are simply expected to work faster and do more in less time" [91, p. 308]. The same authors argue that, at the same time, "users are often unwilling or unable to develop the *frequent* new skills required for using the *ever evolving* ICTs in their organizations" [91, p. 305]. So, as users frequently fail to develop additional IT skills, role overload can then reduce individuals' feelings of PBC with respect to IT. We thus expect:

Hypothesis 4: Quantitative overload negatively influences PBC.

The qualitative dimension of role overload refers to individuals' perceptions that their work tasks require more skills and capabilities than those they currently possess [2]. We expect these perceptions to dampen the feelings of having PBC. Importantly, nowadays office work is performed making significant use of IT. The normative rationale of IT often requires that the issues that it addresses be defined clearly. In addition, more than ever before, individuals may attempt to solve emerging work needs with IT. QUAL experiences are likely to raise individuals' awareness of their limitations with regard to PBC. QUAL is also a cognitive factor that dampens the individual's confidence in performing a behavior [81]. Thus, we would expect that individuals who feel they have insufficient skills to cope with their work issues will feel that they have a lesser ability to leverage IT to solve these issues. Hence,

H5: Qualitative overload negatively influences PBC.

The Social Factor: Managerial Support

Finally, the social factor is an external force that is said to help to explain why individuals use IT [95, 100]. In field theory specifically, the social factor is considered as a non-psychological variable that exerts direct constraints on an individual's perceptions and behaviors. The social factor that we selected for this study is IT perceived managerial support (MSUP). Researchers widely recognize the need for top and mid-level management IT support to achieve effective IT implementation and adoption (e.g., [10, 50, 60, 100]). MSUP is a precondition for the success of business process reengineering initiatives [10], and is related to greater levels of system usage [50]. It facilitates employees forming positive judgments, for example, about the relevance of their job, or with respect to the IT and the quality of the system output [100]. All this contributes to PBC. For this and other reasons, Jasperson et al. [40] suggested that top managers should continually support IT use and best practice over time in order to foster effective postadoptive outcomes. Hence,

H6: Perceived managerial support positively influences PBC.

Uncovering the Relationships Between Field Forces: The Mediating Role of Computer Anxiety

Field theory's core principles suggest that direct links exist between internal and external forces and behavior. It also envisages mutual influences between field forces, which ultimately impact perceptions and behaviors. Another core assumption is that processes that stem from the person (or internal processes) may intervene and mediate the influence of internal and/or external forces on behavior and perceptions. These mediating variables can help to explain "how external physical events take on internal psychological significance" [9, p. 1176]. Depending on how the individual interprets reality, his or her life space will vary in scope and degree, which thereby involves corresponding perceptions and behaviors [53]. This is partly reflected in a statement by Moskowitz about field theory:

> Differences between people . . . should alter the way in which the context is experienced, and the way in which the behavior that is observed within that context is construed. [64, p. 37]

In a workplace IT context, we expect that computer anxiety will partially mediate the relationships (1) between the internal force of PIIT and PBC, and (2) between external forces of AU, QUANT, QUAL, MSUP, and PBC. We explain the rationale for these relationships below.

Mutual Influences Among Internal Forces

We hypothesize that PIIT will impact computer anxiety, which is, therefore, posited to intervene, to some degree, between PIIT and PBC. Earlier research provides support for the direct effect of PIIT on computer anxiety, which, to some degree, mediates the relationship between PIIT and computer self-efficacy [94]. Furthermore, both PIIT and computer anxiety are dynamic IT and situation-specific individual differences [94]. The rationale for the posited relationship is that PIIT gives individuals more confidence in their ability to work efficiently with systems. They also have greater tolerance of risk with respect to using computers [1]. Therefore, overall, they feel less apprehension and anxiety regarding computers. Thus,

> *Hypothesis 7: Personal innovativeness with IT negatively influences computer anxiety.*

Relationships Between External Forces and Computer Anxiety

Significant evidence from Karasek's job demands model [44] and premises from Mikkelsen et al. [62] suggest that greater or lower strain, anxiety, and computer anxiety result, respectively, from work overload (job demands) and autonomy (decision latitude or authority). Mikkelsen suggests:

> As demands for productivity increase and decision authority in the job situation declines, computer technology may transform ordinary jobs into high-stress positions and create computer anxiety. [62, p. 225]

Having greater latitude or decision authority at work makes individuals more confident about their capability to effectively respond to their work constraints. Specifically, autonomous individuals may have a greater ability to respond to IT-led work redesign because they can more easily adapt their work practice and schedules to the new job demands [2, 62]. They are thus less inclined to experience computer anxiety than nonautonomous individuals. We, therefore, posit:

Hypothesis 8: Autonomy negatively influences computer anxiety.

Following the same line of theorization, we argue that overload positively influences computer anxiety. Arguably, in intensive IT usage contexts, much of the increase in job demands may be due to the introduction of IT in the workplace [62, 91]. Mikkelsen et al. [62] found inconclusive support for their original assumption that job demands impact computer anxiety, but as they recognized themselves, their inconclusive result was likely due to the specific production industry in which they conducted their study. Job demands may, in fact, increase along with IT implementations, particularly because IT frequently fails to deliver the expected productivity gains in practice [41, 77, 91]. In short, this creates computer anxiety because the demands of the job increase faster than the user's skills and the resources at hand required to cope with it effectively [8, 62]. We, therefore, posit:

Hypothesis 9: Quantitative overload positively influences computer anxiety.

Hypothesis 10: Qualitative overload positively influences computer anxiety.

Finally, the social factor, introduced in the demand-control model of Karasek, is posited to negatively influence computer anxiety. The social factor reflects the links between the psychological fields of individuals and groups [54]. Researchers employing the demand-control-support model [45, 79] showed, for example, that social support can reduce mental strain and increase intrinsic motivation [107]. It is also directly linked to lower levels of anxiety [45, 107]. It can also reduce the negative effects of job demands on mental strain and satisfaction [79]. Accordingly, Ragu-Nathan et al. [73] showed, for example, that technical support provision and involvement facilitation inhibit technostress. Together with literacy facilitation, they argue that these factors can thus lead to greater job satisfaction, organizational commitment, and continuance commitment. Corroborating this, Allen et al. [5] found that MSUP helps employees to cope with the stressful situations encountered at work. MSUP, overall, makes individuals feel more confident about their ability to use systems because they feel that support is there for them if they should need it in their use of IT. As a result, they have fewer apprehensions and more favorable beliefs about IT, which decreases computer anxiety [38]. As argued by Venkatesh and Bala, "The direct involvement of management in the modification of system features, incentive structures, and work processes will reduce anxiety" [100, p. 297]. Hence,

Hypothesis 11: Perceived managerial support positively influences computer anxiety.

Overall, computer anxiety is, therefore, expected to partly mediate the influence of internal and external forces on PBC. This means that part of the effect of QUANT, QUAL, and AU on PBC is direct, whereas the other part is mediated by computer anxiety.

We also identified a few individual differences that may influence the model. We indicate below what these variables are, and explain how they may influence the research model.

Control Variables: Individual Differences

Lewin [53] suggests that the possible effects of individual differences on behaviors should be accounted for. We have thus considered the effects of gender, age, education, IT experience, and work status as control variables for their potential influence on computer anxiety and PBC.

