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Examining the Relationships Among Personality Traits, IT-specific Traits, and Perceived Ease of Use

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Abstract

The ease of use perception of an information technology has been shown to be an important factor in technology acceptance. This study extends prior research by presenting and testing a new theoretical model of the determinants of perceived ease of use by linking personality traits and IT-specific traits to the ease of use perception. Specifically, our research model theorizes that two broad traits of personality from the Big Five taxonomy, openness to experience and emotional stability, influence the perception of ease of use via three IT-specific traits: personal innovativeness in the domain of information technology (PIIT), computer anxiety, and computer playfulness. The research model was tested using PLS on data from a cross-sectional survey of 111 new users of a spreadsheet software package. The findings indicate a strong effect of openness to experience on PIIT and confirm PIIT as particularly important in influencing computer anxiety, compute playfulness, and perceived ease of use.

Keywords: Technology Acceptance Model, Personality Traits, IT-Specific Traits, Perceived Ease of Use

Introduction

Individual acceptance of information technology (IT) has been recognized as a crucial prerequisite in realizing the benefits of IT and continues to be a significant area of study for information systems researchers (Agarwal 2000). A variety of theoretical models, such as TAM (Davis 1986) and the more recent UTAUT model (Venkatesh et al. 2003), have been developed to enhance the understanding of user acceptance. Underlying many of these theoretical models are individual beliefs associated with the use of technology, most notably the belief of perceived ease of use. With perceived ease of use recognized as particularly salient in the context of technology acceptance, an important stream of inquiry is to investigate the antecedents of this belief.

Past research has linked individuals' IT-specific traits to beliefs related to technology acceptance outcomes. Three particular IT-specific traits – personal innovativeness in the domain of information technology (PIIT), computer anxiety, and computer playfulness – have been identified in previous studies as having especially strong and consistent relationships to acceptance-related outcomes (e.g. Venkatesh 2000; Agarwal and Prasad 1998b). The current study furthers our understanding of technology acceptance by examining key drivers of beliefs that has received little attention to date in the IS literature – personality traits. We present a comprehensive framework in which the Big Five taxonomy of personality traits and IT-specific traits are related to the perceived ease of use of an information system. In our research model, the Big Five traits of openness to experience and emotional stability are linked to perceived ease of use via the mediating IT-specific traits of PIIT, computer anxiety, and computer playfulness.

The primary goal of this study is to provide managers and researchers deeper insight into individual factors that lead to technology acceptance. The results of this study will equip managers with a more in-depth understanding of the role of personality in technology acceptance, which can impact areas such as training where individual differences can be accommodated. For researchers, this study develops a conceptual framework for understanding how the Big Five personality traits (emotional stability and openness to experience) and IT-specific traits relate to beliefs about technology acceptance. Toward this end, we focus on answering the following research question:

> How do the Big Five personality traits of openness to experience and emotional stability influence perceived ease of use?

Theoretical Background

Personality and Personality Traits

Personality traits are consistent patterns of thoughts, feelings, or actions that distinguish people from one another (Johnson 1997). Personality traits are generally accepted as long-term predispositions to certain behaviors or attitudes. The trait approach to personality assumes that individuals can be described in terms of a finite set of personality characteristics (McCrae et al. 1997). In the psychology literature, the "Big Five" (five factor) taxonomy of personality has emerged as a consensual structure for personality traits (Goldberg 1981; McCrae and Costa 1987; Judge and Ilies 2002).

The Big Five has been used in a variety of adopting disciplines to explain various behaviors. In the discipline of organizational behavior, the five factor model has been linked to the selection of personnel (Barrick and Mount 1991), charismatic and transactional leadership (De Hoogh et al. 2005), and participation in self-managed work groups (Thoms et al. 1996). Recent research also suggests that personality and personality traits are related to important organizational outcomes such as job performance (Barrick et al. 2001) and knowledge sharing (Cabrera et al. 2006).

The Big Five taxonomy identifies five broad personality traits that adequately summarize the domain of personality – extroversion, emotional stability, agreeableness, conscientiousness, and openness to experience (Church and Burke 1994; McCrae and Costa 1987). Drawing from relevant prior findings, this study focuses on two of the Big Five traits – openness to experience and emotional stability.

