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Development and Evaluation of the HAVUC (Hostility, Ambiguity, Volatility, Uncertainty, & Complexity) Environment Fitness Scale (HEFS)

Phillip Thomas

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by

Phillip Thomas

Bachelor of Science
Civil Engineering
Florida Institute of Technology
1997

Master of Science
in Defense Analysis
Naval Postgraduate School
2009

Master of Science
in Industrial Organizational Psychology
Florida Institute of Technology
2015

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"Development and Evaluation of the HAVUC (Hostility, Ambiguity, Volatility, Uncertainty, & Complexity) Environment Fitness Scale (HEFS)," a dissertation by Phillip W. Thomas.

____
Richard L. Griffith, Ph.D.
Professor
Industrial/Organizational Psychology
Committee Chair

____
Patrick D. Converse, Ph.D.
Associate Professor
Industrial/Organizational Psychology
Committee Member

____
Jessica L. Wildones, Ph.D.
Associate Professor
Industrial/Organizational Psychology
Committee Member

____
Troy S. Glassman, Ph.D.
Assistant Professor
Business
Outside Committee Member

____
Lisa A. Steelman, Ph.D.
Acting Dean
College of Psychology and Liberal Arts

Abstract

Title:
Development and Evaluation of the HAVUC (Hostility, Ambiguity, Volatility, Uncertainty, & Complexity) Environment Fitness Scale (HEFS)

Author:
Phillip Thomas

Dissertation Advisor:
Richard L. Griffith, Ph.D.

This study examines the psychometric properties of a newly developed scale to measure individuals' attitudes toward hostile, ambiguous, volatile, uncertain, and complex (HAVUC) environments—the HAVUC Environment Fitness Scale (HEFS). The 30-item summated scale consists of five 6-item subscales representing each element of HAVUC, utilizing a 7-point Likert scale ranging from one (1-strongly disagree) to seven (7-strongly agree). This study serves a need to better understand antecedents of individuals' intentions and behavior (e.g., attitudes toward the environment) when operating in turbulent environments, aside from individual traits and the general notion of person-environment (PE) fit. The study follows Spector's (1992) recommendations for scale development and evaluation. Item generation and sorting was performed after the multiple dimensions of HAVUC were clearly defined and a theoretically grounded nomological network was developed. Following item generation and sorting, a series of two online pilot studies (n=200) were conducted. Item analyses and principal component analysis (PCA) were conducted on the data from the two pilot studies to inform item reduction and obtain a preliminary factor structure for the HEFS and the five subscales. Focal study 1 (n=429) was conducted using the 30-item HEFS to test hypotheses regarding the nomological network and to test the factor structure of the HEFS in order to provide construct validity evidence. Finally, focal study 2 (n=348) was conducted using the 30-item HEFS to test for evidence of criterion validity, utilizing stress and performance measures as the criterion. The study found initial evidence supporting validity of the HEFS. Results and implications from the development and evaluation of the HAVUC Environment Fitness Scale are discussed, as well as limitations and recommendations for future research.

A validated measure of these attitudes may provide important insights into the influence of preferences on PE interactions and subsequent stress and performance outcomes. In addition, the HEFS may prove beneficial to evaluate targeted training interventions to assist individuals in overcoming potential areas of discomfort (i.e., ‘non-fit’). Finally, the scale may eventually assist organizations in selecting individuals for jobs that operate in highly turbulent environments, and could also increase an individual’s understanding of their own tolerance for turbulence.

Keywords: VUCA, HAVUC, environmental hostility, hostility, ambiguity, volatility, uncertainty, complexity, decision-making, risk propensity, tolerance of ambiguity, attitudes, person-environment fit, attitude scale, measure.

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Chapter 1: Introduction

Dynamic and complex environments affect the full spectrum of organizations, from profit or non-profit organizations to governments. There is considerable consensus that the current operating environment is turbulent and may continue to become even more turbulent in the future. Organizations of all shapes, sizes, and missions must constantly deal with an increasingly complex and difficult world (e.g., Hoehn et al., 2017; WEF, 2016). In addition, the individuals that work for those organizations must also manage ever-present turbulence (e.g., Camps, Oltra, Aldás-Manzano, Buenaventura-Vera, & Torres-Carballo, 2016).