With respect to *gender,* it has been suggested that men demonstrate higher levels of computer skills [34] and find IT easier to use than do women [32]. In the same vein, some researchers have found that women are more computer-anxious than men [62] and, overall, feel less comfortable than men with computers at work [32, 63]. Results in this domain have not always been clear-cut; these differences were sometimes found to be very small (e.g., [37]), or even irrelevant for some categories of workers such as managers [68]. Therefore, while we expect that women will have more computer anxiety and less PBC than men, the result might also be inconclusive. With respect to *age,* it has most often been suggested that younger people, now sometimes called "born digital" [67], feel more comfortable with computers than the older ones. Likewise, we expect that the former will demonstrate greater PBC with IT and lower computer anxiety than the latter, which is supported by prior research [62, 68]. The *level of education* is expected to relate negatively with computer anxiety. The number of years spent at school may be negatively related with computer anxiety [62] due to cognitive skills and the capability of abstraction, which are typical of IT-related work and required in higher education [62]. People with higher degrees have a better sense of the rationale embedded in IT than those with lower degrees. For the same reasons, we may expect education to impact PBC. In addition, people with greater experience of working with IT often demonstrate greater levels of computer skills, which allow them to perform better and feel more comfortable with IT overall [34]. We thus expect that they will have less computer anxiety and more PBC than people who have less IT experience. Finally, *managers* can be expected to have less computer anxiety and more PBC than nonmanagers. Prior researchers related this to the great decision latitude granted by the position of managers in the hierarchy, or the less structured nature of their work. This can help them to cope more efficiently with work and computer issues because it is easier for them to find resources and support when in need [62]. In contrast, employees who receive instructions mostly via computers have

limited possibilities for getting additional explanations regarding unclear or ambiguous instructions [62]. Furthermore, employees' work is more structured, which may contribute to diminishing face-to-face social relationships with their coworkers [105]. As a result, employees may experience more computer anxiety and have less PBC than managers. Notwithstanding all these insights, it is also suggested that the influence of work status may not be perceived when age, education, and decision latitude are included in a model [62, 105]. The following section describes the research design and methods that we applied to test the model.

Methodology

Research Design

A survey [70] was conducted in France with trainees from a leading vocational training organization that trains workers from numerous professional and educational backgrounds. The participants are actual IT end users and are currently working. The setting was an ongoing context of IT usage, a context "where the computer actually adds value by enabling people to do work faster, better, or more creatively and, thereby, create real business value" [27, p. 396]. Thanks to the company's nationwide scope, we were able to recruit participants among office workers from numerous organizations and business subsidiaries of all sizes and from all sectors. We therefore consider the chosen pool of respondents to be particularly appropriate for testing our model and answering our research questions. For the sake of convenience, only individuals attending courses within the training organization were invited to take part in the study. The trainers received instructions regarding the presentation of the purpose of the study and to deliver the paper-based questionnaires, which they gave out at the end of the courses over a timeframe of approximately one month. The trainees were informed that the study was investigating the behavior and feelings of workers regarding the implementation and use of IT in French companies. Participation in the study was voluntary, and confidentiality was guaranteed, with the aim of overcoming the subjects' potential concerns about participating in the study [72]. We then collected the completed questionnaires for coding and data analysis. The analyses were performed with the partial least squares (PLS) algorithm-based software SmartPLS [74]. Compared with covariance-based software, PLS places fewer demands and distributional assumptions on data and is also better suited for large or complex models [21, 103] (the current model has 11 variables in total, including demographics, and 19 paths).

Measures

The scales were adapted from prior research. Details about constructs and scales are provided in Appendix A. All the measures were reflective and assessed with seven-point Likert scales. In addition, subjects were offered the possibility to check a box if they felt that the statements did not concern them. This technique helps to minimize response bias because respondents do not feel constrained to respond to statements

that do not make sense for them [72]. All measures were perceptual in nature. This is consistent with field theory because it has been shown that individual perceptions are more meaningful for explaining behavior than the actual forces found in the field [64]. All these measures were initially developed in English and were subsequently translated into French. Experts in both languages then translated them back into English. No significant differences were found between the original and the translated items, guaranteeing identical meaning between the French and English versions of the instrument. In addition, we checked the content, ease of understanding, and wording of the questions with two trainers from the professional training organization.

Sampling

Many categories of office workers are represented in the sample, from top managers to clerical workers. Around 3,900 individuals[3] were invited to participate in the study at the end of practical training sessions conducted by the training company. The participants were given the questionnaire and most filled it in on the spot. A few other participants chose the option of returning the completed questionnaire via regular mail with a stamped envelope that was given to them. A total of 1,129 participants took part in the study overall (around 29 percent). Those who answered that they were not concerned by a statement for at least one of the construct items were removed from analysis (266 cases). This put the amount of missing values at less than 5 percent for each of the variables. It was thus reasonable to deal with missing values with a case-wise deletion procedure, which we performed directly using SmartPLS. One hundred thirty-nine additional cases were deleted. The sample resulted in $n = 724$ cases (64 percent of the overall sample). This sample size and the diversity of respondents' backgrounds provide external validity to the study [15]. The participants attended diverse courses (with titles such as "human resource assistant," "tools and techniques for individual effectiveness," "project management," "supply chain director," "creating a Web site," etc.). The demographics are detailed in Appendix B.

Regarding IT experience, 75.4 percent stated that they had used IT for more than five years to accomplish their daily work tasks. A large portion of the participants (85.6 percent) were able to access an intranet system with multiple features such as a knowledge database (57.3 percent), best practices (34.2 percent), a shared agenda (67 percent), e-learning modules (35.6 percent), and human resource features (60.1 percent). Most participants have access to broadband Internet at work (94 percent) and the capability to send or receive e-mails (98.1 percent); 45.8 percent have a professional laptop computer, enabling them to work at home; and 41.8 percent have a professional mobile phone.

Construct Validity and Reliability

In order to test the appropriateness of our instrument, we conducted formal statistical tests of convergent validity, discriminant validity, and construct reliability [16]. Convergent validity was assessed by the cross-loading table shown in Table 1.

Table 1. Cross Loadings

Items	CA	AU	PIIT	PBC	QUAL	MSUP	QUANT
CA1	**0.931**	–0.222	–0.250	–0.360	0.367	0.059	0.135
CA2	**0.942**	–0.179	–0.229	–0.338	0.364	0.037	0.143
CA3	**0.909**	–0.189	–0.200	–0.312	0.376	0.065	0.162
AU1	–0.194	**0.856**	0.088	0.159	–0.122	0.041	–0.020
AU3	–0.065	**0.705**	0.067	0.139	–0.027	0.071	–0.003
AU4	–0.215	**0.849**	0.094	0.160	–0.088	0.075	–0.009
PIIT1	–0.150	0.080	**0.809**	0.307	–0.068	0.225	0.050
PIIT2	–0.181	0.084	**0.878**	0.383	–0.067	0.215	0.044
PIIT3	–0.283	0.106	**0.914**	0.437	–0.087	0.200	0.038
PBC1	–0.330	0.135	0.485	**0.850**	–0.266	0.267	0.027
PBC2	–0.300	0.220	0.310	**0.859**	–0.314	0.312	–0.098
PBC3	–0.317	0.141	0.345	**0.899**	–0.360	0.290	–0.048
QUAL2	0.169	–0.067	–0.001	–0.168	**0.679**	0.042	0.287
QUAL3	0.308	–0.054	–0.083	–0.347	**0.867**	–0.017	0.299
QUAL4	0.374	–0.091	–0.098	–0.336	**0.881**	–0.002	0.330
QUAL5	0.363	–0.127	–0.063	–0.252	**0.748**	0.043	0.262
MSUP1	0.017	0.079	0.197	0.389	–0.088	**0.900**	–0.078
MSUP2	0.056	0.064	0.236	0.165	0.115	**0.797**	–0.003
MSUP3	0.111	0.027	0.192	0.160	0.132	**0.781**	0.036
QUANT1	0.193	–0.027	0.027	–0.060	0.330	–0.020	**0.928**
QUANT2	0.064	0.040	0.100	0.054	0.243	–0.030	**0.708**
QUANT3	0.091	0.011	0.009	–0.052	0.340	–0.057	**0.855**
QUANT4	0.120	–0.028	0.078	–0.029	0.325	–0.039	**0.886**

Notes: CA = computer anxiety, AU = autonomy, PBC = perceived behavioral control, PIIT = personal innovativeness with IT, QUAL = qualitative overload, QUANT = quantitative overload, MSUP = managerial support. The values in boldface represent items' association to their latent construct.