Openness to Experience

Openness to experience describes the extent to which individuals are intelligent, knowledgeable, creative, curious, and imaginative (Goldberg 1992). In organizational settings, people who are high on openness to experience may have broader experiences, as well as a greater appreciation on the merits of new ways of doing things (George and Zhou 2001). Openness to experience has been linked to individual knowledge sharing as part of knowledge management systems (Cabrera et al. 2006), organizational innovation (Judge and Cable 1997), and creative behavior in the workplace (George and Zhou 2001). Technology is an important tool for innovation in the workplace and can enable creative behavior in the workplace. Because

technology acceptance involves the introduction of a new technological innovation in the workplace, the openness of an individual towards the experiences related to the new technology should be particularly relevant.

Emotional Stability

Emotional stability describes the extent to which individuals are calm, relaxed, stable, steady, and unemotional (Goldberg 1992). When viewed from its negative perspective, emotional stability is termed neuroticism, which refers to an individual's tendency to display characteristics such as anxiety, nervousness, and insecurity (Goldberg 1992). In organizational settings, emotional stability has been hypothesized as a predictor of general job performance (Barrick and Mount 1991). In the IS literature, emotional stability has been linked to the IT-specific trait of computer playfulness (Woszczynski et al. 2002).

IT-Specific Traits

The study of individual differences has a rich, cumulative tradition in the IS literature. From the perspective of user acceptance of technology research, several theories (e.g. TAM and UTAUT) recognize the importance of individual differences in either 1) having a direct effect on technology acceptance or 2) having an indirect effect through belief structure (Agarwal 2000). In one of the earliest studies of individual differences, Zmud (1979) noted that individual difference can be categorized into three classes – 1) cognitive style (representing the mode of functioning shown by individuals in their perceptual and thinking behavior), 2) personality (referring to the cognitive and affective structure maintained by individuals in their interactions with others and towards events), and 3) demographic/situational variables (refers to a broad spectrum of personal characteristics like gender, age, experience, education). This study focuses on both general personality traits and IT-specific traits, and the impact these differences have on technology acceptance.

According to Agarwal and Prasad (1999, p. 362), individual differences "refer to user factors that include traits such as personality and demographic variables, as well as situational variables that account for differences attributable to circumstances such as experience and training." In the IS literature, traits are defined as static aspects of human information processing characteristics affecting a broad range of variables (Bostrom et al. 1990; Yager et al. 1997). Individual differences have been classified as either broad, stable traits or dynamic, situation-specific differences (Thatcher and Perrewe 2002). Broad, stable traits are enduring and predispose individuals to respond consistently to stimuli across situations, while dynamic situation-specific differences are those that are relatively enduring within a specific situation that may be changed through training or other experience. (Thatcher and Perrewe 2002). In the IS literature, three IT-specific traits (computer anxiety, computer playfulness, and personal innovativeness) have emerged as exhibiting consistent relationships to technology acceptance outcomes (Venkatesh 2000; Agarwal and Prasad 1998b; Hackbarth et al. 2003; Yi et al. 2006a; Yi et al. 2006b). Thatcher and Perrewe (2002) classify computer playfulness and personal innovativeness as stable, situation-specific traits, and computer anxiety as a dynamic, situation-specific difference. Our overarching conceptual framework (Figure 1) positions the Big Five personality traits as directly impacting the IT-specific traits, which subsequently impact user beliefs and behavioral intention.

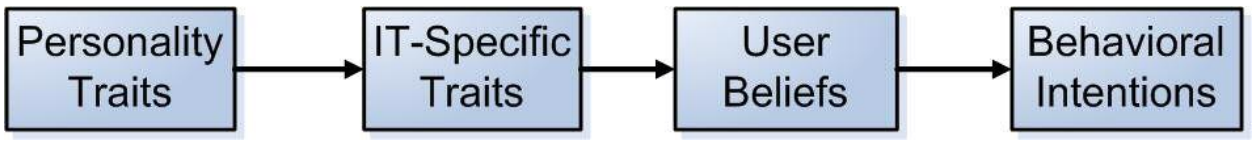

Figure 1. Conceptual Model

Our research model (Figure 2) is derived from the conceptual framework and specifically positions the Big Five traits of openness to experience and emotional stability as two personality traits impacting perceived ease of use through the mediating effects of the IT-specific traits of PIIT, computer anxiety, and computer playfulness.