This study utilizes the HAVUC (hostility, ambiguity, volatility, uncertainty, and complexity) framework suggested by Thomas (2015) as a mechanism to examine turbulent environments. The HAVUC framework combines a refined definition of hostility (derived from the strategic studies literature concept of environmental hostility) with the VUCA (volatility, uncertainty, complexity, and ambiguity) framework first adopted by the U.S. Army and now used throughout the business world. Utilizing HAVUC as a conceptual framework, the purpose of the study is to develop and evaluate an attitude scale aimed at determining individuals' attitudes toward the elements of HAVUC, providing an indicator of person-environment (PE) fit. A validated measure of these attitudes may provide important insights into the influence of preferences on PE interactions and subsequent outcomes (i.e., stress and performance).

Person-Environment (PE) fit theory suggests that some environments match an individual's dispositions or preferences better than others (e.g., French, 1963; Pervin, 1968). A 'match' or 'best-fit' of an individual to environment results in high performance, satisfaction, and less stress whereas 'lack of fit' results in lower performance, dissatisfaction, and increased stress (e.g., French, 1963; Pervin, 1968; Jahoda, 1961). Unfortunately, few measurement scales exist to assess how individuals may view their fit within turbulent (i.e., HAVUC) environments. Understanding how an individual perceives aspects of a particular environment may provide insight on how the individual may experience stress and/or perform in difficult operational contexts. In addition, a scale that assesses a person's attitude toward operating in HAVUC environments may prove beneficial to evaluate targeted training interventions to assist individuals in overcoming potential areas of discomfort (i.e., 'non-fit'). Finally, such a scale may potentially assist organizations in selecting individuals for jobs that operate in highly turbulent environments, and could also increase an individual's understanding of their own tolerance for turbulence.

This research adds to the literature involving person-environment fit measurement and also provides a tool to better understand how individuals' function in difficult environments, i.e., performance *and* stress. In a comprehensive review of stress and human performance, Salas, Driskell, and Hughes (2013, p. 9) suggested that most contemporary stress research has examined stress through the lens of psychoanalysis, i.e., emphasizing coping, defense mechanisms, and restoration of ego equilibrium. Salas et al. (2013, p. 10) further suggest, "The bulk of stress research has almost ignored effective task performances in real-world work environments." Taken together, too often we focus on individuals' performance without accounting for stress. Another pertinent issue within the stress literature is the multitude of ways the construct has been envisioned or conceptually defined (e.g., Salas et al., 2013).

Increased understanding of the dynamic interaction between employees and turbulent environments may prove beneficial, particularly when resources are constrained. Resources may include time, as well as human and fiscal capital. Increased understanding of the dynamics involved may better preserve and direct the fiscal assets and time spent by organizations annually to identify, train, and develop human capital; particularly leaders. This investment challenge becomes particularly important considering the 2014 World Economic Forum's (WEF) report concerning the Outlook on the Global Agenda 2015, which suggests a global leadership crisis (e.g., as reported by 86% of the 1500+ global experts surveyed). Given this potential leadership crisis, organizations cannot afford to select or train the leaders we have in the talent pipeline in an inadequate manner.

Objectives and Scope

The proposed HAVUC environment fitness scale (HEFS) is an initial step for increasing our understanding of person-environment dynamics. The HEFS will serve as an individual measure for selection and professional development purposes, for both selection of *fit* into a particular job or selection into training curricula to assist individuals with unfavorable attitudes resulting in perceived discomfort. The scale may highlight individual training or development needs in regards to comfort and capability of meeting the demands of HAVUC environments. Training may be designed to provide additional skills and techniques to increase the individual's repertoire in dealing with particular aspects of the HAVUC environment, e.g., cognitive reframing, psychophysiological regulation, etc. If successful the measure may facilitate the classification and development of individuals, which would likely enhance the probability of successful operations in situations characterized by HAVUC.

I propose that while the elements of HAVUC interact, they remain five distinct constructs. Therefore, the study will develop and examine the entirety of the HAVUC environment fitness scale, as well as the five subscales (e.g., H, A, V, U, and C). Development and evaluation of the HEFS may also provide evidence of convergent and discriminant validity by testing a theoretically grounded nomological network, which may prove useful for follow-on studies.