The results show that all items load cleanly on their intended constructs, with values greater than 0.64. In addition, *t*-values of the *outer model loadings* statistics are all greater than 1.96 for item loadings on their construct. We can thus conclude that all items load significantly on their intended construct, which indicates appropriate convergent validity [33].

Discriminant validity was assessed with the average variance extracted (AVE) table, given in Table 2. Values on the diagonal are the root square of the average variance extracted for each construct. These values should be greater than any off-diagonal value [33]. Since this condition was satisfied, we can conclude that our instrument has appropriate discriminant validity.

Finally, construct reliability was checked with composite reliability [31] and Cronbach's alpha calculation. All values of composite reliability and Cronbach's alpha were well above the generally accepted threshold of 0.70 [16]. This proves that our constructs have appropriate internal consistency.

Table 2. Discriminant Validity and Reliability

Variables	CR	CA	1	2	3	4	5	6	7
(1) Autonomy	0.847	0.739	**0.806**						
(2) Computer Anxiety	0.949	0.919	–0.213	**0.927**					
(3) Managerial Support	0.866	0.799	0.074	0.058	**0.827**				
(4) Perceived Behavioral Control	0.903	0.838	0.189	–0.364	0.332	**0.869**			
(5) Personal Innovativeness with IT	0.902	0.838	0.105	–0.245	0.242	0.440	**0.868**		
(6) Qualitative Overload	0.874	0.811	–0.107	0.397	0.015	–0.360	–0.086	**0.798**	
(7) Quantitative Overload	0.911	0.879	–0.014	0.158	–0.039	–0.044	0.050	0.366	**0.848**

Notes: CR = composite reliability, CA = Cronbach's alpha. Items on the diagonal (in boldface) are the square root of average variance extracted (AVE).

Given the very good values overall for convergent validity, discriminant validity, and reliability, we can conclude that our instrument displays the appropriate measurement properties.

Common Methods Variance Analysis

Regarding any research using subjective measurements during a single period in time, common method bias may occur in the study. We therefore conducted ad hoc tests to assess how serious the problem was in our case. Following the guidelines elaborated by Podsakoff et al. [72], we performed the Harman single-factor test on all seven core construct items in the model. We did this with an unrotated exploratory factor analysis (principal components analysis) using SPSS 12. The highest variance explained by one factor only was 22.448 percent, and all 7 components were present. Since more than one factor emerged from the analysis, we can conclude that common method variance is not a serious concern in our study. The next step is the analysis of structural paths.

Results

In order to test the posited relationships, we ran a bootstrap analysis with 500 resamples [21] with SmartPLS. Overall, our model explains a substantial amount of the variance of PBC ($R^2 = 0.417$) and of computer anxiety (CA) ($R^2 = 0.297$).

Relationships Between Internal and External Field Forces and Perceived Behavioral Control

As expected in H1, the CA → PBC link ($\beta = -0.195$, $p < 0.000$) was found to be negative and significant. Likewise, the PIIT → PBC link ($\beta = 0.276$, $p < 0.000$) was positive and significant, and H2 is thus validated. The influence of broad work environment factors was as follows. The link AU → PBC ($\beta = 0.067$, n.s. [nonsignificant]) was not significant and, therefore, H3 is not validated. In contrast, the link QUANT → PBC ($\beta = 0.095$, $p < 0.05$) is significant but positive, which contradicts and invalidates H4. Then, the link QUAL → PBC ($\beta = -0.274$, $p < 0.000$) is significant and gives strong support to H5. Finally, the hypothesis regarding the influence of the social factor with the link MSUP → PBC ($\beta = 0.274$, $p < 0.001$) was supported, giving strong support to H6.

Relationships Between Field Forces and Computer Anxiety

As expected, the links PIIT → CA ($\beta = -0.226$, $p < 0.001$), AU → CA ($\beta = -0.144$, $p < 0.001$), QUAL → CA ($\beta = 0.305$, $p < 0.001$), and to a lesser extent, QUANT → CA ($\beta = 0.069$, $p < 0.05$), were as expected. This gives support to H7, H8, H9, and H10. Unexpectedly, however, we found that the MSUP → CA link ($\beta = 0.100$, $p < 0.000$)

was positive and significant, contradicting the negative relationship posited in H11. Together, the results mostly support the research model, and confirm that the influences of individual and environmental forces on PBC are, to some degree, mediated by computer anxiety.[4] These results are summarized in Table 3.

Influence of Individual Differences on Computer Anxiety and Perceived Behavioral Control

The study results indicate mixed effects of demographics on PBC and on computer anxiety. We found a significant gender (men = 0, women = 1) effect on computer anxiety ($\beta = -0.082$, $p < 0.05$), unexpectedly with women experiencing less computer anxiety than men. However, as expected, women experience a lower level of PBC than men ($\beta = -0.102$, $p < 0.000$). Age was then found to significantly influence computer anxiety ($\beta = 0.164$, $p < 0.000$) and PBC ($\beta = -0.083$, $p < 0.05$) with the expected patterns of relationships. Older workers tend to experience more computer anxiety and a lower level of PBC than younger ones, which is consistent with prior research [22, 62]. With respect to experience with IT, we found no significant influence of this factor on either computer anxiety ($\beta = -0.032$, n.s.) or on PBC ($\beta = 0.038$, n.s.). Conversely, a higher level of education was significantly related to lower computer anxiety scores as expected ($\beta = -0.129$, $p < 0.000$). However, it was not significantly related to PBC ($\beta = -0.049$, n.s.). Finally, a *t*-test shows that supervisors (mean = 2.618, standard deviation = 1.320) tend to experience more computer anxiety than executives (mean = 2.314, standard deviation = 1.063) as expected ($t = -2.67$, $p < 0.01$). However, overall, we found no direct effect of work status on either computer anxiety ($\beta = -0.023$, n.s.) or PBC ($\beta = 0.062$, n.s.) in our model. In the following section, we discuss the results of this study, its limitations, and its contributions.

Discussion

THE PRESENT STUDY YIELDS MEANINGFUL FINDINGS about the internal and external determinants of IT-PBC and computer anxiety. Earlier research provides evidence concerning the direct effects of computer anxiety on intention to use IS [99]. We found that computer anxiety, furthermore, directly affects PBC, and that it is an important mediator of the influence of internal and external forces on this variable. Together, these results offer a reason why companies should care about the anxiety that their employees experience regarding computers.

Next, we show that personal innovativeness with IT influences PBC both directly and indirectly. The current study extends prior research that suggests that personal innovativeness directly affects computer self-efficacy [1, 94]. It does so by showing that the same pattern of relationship holds with the related—but more global—PBC construct. With respect to the indirect effect, the results show that a significant amount of the beneficial effect of personal innovativeness is expressed by a decrease in computer anxiety. In addition, consistent with prior research, we also noted that the value of the PIIT → CA ($\beta = -0.226$) link is very similar to that found in the study by Thatcher