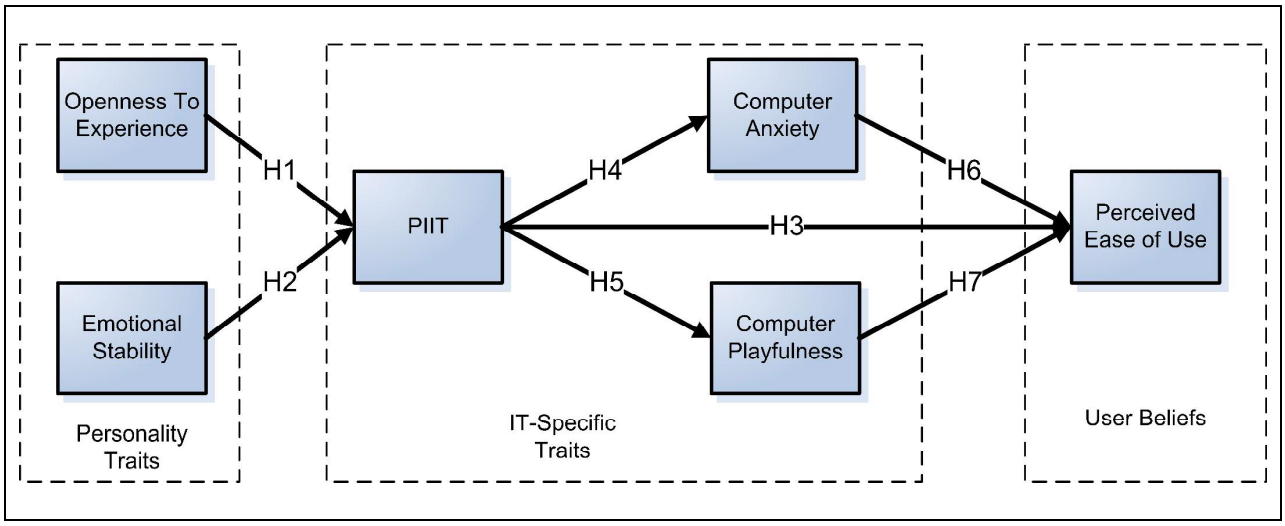

Figure 2. Research Model

Research Hypotheses

The construct of PIIT is theoretically grounded in innovation diffusion theory (Rogers 2003) and defined as "the willingness of an individual to try out any new information technology" (Agarwal and Prasad 1998b). The items in the construct reflect an individual's likelihood and willingness of experimenting with (and thus experiencing) a new technology, as well as the likelihood of being an initial adopter of the new technology. Individuals high in openness to experience are less likely to be conventional or traditional in their outlook and behavior. They prefer new experiences to familiar routines. Therefore:

H1: Openness to experience has a significant (positive) effect on PIIT

Individuals low in emotional stability are likely to lack self-confidence in their ability to effectively perform tasks (Thoms et al. 1996), resulting in a hesitancy to try out a new technology. Alternately, individuals high in emotional stability are more likely to have more self-confidence, leading to an increased willingness to experiment with a new technology. New technologies often require some degree of learning curve and uncertainty. Individuals that demonstrate high levels of emotional stability should be more likely to overcome these obstacles to acceptance, where unstable individuals are more likely to become frustrated and insecure about the technology. Therefore:

H2: Emotional stability has a significant (positive) effect on PIIT

Prior research has theorized the relationship between PIIT and technology acceptance. PIIT was originally theorized to have a moderating influence on three perceptions (ease of use, perceived usefulness, and compatibility) and the intended use of a new IT (Agarwal and Prasad 1998a). In a more recent study, Lewis et al. (2003) and Yi et al. (2006a) position PIIT as a direct determinant of perceived ease of use. Our research model builds on the work of these studies and positions PIIT as having a direct effect on perceived ease of use. More formally:

H3: PIIT has a significant (positive) effect on perceived ease of use

In the IS literature, PIIT has also been theorized to influence other IS-specific traits. Computer anxiety is commonly defined as an emotional fear or apprehension when using a computer or when considering the possibility of computer use (Chua et al. 1999). According to innovation diffusion theory, highly innovative individuals are characterized by their venturesomeness and their desire for "the rash, the daring, and the risky" (Rogers 2003, p. 283). Thatcher and Perrewe (2002) position PIIT as an antecedent to computer anxiety in that people who report lower levels of PIIT should have less tolerance for risk and therefore be more likely to report computer anxiety (Harris 1999). Therefore:

H4: PIIT has a significant (negative) effect on computer anxiety

Computer playfulness refers to an individual characteristic that describes an individual's tendency to interact spontaneously, inventively, and imaginatively with computers (Webster and Martocchio 1992). PIIT and computer playfulness are both grounded in the individual characteristics of creativity and curiosity. More innovative individuals are likely to be highly technologically competent and knowledgeable (Rogers 2003), enabling them to be more spontaneous and creative in using the technology. Therefore:

H5: PIIT has a significant (positive) effect on computer playfulness

In addition to the direct effect of PIIT on perceived ease of use, the IS literature has explored other possible determinants of perceived ease of use. Venkatesh (2000) presents an anchoring and adjustment-based theoretical model of perceived ease of use. Anchoring refers to the IT-specific traits that determine early perceptions about the general beliefs about computers and computer usage, and adjustments refer to beliefs that are shaped by direct experiences with a target system. Two of the anchors in the Venkatesh (2000) study are computer playfulness and computer anxiety – both of which were identified as determinants of perceived ease of use. Hackbarth et al. (2003) also focused on computer anxiety and computer playfulness, finding that both computer anxiety and computer playfulness mediate the relationship between system experience and ease of use. Therefore, we hypothesize:

H6: Computer anxiety has a significant (negative) effect on perceived ease of use

H7: Computer playfulness has a significant (positive) effect on perceived ease of use

Method and Results

Study Context and Sample

The research was conducted using a survey instrument in the context of the adoption and use of Microsoft Excel. The respondents were undergraduate students enrolled in an introductory IS class at a major university in the Eastern United States. The respondents were 40.5% male and 59.5% female with a mean age of 19 and mean work experience of 2.9 years. The survey was administered after the subjects had about six weeks of exposure to Excel through class lectures and exercises. A total of 175 undergraduates were invited to participate in the study, and we received 111 usable responses for a response rate of 63.4%.

Construct Operationalization

The constructs in the research model were operationalized using items validated in previous studies. Scales for the Big Five traits are adopted from the International Personality Item Pool (Goldberg 1999). The four-item perceived ease of use scale was derived from Venkatesh and Davis (2000). For computer anxiety and computer playfulness, we used the operationalization of these constructs by Hackbarth et al. (2003). Finally, for PIIT, we used the scales described by Agarwal and Prasad (1998b). Appendix A provides the items for each construct.

Data Analysis and Results

The structural equation modeling technique of Partial Least Squares (PLS) was used to test the research hypotheses. The measurement model was first assessed via a confirmatory factor analysis. Although all of the scales were previously validated by other studies, the results of the confirmatory factor analysis indicated a problem with several of the reverse-coded items. Items with factor loadings < .4 were dropped (Nunnally 1978), resulting in a deletion of 8 items as indicated in Appendix A. Based on the remaining items, discriminant validity was assessed by determining whether the indicators load more strongly on their corresponding construct than on other constructs in the research model and whether the square root of the average variance extracted (AVE) is larger than the inter-construct correlation (Chin 1998). As shown in Table 1, all constructs share more variance with their indicators than with other constructs, and the composite reliability scores of multi-item constructs indicate good internal consistency.

Table 1. Inter-Construct Correlations

	Reliability	OPEN	ES	PIIT	ANXIETY	PLAY	EOU
OPEN	0.860	0.688					
ES	0.870	0.015	0.653				
PIIT	0.941	0.339	0.291	0.917			
ANXIETY	0.946	-0.245	-0.097	-0.501	0.846		
PLAY	0.887	0.095	0.171	0.565	-0.508	0.813	
EOU	0.923	0.278	0.187	0.458	-0.546	0.297	0.867

Notes: Shaded numbers on the leading diagonal are the square root of the variance shared between the constructs and their measures. Off diagonal elements are correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

Figure 3 provides the path coefficients and the explained variance for the structural model.