The scope of this research begins with clearly defining the elements of HAVUC to provide a robust framework that accounts for the factors involved in turbulent environments. Secondly, a review of the literature is performed in order to develop a theory-based nomological network of existing measures that should and should not be related to the separate elements of HAVUC. After reviewing how the elements of HAVUC environments theoretically influence individuals' stress and performance outcomes, items for the HEFS will be developed and refined. Results from the data collected from administration of the HEFS will be analyzed and evaluated to establish the reliability and validity of the scale.

Methodology Overview

This study follows the guidelines suggested by Spector (1992) in regards to developing a reliable and valid measurement scale. The theoretically derived nomological network and definitions informed the design of the HEFS, to include: the general format of the scale, item stems, response choices, scale quantification, and scale instructions. Next, a large pool of items was written and a panel of experts assisted with an item sorting exercise and critique of the scale, focusing on ambiguous or confusing instructions, items, and/or terms. A total of 100-items were revised as needed and retained for the initial pilot study. Following the panel, the scale was subjected to a series of two pilot studies. The item analyses informed item reduction, and helped identify which items should be retained to form the most internally consistent scale, for both the summated HEFS and the five subscales. Lastly, the final revised scale was evaluated for validity evidence by administering to a large sample to determine if the scale measures the constructs it was designed to measure and predicts meaningful outcomes. The data collected from the large sample also provided inferences in regards to the theoretical predictions outlined in Chapter 2.

As per guidelines outlined in Spector (1992), the data collected in the final step was used to test hypotheses involving the constructs of the scale with other theoretically related and unrelated constructs, i.e. the partial nomological network. Additionally, the study provides initial evidence for the existence of the HAVUC framework and resulting theory-based nomological network as a baseline for future research. Lastly, predictions involving criterion relationships (e.g., stress and performance) with the scale were evaluated.

Chapter Overview

This chapter establishes the need for this study and line of research, as well as the overall purpose, objectives, and scope. In addition, the methods summary provides a roadmap for the reader in regards to the research design and outcomes. Chapter 2 provides a short background of the HAVUC framework and a brief discussion regarding person-environment interactions. After discussing the HAVUC framework, a review of the literature helps refine the construct definitions (e.g., H, A, V, U, & C) and provides a discussion regarding relevant constructs and measures for the nomological network, respectively. Following the discussion of each respective HAVUC dimension, a portion of the overall nomological network is presented along with theoretically derived hypotheses for that particular HAVUC dimension. The chapter closes with a discussion of the overall outcomes associated with individuals interacting in HAVUC environments, a presentation of the overall partial nomological network, and the remaining overarching hypotheses.

Chapter 3 presents and explains the research methodology in detail. The chapter provides an in depth discussion concerning development and evaluation of the HAVUC Environment Fitness Scale (e.g., Spector, 1992). Results from the two pilot studies are presented, followed by details regarding the measures utilized, procedures, and analysis plan for the two focal studies.

Chapter 4 offers the results from the two focal studies, providing evidence for construct and criterion validity of the new measure. Lastly, chapter 5 provides a discussion of the study, regarding limitations, implications, and recommendations for future research.

Chapter 2: Theoretical Framework

HAVUC Background

In search of ways to better train leaders to identify, understand, and operate in dynamic and complex environments, the U.S. Army War College (e.g., Gerras et al., 2010) instituted the VUCA framework from Jacobs' then unpublished manuscript (Jacobs, 2002; later published in 2008). The VUCA framework identifies and delineates four separate constructs in the modern operational environment: *volatility, uncertainty, complexity, and ambiguity*. In addition to the military's application of the VUCA framework, it is also widely accepted throughout the business world. VUCA is often used as a buzzword to represent the contemporary environment or as an adjective to describe a specific environment. However, the framework could better be used to understand and analyze the separate elements of the environment in order to focus attention and resources relevant to a particular situation (e.g., Johansen, 2009; Gerras et al., 2010; Bennett & Lemoine, 2014). Each of the VUCA elements, while related, influences situations differentially.