Table 3. Path Coefficients

Link	Hypothesis (validation)	Original sample	Sample mean	Standard deviation	Standard error	*t*-statistic
Gender → PBC	—	–0.102***	–0.105	0.029	0.029	3.552
Age → PBC	—	–0.083**	–0.082	0.030	0.030	2.753
Education → PBC	—	–0.049	–0.051	0.028	0.028	1.743
IT experience → PBC	—	0.038	0.040	0.024	0.024	1.583
Computer anxiety → PBC	H1 (yes)	–0.195***	–0.192	0.034	0.034	5.659
Personal innovativeness with IT → PBC	H2 (yes)	0.276***	0.275	0.039	0.039	7.043
Autonomy → PBC	H3 (no)	0.067	0.067	0.034	0.034	1.950
Quantitative overload → PBC	H4 (no)	0.095*	0.094	0.038	0.038	2.477
Qualitative overload → PBC	H5 (yes)	–0.274***	–0.280	0.039	0.039	7.119
Managerial support → PBC	H6 (yes)	0.274***	0.275	0.033	0.033	8.415
Gender → CA	—	–0.082*	–0.082	0.034	0.034	2.454
Age → CA	—	0.164***	0.160	0.033	0.033	4.990
Education → CA	—	–0.129***	–0.128	0.033	0.033	3.850
IT experience → CA	—	–0.032	–0.037	0.026	0.026	1.243
Personal innovativeness with IT → CA	H7 (yes)	–0.226***	–0.225	0.030	0.030	7.437
Autonomy → CA	H8 (yes)	–0.144***	–0.150	0.038	0.038	3.835
Quantitative overload → CA	H9 (yes)	0.069*	0.069	0.033	0.033	2.061
Qualitative overload → CA	H10 (yes)	0.305***	0.305	0.037	0.037	8.219
Managerial support → CA	H11 (no)	0.100***	0.101	0.031	0.031	3.172

Notes: Variance explained: $R^2_{\text{(Perceived Behavioral Control)}} = 0.417$; $R^2_{\text{(Computer Anxiety)}} = 0.297$. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.000$.

and Perrewé ($\beta = -0.217$). This confirms the robustness of the relationship, and the meaningfulness of personal innovativeness as a hinderer of computer anxiety.

The results also show that external forces, specifically qualitative overload and IT managerial support, have significant direct and indirect effects on PBC. By contrast, autonomy drives PBC only via an effect that is mediated by computer anxiety. Although quantitative overload has a negative effect on computer anxiety and, contrary to our expectations, a positive effect on PBC, these effects are weak and the mediation by computer anxiety was not found to be significant. So, while both variables significantly impact PBC and computer anxiety, it appears that qualitative overload has a greater adverse effect than quantitative overload on PBC and computer anxiety. Why? The work pressure may encourage workers to develop more efficient patterns of IT usage, which might result in them feeling more in control regarding the IT that they use. Furthermore, it is possible that overwhelmed workers manage spontaneously to adjust their work tasks in order to cope with quantitative overload, without further IT needs. Likewise, it is possible that they experience less computer anxiety because they may perceive IT as an opportunity to complete their work tasks more efficiently and to reduce their overall workload [80]. In contrast, if the tasks to be performed are complex or require new skills or abilities (qualitative overload), individuals may perceive that, overall, they have to make significant efforts in order to adapt to the new IT. It is, therefore, plausible that this need to acquire new skills, and the significant adaptive efforts that this entails, may generate computer anxiety and decrease PBC. Together, these assumptions may help to explain why qualitative overload is more likely to have a stronger impact on computer anxiety and PBC than quantitative overload.

Much prior research has highlighted social norms as key determinants of successful IT diffusion and adoption [59, 86]. Accordingly, this study underscores the value of managerial support in fostering individuals' feelings of control. Unexpectedly, however, managerial support was also found to be positively related to computer anxiety. It drives PBC directly, but indirectly restrains it by increasing computer anxiety. While this result came as a surprise, prior research may help to explain it. For example, Compeau and Higgins [24] found that encouragement by peers and peers' usage of IT help to foster computer self-efficacy. In contrast, organizational support was negatively related with it. Thatcher et al. [95] further argue that when individuals receive external support, they tend to feel less capable of using IT effectively on their own. Consequently, this can generate computer anxiety. Another possible explanation is that the message communicated by top managers may reflect the exercise of authority. Managerial support may increase the pressure exerted on individuals to achieve their work goals, thus increasing anxiety.

With respect to individual differences, the study indicates mixed effects of demographics on PBC and computer anxiety. In line with Harrison and Rainer's [34] study on computer skills, the results show that age, gender, and experience with IT are related to PBC, while education is not. We further found that age and education are relevant predictors of computer anxiety, which is consistent with prior research [22, 62]. Workers with higher levels of education may have acquired valuable IT skills during their studies. They may also have a better sense of the underlying operating

mode of IT [62] and, therefore, feel more comfortable with it. A *t*-test showed that managers experienced less computer anxiety than supervisors, a factor that was explained earlier by the greater decision latitude of managers, who have more resources at hand to cope with IT-related job demands [62]. However, overall, the work status variable did not significantly influence the research model. The influence of gender on computer anxiety was contrary to our expectations. It is possible that this result is sample specific, and that factors not examined here may explain it (e.g., [68]). We might postulate that complex interactions between age, gender, or job characteristics make women from our sample feel less anxious about IT than men. These results together suggest that specific attention should be paid to seniors and those with less IT experience in dealing with PBC and computer anxiety.

Interestingly, the variance of computer anxiety ($R^2 = 0.297$) in our model is significantly higher than the variance of computer anxiety ($R^2 = 0.182$) in Thatcher and Perrewé's model [94]. This means that work environment variables and managerial support explain a significantly higher amount of the variance of computer anxiety than the negative affectivity and trait anxiety in Thatcher and Perrewé's study [94]. It is important to take this result into consideration because managers cannot really act on the personality traits of their employees. Conversely, they can modify and adapt their employees' working environment.

Contributions

THIS STUDY HAS SEVERAL IMPLICATIONS FOR IS RESEARCH AND PRACTICE. Overall, IS researchers are concerned that we do not sufficiently understand the nomological net surrounding PBC in TPB-based studies [13]. According to Deng et al. [27], most IS research dealing with PBC has focused on training contexts. Furthermore, little attention has been paid to external and internal forces such as autonomy, support, or personal innovativeness. The first contribution of this paper is, therefore, to conceptualize a model explaining PBC in IT contexts. The model, which applies field theory combined with the demand-control theory in IT contexts, posits and validates the joint influences of internal, external, and social forces on PBC with respect to IT. By emphasizing the drivers of and impediments to PBC, the study offers guidance for fostering IT adoption, for efficient adaptive strategies to IT, and for mitigating the development of negative cognitions about IT such as technostress.

Second, the integration of field theory with the demand-control theory helps to reveal the role of computer anxiety in the formation of PBC. While IS managers generally expect productivity gains from IT [56], they often fail to obtain them [77]. This can result in increased job demands for workers because they have to do more without the expected IT benefits. As we need to help managers to cope with these issues, this study extends prior research on general *work* anxiety, and emphasizes the environmental and individual mechanisms that generate *computer* anxiety in the workplace. It conceptualizes and provides evidence for the adverse and beneficial effects of the work environment, internal forces, and context on computer anxiety. It also shows that these effects are, to some degree, transmitted to PBC. Computer anxiety is thus

an important conduit through which internal and external forces can influence control perceptions in the workplace.

Third, the research model conceptually embeds IT use within the context, tasks, and structures [14, 46]. It explains PBC by mapping out the complexity of the field in which it is construed. This implies that, following the work of Lamb and Kling [46], individuals should not be considered only as system users. They are primarily *social actors* who make sense of the IT available to them, but also of their work and social context, in performing their work activities. Context matters because IT outcomes vary considerably depending on this parameter [7]. Surprisingly, however, the joint study of context and that of internal forces in IS has often seemed to be privileged by social and interpretive researchers and neglected by positivist ones [7]. By examining internal and external field forces together, this study is thus an important incremental contribution to IS research. It shows how Lewin's [55] field theory can help to create richer and less fragmented models to capture more fully the individual and contextual determinants of individual IT adoption and adaptation.