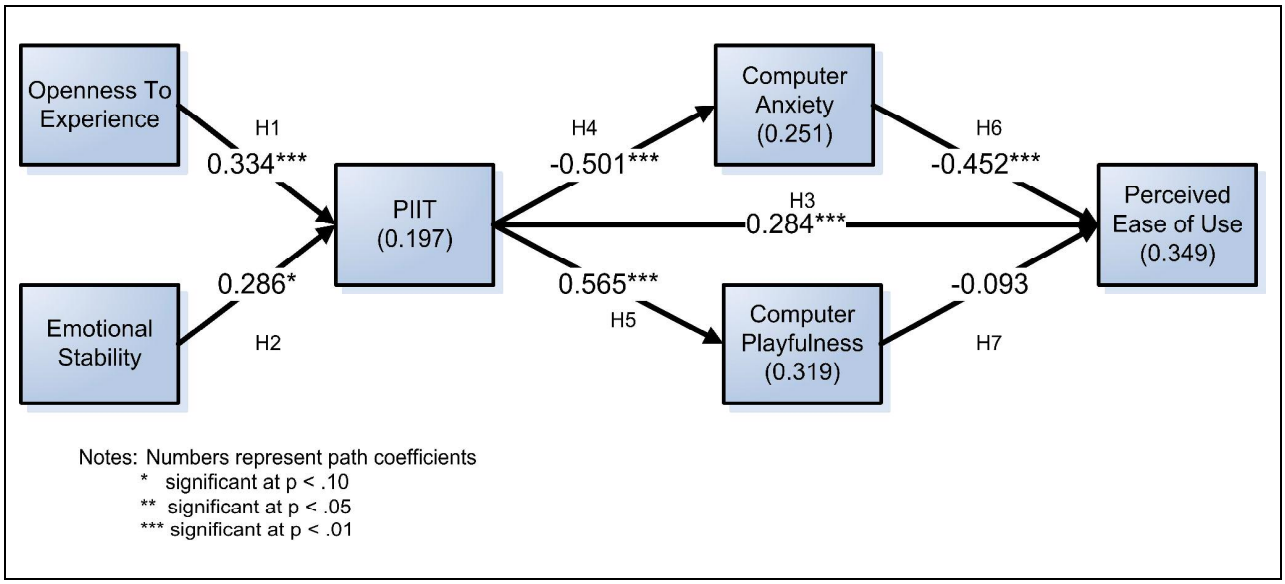

Figure 3. PLS Results

The hypothesized path relationships were significant at $p < 0.05$ with the exception of the path between emotional stability and PIIT (γ=0.286, $p<0.10$) and the path between computer playfulness and ease of use (γ=-0.093, $p<0.500$). At a significance level of $p < .05$, the following hypotheses were supported – H1, H3, H4, H5, and H6. The Big Five traits of openness to experience and emotional stability together accounted for 19.7% of the variance in PIIT. The IT-specific traits of PIIT, computer anxiety, and computer playfulness together explained 34.9% of the variance in perceived ease of use.

Discussion and Conclusions

The results of the study provide support for our conceptual model identifying personality traits as antecedent variables to IT-specific traits. In our research model, individuals who are more open to experiences are more likely to score higher in PIIT. We also found weaker support ($p < .10$) for a relationship between emotional stability and PIIT.

We have found that openness to experience has a strong effect on PIIT, indicating that more intelligent and imaginative people are more likely to be innovative in trying out and adopting IT. To the best of our knowledge, this study represents the first study to discover the link between openness to experience and PIIT. We have also found that the effect of openness to experience on PIIT to be stronger than that of emotional stability on PIIT. The relative weaker results linking emotional stability and PIIT could be an indication of the more cognitive nature of the innovativeness construct within the IT domain. Although not as strong as openness to experience, the effect of emotional stability was in the expected direction and close to the significance level of 0.05. Future research might further explore the effects of these two constructs on other IT-specific traits.