Upon reviewing the literature supporting the VUCA framework, Thomas (2015) suggests the VUCA framework insufficiently accounts for the elements present in most environments in which businesses and governments operate. Specifically, Thomas (2015) argues for the addition of *hostility*, in order to address explicit *risks* involved and the *time* available for decisions. Initial empirical evidence suggests that hostility does influence an individual's stress and performance outcomes when added to an existing VUCA environment (Thomas, 2015). The addition of hostility to the VUCA framework transforms the acronym and framework to *HAVUC*; accounting for hostility, ambiguity, volatility, uncertainty, and complexity (Thomas, 2015). Given the theoretical rationale and initial empirical evidence, the HAVUC framework is utilized for this study.

The HAVUC framework is used to frame an environment or situation and consists of five interrelated, but separate constructs. An in depth literature review of the factors (Thomas, 2015) revealed that the HAVUC constructs share some dependencies, but may also influence environments independently as they each have unique characteristics. The five factors generally exist on a spectrum from less to more, thus the interaction of the five factors produce a full-spectrum of turbulence.

A person's attitudes toward specific HAVUC factors may assist in determining the level of person-environment fit, in regards to preferences. Attitudes are different than general propensities or orientations; instead an attitude is an evaluation of a particular *target* (i.e., elements of the HAVUC environment), (Solinger et al., 2008). Attitudes may be driven by an individual's feelings or beliefs and ultimately result in behavioral inclinations (i.e., intentions); however, attitudes range from negative to positive evaluations of a specific target, not the intention to act. These feelings and beliefs may not directly impact immediate performance. However, performance may be affected over time as these attitudes may reflect how comfortable a person feels in such an environment, i.e., influencing perceived PE fit.

This study proposes that individuals hold different attitudes towards the environmental elements of HAVUC, which the HEFS is designed to measure. Person-Environment (PE) fit theory suggests that some environments match an individual's dispositions or preferences better than others (e.g., French, 1963; Pervin, 1968). Individuals that 'fit' the environment based on their dispositions or preferences are more likely to experience high performance, satisfaction, and less stress whereas 'lack of fit' results in the opposite (e.g., French, 1963; Pervin, 1968; Jahoda, 1961). Individuals with unfavorable attitudes toward HAVUC environments may perceive discomfort, and as a result experience increased perceived stress, dissatisfaction, and decreased performance over time.

The five subscales of the HEFS measure individuals' attitudes toward specific targets within the environment, i.e., H, A, V, U, or C. This level of specificity is more likely to provide actionable insights about an individual's attitude toward the individual elements (e.g., attitude toward 'hostility'), as well as an overall measure of the individual's attitude toward operating in HAVUC environments. Figure 1 presents the relevant constructs and measures to be discussed throughout the chapter in order to provide a mental guide for the reader. Figure 2 presents the definitions used for the HAVUC framework as a reference to enable more clarity when discussing the related measures included in the partial nomological network.