The study results are also of consequence for practitioners. The results emphasize the variables that managers should manipulate in order to decrease computer anxiety and increase PBC. They show that, in a given work environment, qualitative overload and autonomy are critical in the assessment of computer anxiety and PBC. In contrast, reducing the quantity of work per se will have little effect on these variables. Confirming prior research [59, 86], this study also emphasizes the value of IT managerial support in fostering individuals' feelings of control. On the contrary, managerial support simultaneously and indirectly decreases PBC by augmenting computer anxiety. Companies should thus try to take the psychology of their workers into account when communicating about IT. They should, for example, avoid applying systematically top-down change approaches, communicating stressful messages, and overselling IT, and should exert reasonable authority. Otherwise, their messages may lead to unexpected outcomes, such as computer anxiety, weaker feelings of control, or technology avoidance by users [86]. Interestingly, the results of this study have a bearing on contexts of pressing societal concerns about psychological well-being and psychosocial risks at work [65]. For example, a recent report indicates that over 25 percent of EU workers experience stress and anxiety at work linked to considerable work demands [65]. It also emphasizes the need to better understand the consequences of the imbalance between available resources and the ability to deal with the constraints imposed by work environments.

So, overall, managers should encourage organizational initiatives that promote feelings of control over the systems used by workers. In organizations, human resources and operational managers—more often than IS managers, especially in ongoing use contexts—are in charge of taking these initiatives, which involve general aspects of the work environment. Given their impact on IT perceptions, and subsequently on IS success, it is necessary for IS and operational managers to work more closely together. They could then better take into account the effect of the internal and contextual forces that surround IT usage [7, 77].

In doing so, managers would also be wise to take into account the characteristics of the IT that they want to promote. Some IT, such as enterprise resource planning (ERP), cannot be easily manipulated by the end user. Such applications typically integrate accepted best practice with which the end user is obliged to comply. As such, they frequently offer a great deal of guidance, often have a "one best way" embedded in their design, and their use is often mandated within organizations [87]. This can conflict with existing work practices. As a result, when required to use such IT, users may no longer feel in control of the technology itself, or of their own IT-supported work [91]. Notwithstanding, this loss of behavioral control may still have a limited impact on usage of IT itself. In fact, the ways in which a specific IT is used can be embedded to some degree in its structural properties [28]. This is not the case for emerging Web 2.0 tools, such as wikis, which are increasingly implemented and used in organizations [61, 89]. Wikis are "a type of website that allows the visitors themselves to easily add, remove, and otherwise edit and change available content" [89, p. 513]. In nature, these collaborative applications are much more flexible and less structured than IT such as ERPs. Moreover, wiki usage is still frequently voluntary as users are usually free to participate or not in content creation [42]. As these types of technologies offer little guidance and structure to users, it is all the more important that those users feel in control of these technologies. If they do not, emergent ways of using these applications may prove to be counterproductive and detrimental to the supported collaborative work processes. Furthermore, security issues, misuses, and threats to information accuracy can quickly arise [42, 71] and impede the realization of wiki benefits for the companies that implement these ITs.

The above-mentioned characteristics of Web 2.0 applications also have implications for the way in which managers support IT usage. In the context of Web 2.0 usage, the computer anxiety generated by managerial support can, in fact, hurt workers' creativity, their willingness to use these tools, and their capability to collaborate effectively via them. In such circumstances, empowering users and developing work structures that support bottom-up collaborative dynamics would, arguably, seem to be more suitable ways of fostering effective IT usage.

Limitations and Future Research

THE RESEARCH HAS LIMITATIONS THAT ARE IMPORTANT TO ACKNOWLEDGE. The first limitation lies in the internal validity of our model. In effect, inferences are often better assessed with stronger designs such as lab experiments [25]. Furthermore, data were gathered via self-assessments, and, therefore, with the predictor and criterion variable measures provided by the same person, implying the risk of method bias [72]. However, as mentioned earlier, we conducted ad hoc statistical tests that showed that common methods bias is not a serious concern in this study.

A second limitation lies in our approach to the IT artifact. Similar to other studies in the IS field (e.g., [73, 91]), we surveyed end users' interactions with the IT that they most frequently use in the workplace, without focusing on a specific technology. However, this approach is consistent with the studies that have shown that workers,

and especially managers, rely on portfolios comprising multiple IT to accomplish their work tasks (e.g., [59]). We therefore believe that it makes sense to examine workers' perceptions of the IT that they use in the workplace from a broad point of view.

Third, we examined the impact of a limited set of internal and external field forces. We did not test their subsequent effects on behaviors such as IT usage or intentions to use. Acknowledging these elements could help to determine whether, for example, computer anxiety and PBC impact and mediate the effect of the work environment on system usage, or on outcomes such as technostress.

Some of these limitations are opportunities for future research in several areas. First, the results imply that field theory could be used to examine the nomological net of other key IT outcomes related to computer phobia and control, such as technostress, in a more comprehensive way. Interestingly, previous researchers developed measures for technostress and tested its key effects on productivity in the workplace (e.g., [73, 91]). However, so far, its determinants have been underinvestigated [91]. We believe that field theory would offer a relevant and more comprehensive perspective for an improved acknowledgment of the *determinants* of this phenomenon. Complementing earlier research in this domain, field theory would make it possible to examine the relationships between the different kinds of internal and external forces that together influence technostress.

Other key IS-related phenomena, such as IT usage, adaptation, postadoptive behaviors (e.g., personal innovation), user experience [35, 48] or adaptation [11], offer interesting avenues for future research. For example, control is an essential parameter to be taken into account when studying coping with technologies [11, 12]. Future research could, for example, examine whether internal and external factors affect adaptive strategies via computer anxiety and PBC.

Second, future research could consider the influence of other internal and external factors on computer anxiety and on PBC. For example, user involvement in IT implementations [62], intrinsic motivations, and national culture are other variables of interest that could be investigated. With respect to national culture, for example, personal innovativeness relates to risk-taking behaviors and the cultural value of uncertainty avoidance [36]; we may thus expect values such as uncertainty avoidance to have an impact on our research model. It has also been shown that, overall, national culture is linked to computer anxiety [75]. Moreover, an earlier study by Smulders et al. [84] suggested that French workers differ significantly from other European workers regarding variables such as perceptions of psychological job demands, the degree of control over work, and the perceptions of the material support provided by peers or superiors. It thus makes sense to extend our model and consider national cultural differences in future research.

The objective and perceived characteristics of the IT (e.g., those of the abovementioned Web 2.0 applications) or the IT-use context could also be taken into consideration. For instance, the examination of IT restrictiveness [82], decisional guidance [83], and IT voluntariness [104] could increase our knowledge of individual perceptions of control, while facing IT constraints. In fact, these underinvestigated variables are directly related to IT control and job demands in IT-intensive work contexts.

Researchers may also want to investigate a broader range of social supports (e.g., such as peer support, which has been shown to reduce computer anxiety [76], job demands, and job control factors). In a study conducted among Spanish managers, Bruque et al. [19] stressed the importance of a supportive social network for reducing computer anxiety. They argue that the more social ties managers have, the easier it is for them to adapt to IT. Future research could thus examine the effects of these networks on computer anxiety and PBC.

Conclusions

Building on Lewin's [55] field theory, this study extends our knowledge of the individual, contextual, and social forces that drive or restrain PBC in ongoing IT usage contexts. After conducting a survey and testing our research model with a sample of 724 workers in a professional training situation in France, our study indicated that external forces such as broad work environment factors, managerial support, and personal innovativeness with IT affect PBC. These effects are partly mediated by computer anxiety. The study has important implications for both research and practice. It increases our understanding of the nomological net surrounding PBC. In addition, it suggests that field theory is a relevant lens for better acknowledging individuals' responses to IT in the workplace. Finally, it informs practitioners of the key forces that they can stimulate in order to increase end-user PBC, thus providing insights into how they can increase the effectiveness of IT adoption in the workplace.

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Notes

1. This phenomenon is somewhat similar to insights from the theory of coping [49] and the coping model of user adaptation [11]. For this theory, users can adapt in different ways when they have to face IT challenges. On the one hand, problem-focused adaptive strategies lead IT users to directly tackle the given IT issue, which thereby produces locomotion. On the other hand, emotion-focused coping strategies include the user changing his or her perception of the problem (e.g., minimizing the perceived negative consequences of the IT, positive comparison), and hence produce changes in cognitive structure.