Our study further highlights the strong influence of PIIT on other IT-specific traits and on perceived ease of use. Previous studies such as Agarwal and Prasad (1998a) positioned PIIT as a moderating variable of ease of use perceptions and the adoption decision. Our research model places PIIT earlier in the causal chain as an antecedent to perceived ease of use, as well as an antecedent to other IT-specific traits affecting ease of use. Most notably, we found a strong, direct relationship between PIIT and computer playfulness, which has not been explored in prior studies. We found a strong positive relationship between PIIT and ease of use, agreeing with the results of Lewis et al. (2003) and Yi et al. (2006). We found a strong negative relationship between PIIT and computer anxiety, confirming the work of Thatcher and Perrewe (2002). However, we did not find a relationship between computer playfulness and ease of use. Hackbarth et al. (2003) found playfulness to be a significant mediator between system experience and ease of use, but the effect of playfulness on ease of use to become non-significant in the presence of anxiety. Venkatesh (2000) also found the relationship between playfulness and ease of use significant only during the early adoption phase and not significant after three months.

Although the Big Five model has been applied to various settings, some researchers assert that the Big Five traits may be too broad and instead recommend narrow, more specific personality traits (Ashton 1998). Our study can be extended by exploring the relationship among both broad traits and other potentially applicable narrow traits and their impact on IT-specific traits.

The primary theoretical contribution of this study is the conceptual development of a framework linking personality traits to IT-specific traits to beliefs and ultimately to behavioral intentions. Furthermore, we empirically validate the conceptual model through a cross-sectional survey. Our conceptual model provides a theory for explaining how individual personality differences as captured by the Big Five traits impact perceptions of ease of use, which ultimately impacts classic acceptance models like TAM and the more recent UTAUT.

Our study also has implications for practice. As suggested by Agarwal and Prasad (1999), our results linking openness to experience and emotional stability to PIIT can be used by managers to construct profiles of individuals more amenable to new technologies, thus facilitating the development of strategies and training related to the introduction of these new technologies.

Individual differences represent significant theoretical constructs in the context of technology acceptance. The incorporation of Big Five personality variables (openness to experience and emotional stability) in the nomological network of technology acceptance furthers our understanding of this complex phenomenon.

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Appendix A – Scales and Items

Perceived Ease of Use (Source: Venkatesh and Davis 2000)

EOU1	My interactions with Excel are clear and understandable.
EOU2	Interacting with Excel does not require a lot of my mental effort.
EOU3	I find it easy to get Excel to do what I want it to do.
EOU4	Overall, I find Excel to be easy to use.

Personal Innovativeness in Information Technology (Source: Agarwal and Prasad 1998)

PIIT1	If I heard about a new information technology, I would look for ways to experiment with it.
PIIT2	Among my peers, I am usually the first to try out new information technologies.
PIIT3*	In general, I am hesitant to try out new information technologies.
PIIT4	I like to experiment with new information technologies.

Computer Playfulness (Source: Hackbarth, Grover, and Yi 2003)

"When I interact with a computer, I feel …"

PLAY1	Spontaneous
PLAY2*	Unimaginative
PLAY3	Flexible
PLAY4	Creative
PLAY5	Playful
PLAY6*	Unoriginal
PLAY7*	Uninventive

Computer Anxiety (Source: Hackbarth, Grover, and Yi 2003)

ANX1	A computer does not scare me
ANX2	I have lots of self-confidence when it comes to working with a computer
ANX3	I get a sinking feeling when trying to use a computer
ANX4	I would feel comfortable working with a computer
ANX5	Generally, I feel okay about trying new features of a computer
ANX6	I am no good with a computer
ANX7	I am not the type to do well with a computer
ANX8*	I do not feel threatened when others talk about computers

Openness to Experience (Source: Goldberg et al. 1999)

OPEN1	Have a rich vocabulary.
OPEN2	Have a vivid imagination.
OPEN3	Have excellent ideas.
OPEN4	Am quick to understand things.
OPEN5	Use difficult words.
OPEN6	Spend time reflecting on things.
OPEN7	Am full of ideas.
OPEN8*	Have difficulty understanding abstract ideas.
OPEN9*	Am not interested in abstract ideas.
OPEN10*	Do not have a good imagination.

Emotional Stability (Source: Goldberg et al. 1999)

ES1	Am relaxed most of the time.
ES2	Seldom feel blue.
ES3	Get stressed out easily.
ES4	Worry about things.
ES5	Am easily disturbed.
ES6	Get upset easily.
ES7	Change my mood a lot.
ES8	Have frequent mood swings.
ES9	Get irritated easily.
ES10	Often feel blue.

*Item dropped due to factor loading < .4 during a confirmatory factor analysis