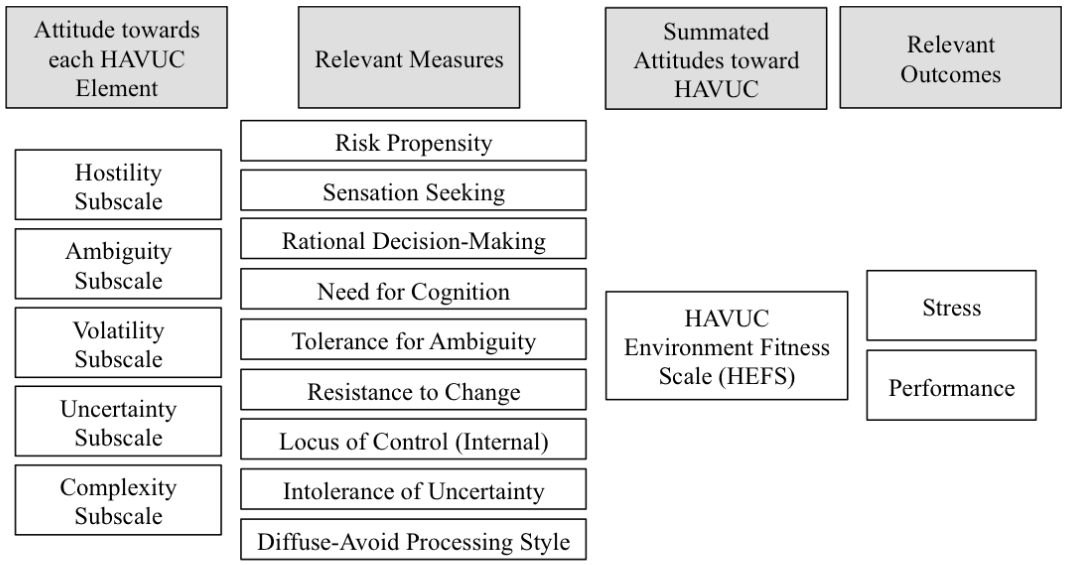

Figure 1. Relevant Constructs and Measures: Development and Evaluation.

HAVUC Dimension	Definition
Hostility	The overall risk involved in a situation considering the internal and external environmental factors of competition, threats, regulations, opportunities, resource availability, and the time available for decisions.
Ambiguity	A specific type of uncertainty resulting from different interpretations of the same information.
Volatility	The rate of change within the environment.
Uncertainty	The inability to know everything about a situation due to lack of information. (Involves the lack of information versus difficulty of interpreting information in regards to ambiguity.)
Complexity	Refers to the difficulty of understating a situation, particularly situations with multiple interactive parts or factors in a highly interdependent system.

Figure 2. HAVUC Dimension Definitions.

Hostility.

Hostility is defined as the overall risk involved in a situation considering the internal and external environmental factors of competition, threats, regulations, opportunities, resource availability, and the time available for decisions (Thomas, 2015). This definition of hostility differs slightly from the definition of *environmental hostility* offered in the strategic studies literature. Environmental hostility is generally defined as the composition of threats, competition, regulations, opportunity, and resource scarcity (e.g., Khandwalla, 1977; Kach, 2012; Potter, 1994; Hall, 1980; Covin & Slevin, 1998; Mintzberg, 1979; Davis et al. 1991; McGee & Rubach, 1997; Miller, 1987).

The concept of hostility used in this study maintains the essence of environmental hostility by referring to the external environment, but also explicitly accounts for an individual's internal environment (e.g., resource scarcity within the organization a person works, competition for promotion, organizational policies and regulations, etc.). Moreover, the hostility definition used for this study explicitly accounts for time available for decisions, rather than implicitly relying on individuals to account for time as a resource (i.e., resource scarcity). Lastly, environmental hostility has historically been viewed as an external environmental factor that affects the organization (e.g., Kach, 2010). The HAVUC framework concedes organizational outcomes are affected by hostility, but also suggests individuals are influenced by hostility and other environmental factors as well (e.g., Gerras et al., 2010; Thomas, 2015).

Salas and Driskell (2013) further suggest hostility influences individuals' perceptions and subsequent outcomes. In fact, the explicit discussion of hostility in Salas and Driskell's (2013) book involves hostility as an individual attribute rather than an environmental factor. The notion of time pressure and threats, both internal and external to an organization, is often discussed as critical concepts when studying human stress and performance (e.g., Salas & Driskell, 2013). In addition to time, risk is another key element necessary to understand hostility. Risk is defined as the uncertainty about outcomes of a decision regarding the possibility of physical, social, or financial harm, detriment, or loss (Rohrmann, 2005).

A three-item environmental hostility scale currently exists (Khandwalla, 1977); however, the scale only functions to characterize the external environment within which an organization functions (Covin & Slevin, 1998). Other hostility scales exist for measuring individual attitudes; however, these scales do *not* measure an attitude towards environmental hostility, instead they measure an individual's propensity to display hostility (i.e., aligned with anger scales). In addition, several measures are available to measure a person's *risk propensity*, attitude towards taking risks, and *risk aversion,* attitude toward avoiding risks (Rohrmann, 2005). Rohrmann (2005) suggests significant contributions to the theoretical conceptualization of subjective orientations towards risks have been made; however, the findings and research are quite heterogeneous. The differing results are due in part to the target of the risk, i.e., personal risk, social risk, or financial risks. Taking a different view of risk propensity, Meertens and Lion (2008) argue that risk propensity is not an attitude, rather a stable individual trait that can be measured to cover a wide domain of situations. Additionally, Rohrmann (2005) posits other personality type variables which are not risk attitudes are also indirectly linked to risk through decision-making; e.g., the constructs of sensation-seeking (Zuckerman, Price, & Zoob, 1964; Zuckerman 1979, 2014), impulsiveness (e.g., Eysenck & Eysenck 1977; Wolfram 1982) and decision-making styles (e.g., Franken 1988; Wolfram, 1982).