2. These forces can also influence, or even transform into, driving forces with reverse effects on the behavior. This can occur, for example, when an individual repeatedly fails to perform a behavior in the presence of a given obstacle. After some unsuccessful attempts, the presence of the obstacle may discourage any future attempts, and may hence negatively impact the behavior.

3. The number of questionnaires distributed is based on the estimated number of printed questionnaires.

4. In order to further assess the extent to which computer anxiety mediates the impact of internal and external forces on PBC, we computed the *significance* of the partial mediation effects via the Sobel test [9]. This test confirmed the significance of the partial mediation by CA of the influence on PBC of AU ($Z = 3.763$, $p < 0.000$), PIIT ($Z = 5.193$, $p < 0.000$), QUAL ($Z = -5.213$, $p < 0.000$), and MSUP ($Z = -3.189$, $p < 0.000$), but not that of QUANT, which has no effect that would be mediated by CA on PBC.

References

1. Agarwal, R., and Prasad, J. A Conceptual and operational definition of personal innovativeness in the domain of information technology. *Information Systems Research, 9,* 2 (1998), 204–215.

2. Ahuja, M.K., and Thatcher, J.B. Moving beyond intentions and toward the theory of trying: Effects of work environment and gender on post-adoption information technology use. *MIS Quarterly, 29,* 3 (2005), 427–459.

3. Ajzen, I. The theory of planned behavior. *Organizational Behavior and Human Decisions Processes, 50,* 2 (1991), 179–221.

4. Ajzen, I. Perceived behavioral control, self-efficacy, locus of control and the theory of planned behavior. *Journal of Applied Social Psychology, 32,* 4 (2002), 665–683.

5. Allen, M.W.; Armstrong, D.J.; Reid, M.F.; and Riemenschneider, C.K. Factors impacting the perceived organizational support of IT employees. *Information & Management, 45,* 8 (2008), 556–563.

6. Arnoux, P. Attention, Brouillard: Les multiples moyens de communication s'empilent sans bien se comprendre dans une cacophonie contre-productive [Fog warning: Without mutual understanding, the multiple means of communication pile up in a counterproductive cacophony], *Le Nouvel Economiste, 1487,* 2 (2009), 17–18.

7. Avgerou, C. The significance of context in information systems and organizational change. *Information Systems Journal, 11,* 1 (2001), 43–63.

8. Bandura, A. Self-efficacy: Toward an unifying theory of behavioral change. *Psychological Review, 84,* 2 (1977), 191–215.

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

10. Bashein, B.J., and Markus, M.L. Preconditions for BPR success. *Information Systems Management, 11,* 2 (1994), 7–13.

11. Beaudry, A., and Pinsonneault, A. Understanding user responses to information technology: A coping model of user adaptation. *MIS Quarterly, 29,* 3 (2005), 493–524.

12. Beaudry, A., and Pinsonneault, A. The other side of acceptance: studying the direct and indirect effects of emotions on information technology use. *MIS Quarterly, 34,* 4 (2010), 689–710.

13. Benbasat, I., and Barki, H. Quo vadis, TAM? *Journal of the Association for Information Systems, 8,* 4 (2007), 211–218.

14. Benbasat, I., and Zmud, R.W. The identity crisis within the IS discipline's core properties. *MIS Quarterly, 27,* 2 (2003), 183–194.

15. Bouchard, T.J. Field research methods: Interviewing, questionnaires, participant observation, unobtrusive measures. In M.D. Dunnette (ed.), *Handbook of Industrial and Organizational Psychology.* Chicago: Rand McNally, 1976, pp. 363–413.

16. Boudreau, M.-C.; Gefen, D.; and Straub, D.W. Validation in information systems research: A state-of-the-art assessment. *MIS Quarterly, 25,* 1 (2001), 1–16.

17. Brancheau, J.C., and Wetherbe, J.C. The adoption of spreadsheet software: Testing innovation diffusion theory in the context of end-user computing. *Information Systems Research, 1,* 2 (1990), 115–143.

18. Brod, C. Managing technostress: Optimizing the use of computer technology. *Personnel Journal, 61,* 10 (1982), 753–757.

19. Bruque, S.; Moyano, J.; and Eisenberg, J. Individual adaptation to IT-induced change: The role of social networks. *Journal of Management Information Systems, 25,* 3 (2009–10), 177–206.

20. Burnes, B. Kurt Lewin and the planned approach to change: A re-appraisal. *Journal of Management Studies, 41,* 6 (2004), 977–1002.

21. Chin, W.W. PLS-Graph user's guide, version 3.0. Soft Modeling, February 2001 (available at www.pubinfo.vcu.edu/carma/Documents/OCT1405/PLSGRAPH3.0Manual.hubona.pdf).

22. Chua, S.L.; Chen, D.-T.; and Wong, A.F.L. Computer anxiety and its correlates: A meta-analysis. *Computers in Human Behavior, 15,* 1 (1999), 609–623.

23. Coffin, R.J., and MacIntyre, P.D. Motivational influences on computer-related affective states. *Computers in Human Behavior, 15,* 5 (1999), 549–569.

24. Compeau, D.R., and Higgins, C.A. Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly, 19,* 2 (1995), 189–211.

25. Cook, T.D., and Campbell, D.T. *Quasi Experimentation: Design and Analytical Issues for Field Settings.* Chicago: Rand McNally, 1979.

26. DeLone, W.H., and McLean, E.R. The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems, 19,* 4 (Spring 2003), 9–30.

27. Deng, X.; Doll, W.J.; and Truong, D. Computer self-efficacy in an ongoing use context. *Behaviour and Information Technology, 23,* 6 (2004), 395–412.

28. DeSanctis, G. Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organization Science, 5,* 2 (1994), 121–147.

29. Durndell, A., and Haag, Z. Computer self efficacy, computer anxiety, attitudes towards the Internet and reported experience with the Internet, by gender, in an East European sample. *Computers in Human Behavior, 18,* 5 (2002), 521–535.

30. Fishbein, M., and Ajzen, I. *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research.* Reading, MA: Longman Higher Education, 1975.

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

32. Gefen, D., and Straub, D.W. Gender differences in perception and adoption of e-mail: An extension to the technology acceptance model. *MIS Quarterly, 21,* 4 (1997), 389–400.

33. Gefen, D.; Straub, D.; and Boudreau, M. Structural equation modeling techniques and regression: Guidelines for research practice. *Communications of the Association for Information Systems, 7,* 7 (2000), 1–78.

34. Harrison, A.W., and R.K. Rainer, Jr. The influence of individual differences on skill in end-user computing. *Journal of Management Information Systems, 9,* 1 (Summer 1992), 93–111.

35. Hassenzahl, M., and Tractinsky, N. User experience: A research agenda. *Behaviour and Information Technology, 25,* 2 (2006), 91–97.

36. Hofstede, G. *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations.* Thousand Oaks, CA: Sage, 2001.

37. Igbaria, M. User acceptance of microcomputer technology: An empirical test. *OMEGA, 21,* 1 (1993), 73–90.

38. Igbaria, M. An examination of the factors contributing to microcomputer technology acceptance. *Accounting, Management and Information Technology, 4,* 4 (1994), 205–224.

39. Igbaria, M., and Parasuraman, S. A path analytic study of individual characteristics, computer anxiety and attitudes toward microcomputers. *Journal of Management, 15,* 3 (1989), 373–388.

40. Jasperson, J.; Carter, P.; and Zmud, R. A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems. *MIS Quarterly, 29,* 3 (2005), 525–557.

41. Kalika, M.; Boukef Charki, N.; and Isaac, H. The Napoleon effect perspective: An empirical investigation of e-mail use versus face-to-face meetings. *Communications of the Association for Information Systems, 22,* 27 (2008), 501–514.

42. Kane, G.C., and Fichman, R.G. The shoemaker's children: Using wikis for information systems teaching, research, and publication. *MIS Quarterly, 33,* 1 (2009), 1–17.

43. Karahanna, E.; Ahuja, M.; Srite, M.; and Galvin, J. Individual differences and relative advantage: The case of GSS. *Decision Support Systems, 32,* 4 (2002), 327–341.

44. Karasek, R.A. Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24,* 2 (1979), 285–308.

45. Karasek, R.A., and Theorell, T. *Healthy Work: Stress, Productivity, and the Reconstruction of Working Life.* New York: Basic Books, 1990.

46. Lamb, R., and Kling, R. Reconceptualizing users as social actors in information systems research. *MIS Quarterly, 27,* 2 (2003), 197–235.

47. Lapointe, L., and Rivard, S. A multilevel model of resistance to information technology implementation. *MIS Quarterly, 29,* 3 (2005), 461–491.

48. Law, E.L.-C.; Roto, V.; Hassenzahl, M.; Vermeeren, A.P.O.S.; and Kort, J. Understanding, scoping and defining user experience: A survey approach. In *Proceedings of the 27th Conference on Human Factors in Computing Systems.* Boston: ACM Press, 2009, pp. 719–728.

49. Lazarus, R.S., and Folkman, S. *Stress, Appraisal, and Coping.* New York: Springer, 1984.

50. Leonard-Barton, D., and Deschamps, I. Managerial influence in the implementation of new technology. *Management Science, 34,* 10 (1988), 1252–1265.

51. Lewin, K. Field theory and experiment in social psychology: Concepts and methods. *American Journal of Sociology, 44,* 6 (1939), 868–896.

52. Lewin, K. Defining the "field at a given time." *Psychological Review, 50,* 3 (1943), 292–310.

53. Lewin, K. Behavior and development as a function of the total situation. In D. Cartwright (ed.), *Resolving Social Conflicts & Field Theory in Social Science.* Washington, DC: American Sociological Association, 1946, pp. 337–381.

54. Lewin, K. *Psychologie dynamique—les relations humaines* [Dynamic Psychology—Human Relations]. Paris: Presses Universitaires de France, 1959.

55. Lewin, K. Frontiers in group dynamics. In D. Cartwright (ed.), *Resolving Social Conflicts & Field Theory in Social Science.* Washington DC: American Psychological Association, 1997, pp. 301–336.

56. Luftman, J., and Ben-Zvi, T. Key issues for IT executives 2009: Difficult economy's impact on IT. *MIS Quarterly Executive, 9,* 1 (2010), 49–59.

57. Mahar, D.; Henderson, R.; and Deane, F. The effect of computer anxiety, state anxiety, and computer experience on users' performance. *Personality and Individual Differences, 22,* 5 (1997), 683–692.

58. Manstead, A.S.R., and Eekelen, S.A.M.V. Distinguishing between perceived behavioral control and self-efficacy in the domain of academic achievement intentions and behaviors. *Journal of Applied Social Psychology, 28,* 15 (1998), 1375–1392.

59. Markus, M.L. Electronic mail as the medium of managerial choice. *Organization Science, 5,* 4 (1994), 502–527.

60. Martinko, M.J.; Henry, J.W.; and Zmud, R.W. An attributional explanation of individual resistance to the introduction of information technologies in the workplace. *Behaviour & Information Technology, 15,* 5 (1996), 313–330.

61. McAfee, A.P. Enterprise 2.0: The dawn of emergent collaboration. *MIT Sloan Management Review, 47,* 3 (2006), 21–28.

62. Mikkelsen, A.; Ogaard, T.; Lindoe, P.H.; and Olsen, O.E. Job characteristics and computer anxiety in the production industry. *Computers in Human Behavior, 18,* 3 (2002), 223–239.

63. Morris, M.G.; Venkatesh, V.; and Ackerman, P.L. Gender and age differences in employee decisions about new technology: An extension of the theory of planned behavior. *IEEE Transactions on Engineering Management, 52,* 1 (2005), 69–84.

64. Moskowitz, G.B. *Social Cognition: Understanding Self and Others.* New York, London: Guilford Press, 2004.

65. Nasse, P., and Legeron, P. *Rapport sur la détermination, la mesure, et le suivi des risques psychosociaux au travail* [A Report on the Determination, Measurement, and Follow-Up to Work-Related Psychosocial Risks]. Paris: Ministère du travail, des relations sociales et de la solidarité, 2008.

66. Nelson, R.R. IT project management: Infamous failures, classic mistakes, and best practices. *MIS Quarterly Executive, 6,* 2 (2007), 67–78.

67. Palfrey, J., and Gasser, U. *Born Digital: Understanding the First Generation of Digital Natives.* Basic Book, 2008.

68. Parasuraman, S., and Igbaria, M. An examination of gender differences in the determinants of computer anxiety and attitudes toward microcomputers among managers. *International Journal of Man-Machine Studies, 32,* 3 (1990), 327–340.

69. Parthasarathy, M., and Bhattacherjee, A. Understanding post-adoption behavior in the context of online services. *Information Systems Research, 9,* 4 (1998), 362–379.

70. Pinsonneault, A., and Kraemer, K.L. Survey research methodology in management information systems: An assessment. *Journal of Management Information Systems, 10,* 2 (Fall 1993), 75–105.

71. Plummer, M.; Plotnick, L.; Hiltz, S.R.; and Jones, Q. A wiki that knows where it is being used: Social hazard or social service? Paper presented at the 2007 Americas Conference on Information Systems, Keystone, CO, August 9–12, 2007.

72. Podsakoff, P.M.; MacKenzie, S.B.; Lee, J.-Y.; and Podsakoff, N.P. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88,* 5 (2003), 879–903.

73. Ragu-Nathan, T.S.; Tarafdar, M.; Ragu-Nathan, B.S.; and Tu, Q. The consequences of technostress for end users in organizations: Conceptual development and empirical validation. *Information Systems Research, 19,* 4 (2008), 417–433.

74. Ringle, C.M.; Wende, S.; and Will, A. Smart PLS. University of Hamburg, Hamburg, Germany, 2005.

75. Rosen, L.D., and Weil, M.M. Computer anxiety: A cross cultural comparison of university students in ten countries. *Computers in Human Behavior, 11,* 1 (1995), 45–64.

76. Rosen, L.D.; Sears, D.C.; and Weil, M.M. Treating technophobia: A longitudinal evaluation of the computerphobia reduction program. *Computers in Human Behavior, 9,* 1 (1993), 27–50.

77. Ross, J.W., and Weil, P. Six IT decisions your IT people shouldn't make. *Harvard Business Review, 80,* 11 (November 2002), 84–91.

78. Sales, S.M. Some effects of role overload and role underload. *Organizational Behavior and Human Performance, 5,* 6 (1970), 592–608.

79. Sargent, L.D., and Terry, D.J. The moderating role of social support in Karasek's job strain model. *Work & Stress, 14,* 3 (2000), 245–261.

80. Schultze, U., and Vandenbosh, B. Information overload in a groupware environment: Now you see it, now you don't. *Journal of Organizational Computing and Electronic Commerce, 8,* 2 (1998), 127–148.

81. Schwenkmezger, P., and Steffgen, G. Anxiety and motor performance. In B. Kirkcaldy (ed.), *Normalities and Abnormalities in Human Movement.* Basel: Karger, 1989, pp. 78–99.

82. Silver, M.S. User perceptions of decision support system restrictiveness: An experiment. *Journal of Management Information Systems, 5,* 1 (Summer 1988), 51–65.

83. Silver, M.S. Decisional guidance for computer-based decision support. *MIS Quarterly, 15,* 1 (1991), 105–122.

84. Smulders, P.G.W.; Kompier, M.A.J.; and Paoli, P. The work environment in the twelve EU-countries: Differences and similarities. *Human Relations, 49,* 10 (1996), 1291–1313.

85. Spreitzer, G.M. Social structural characteristics of psychological empowerment. *Academy of Management Journal, 39,* 2 (1996), 483–504.

86. Standing, C.; Sims, I.; and Love, P. IT non-conformity in institutional environments: E-marketplace adoption in the government sector. *Information & Management, 46,* 2 (2009), 138–149.

87. Straub, D.; Limayem, M.; and Karahanna-Evaristo, E. Measuring system usage: Implications for IS theory testing. *Management Science, 41,* 8 (1995), 1328–1342.

88. Sun, H., and Zhang, P. The role of affect in IS research: A critical survey and a research model. In P. Zhang and D. Galletta (ed.), *Human–Computer Interaction and Management Information Systems: Foundations.* Armonk, NY: M.E. Sharpe, 2006.

89. Sutter, J. Tutorial: Introduction to Web 2.0. *Communications of the Association for Information Systems, 25,* 40 (2009), 511–540.

90. Tarafdar, M.; Tu, Q.; and Ragu-Nathan, T.S. Impact of technostress on end-user satisfaction and performance. *Journal of Management Information Systems, 27,* 3 (Winter 2010–11), 303–334.

91. Tarafdar, M.; Tu, Q.; Ragu-Nathan, B.S.; and Ragu-Nathan, T.S. The impact of technostress on role stress and productivity. *Journal of Management Information Systems, 24,* 1 (Summer 2007), 301–328.

92. Taylor, S., and Todd, P.A. Assessing IT usage: The role of prior experience. *MIS Quarterly, 19,* 4 (1995), 561–570.

93. Taylor, S., and Todd, P.A. Understanding information technology usage: A test of competing models. *Information Systems Research, 6,* 2 (1995), 144–176.

94. Thatcher, J.B., and Perrewé, P.L. An empirical examination of individual traits as antecedents to computer anxiety and computer self-efficacy. *MIS Quarterly, 26,* 4 (2002), 381–396.

95. Thatcher, J.B.; Zimmze, J.C.; Gundlach, M.J.; and McKnight, D.H. Internal and external dimensions of computer self-efficacy: An empirical examination. *IEEE Transactions on Engineering Management, 55,* 4 (2008), 628–644.

96. Thomas, K.W., and Velthouse, B.A. Cognitive elements of empowerment. *Academy of Management Review, 15,* 4 (1990), 666–681.

97. Thompson, R.L., and Higgins, C.A. Personal computing: Toward a conceptual model of utilization. *MIS Quarterly, 15,* 1 (1991), 125–143.

98. Thompson, R.L.; Compeau, D.; and Higgins, C. Intentions to use information technologies: An integrative model. *Journal of Organizational and End User Computing, 18,* 3 (2006), 25–46.

99. Venkatesh, V. Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research, 11,* 4 (2000), 342–365.

100. Venkatesh, V., and Bala, H. Technology acceptance model 3 and a research agenda on interventions. *Decision Science, 39,* 2 (2008), 273–315.

101. Venkatesh, V.; Morris, M.G.; Davis, G.B.; and Davis, F.D. User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27,* 3 (2003), 425–478.

102. Weil, M.M.; Rosen, L.D.; and Wugalter, S.E. The etiology of computerphobia. *Computers in Human Behavior, 6,* 4 (1990), 361–379.

103. Wold, H. Partial least squares. In S. Kotz and N.L. Johnson (eds.), *Encyclopedia of Statistical Sciences.* New York: Wiley, 1985, pp. 581–591.

104. Wu, J., and Lederer, A. A meta-analysis of the role of environment-based voluntariness in information technology acceptance. *MIS Quarterly, 33,* 2 (2009), 419–432.

105. Yaverbaum, G.J. Critical factors in the user environment: An experimental study of users, organizations, and tasks. *MIS Quarterly, 12,* 1 (1988), 75–88.

106. Yi, M.Y.; Fiedler, K.D.; and Park, J.S. Understanding the role of individual innovativeness in the acceptance of IT-based innovations: Comparative analyses of models and measures. *Decision Sciences, 37,* 3 (2006), 393–426.

107. Yperen, N.W.V., and Hgedoorn, M. Do high job demands increase intrinsic motivation or fatigue or both? The role of job control and job social support. *Academy of Management Journal, 46,* 3 (2003), 339–348.

108. Zmud, R.W. Individual differences and MIS success: A review of the empirical literature. *Management Science, 25,* 10 (1979), 966–979.

Appendix A: Constructs and Items

Construct	Item	Items	Authors
Computer anxiety	CA1	Working with IT makes me nervous.	Venkatesh [99]
	CA2	IT makes me feel uncomfortable.	
	CA3	IT makes me feel uneasy.	
Autonomy	AU1	I have a lot of freedom to decide how I perform assigned tasks.	Adapted from Ahuja and Thatcher [2]
	AU2	I control the content of my job.*	
	AU3	I have the authority to initiate projects in my job.	
	AU4	I set my own schedule for completing assigned tasks.	
Qualitative overload	QUAL1	To be successful on my job requires more IT skills than I currently have.	Adapted from Ahuja and Thatcher [2]
	QUAL2	To be successful on my job requires more abilities than I currently have.	
	QUAL3	My job requires me to do things for which I have insufficient IT training.	
	QUAL4	My capabilities are insufficient with respect to the performance I should have at work.	
Quantitative overload	QUANT1	My workload is too heavy.	Adapted from Ahuja and Thatcher [2]
	QUANT2	The amount of work I am given prevents me from doing my job as well as I would like.	
	QUANT3	It often seems that I have too much work for one person to do.	
	QUANT4	I never have enough time to do what is expected of me at work.	
Personal innovativeness	PIIT1	If I heard about a new information technology, I would look for ways to experiment with it.	Agarwal and Prasad [1]
	PIIT2	Among peers, I am usually the first to try out new information technologies.	
	PIIT3	I like to experiment with new information technologies.	
Managerial support	MSUP1	The senior management of my company supports best practices in using IT.	Adapted from Thompson et al. [97]
	MSUP2	My boss is very supportive of PC use for my job.	
	MSUP3	My boss strongly encourages me to make better use of IT.	
Perceived behavioral control	PBC1	I have control over using IT when performing my work tasks.	Adapted from Venkatesh [99]
	PBC2	I have the resources necessary to use the IT available to me at work.	
	PBC3	I have the knowledge necessary to use the IT available to me at work.	

* Item deleted due to poor psychometric properties.

Appendix B: Sample Characteristics

Characteristic	Label	Frequency	Valid percent
Education	Self-made/without diploma	9	1.2
	Professional school certificate	48	6.6
	High school	78	10.8
	Two-year college	240	33.1
	Bachelor degree	136	18.8
	Master degree or more	213	29.4
	Total	724	100.0
Age	Below 25	20	2.8
	26–35	265	36.6
	36–50	376	51.9
	Above 50	63	8.7
	Total	724	100.0
Gender	Male	322	44.5
	Female	402	55.5
	Total	724	100.0
Experience with IT	Less than 1 year	5	.7
	1–3 years	67	9.3
	4–5 years	95	13.1
	Above 5	550	76.0
	Do not use	7	1.0
	Total	724	100.0
Work status	Executive	422	58.3
	Supervisor	129	17.8
	Technician	47	6.5
	Office worker	126	17.4
	Total	724	100.0
Industry	Building and public works	17	2.4
	Industry	256	36.1
	Trade	50	7.0
	Hotel business and catering	10	1.4
	Transportation	31	4.4
	Telecommunications and IT services	75	10.6
	Finance and real estate	35	4.9
	Business services (except IT services)	48	6.8
	Private services	18	2.5
	Other	184	23.9
	Total	724	100.0
Company size	Below 50	47	6.5
	51–500	224	31.2
	501–1,000	91	12.7
	1,001–5,000	137	19.1
	5,001–10,000	52	7.2
	Above 10,000	168	23.4
	Total	719	100.0
	Missing	5	
	Total	724	