When viewed as a stable trait, risk propensity represents an individual's inclination to accept risks with higher returns and lower probability for success (Meerten & Lion, 2008). Many definitions are available in the extant literature (e.g., Ghosh & Ray, 1997; Sitkin & Pablo, 1992; Meerten & Lion, 2008; Rowe, 1977); however, all essentially agree that risk propensity varies as an individual level construct (Hung & Tangpong, 2010). The perspectives regarding risk propensity vary in three ways according to Hung and Tangpong (2010): 1.) As a personality trait or general disposition that remains stable across situations, 2.) Varies based on interactions with the context of the environment and history of learning, and 3.) As an individual's current tendency to behave in a risk-taking or risk-avoiding manner. Evidence for each of the perspectives exists in the literature (e.g., Kogan & Wallach, 1967; Weber, Blais, & Betz, 2002; Sitkin & Pablo, 1992), although results are mixed. For this reason, Hung and Tangpong (2010, p. 88) synthesized the existing literature and offer the following definition to address the various perspectives: “risk propensity is a personality attribute that reflects a decision-maker’s cumulative tendency to take or avoid risks and is simultaneously persistent and can evolve over time as the decision-maker gains more experiences.”

Zuckerman (2014, p. 10) suggested sensation seeking is a trait, defined by “the need for varied, novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experience.” Additionally, the evidence suggested that sensation seeking is not the same as cognitive curiosity. While not incompatible with cognitive curiosity, sensation seeking scales attempt to measure an individual’s need to seek external stimulation (Zuckerman, 2014). Seeking is viewed as an active mode, where someone high in sensation seeking is sensitive to their internal sensations and seeks external stimuli to maximize their internal sensations (Zuckerman, 2014). Slater (2009) suggests cognitive curiosity on the other hand, is more narrowly focused on a person’s desire to seek and integrate knowledge about their environment to enhance or simulate intellectual functioning. Whereas, a person high in sensation seeking will find ways to experience sensations even in sensory deprived environments, e.g., moving around, rubbing their hands on the floor, making up games, etc. (e.g., Zuckerman, 2014).

Regardless of perspective and the proposal that an individual’s attitude toward hostility differs from their risk propensity and sensation seeking, it is reasonable to expect that individual’s with higher levels of risk propensity and sensation seeking have more favorable attitudes toward hostility. Specifically, given that hostile environments contain potential physical, social, and/or financial risks, individuals high in risk propensity may at least accept the risk (e.g., Meerten & Lion, 2008) and in the case of high sensation seekers, they may seek hostile environments in order to maximize internal sensations (e.g., Zuckerman, 2014). Thus, validated measures of risk propensity and sensation seeking should be positively related to the hostility subscale.

Hypothesis 1: The hostility subscale will demonstrate a statistically significant positive relationship with a measure of risk propensity.

Hypothesis 2: The hostility subscale will demonstrate a statistically significant positive relationship with a measure of sensation seeking.

Bromiley (1991) suggests the individual difference of risk propensity or predispositions toward risk (i.e., attitude toward hostility) become important in making decisions in hostile environments. Hostile environments may favor individuals willing to accept at least some risk, as the decision context often involves elevated risk and small decision windows (Mintzberg, 1979; Davis et al., 1991; Kach, 2012).

Research and theory has focused on decision tasks and/or decision contexts, but less so on individual differences of decision makers (Scott & Bruce, 1995). Scott and Bruce's (1995) general decision-making style (GDMS) measure originally hypothesized four styles, *Rational, Intuitive, Dependent,* and *Avoidant,* although a fifth style, *Spontaneous*, emerged in the process of assessing the instrument. Decision-making style is defined as "the learned, habitual response pattern exhibited by an individual when confronted with a decision context" (Scott & Bruce, 1995, p. 820). The five general decision making styles are characterized in the following ways: 1.) Rational, thoroughly search for and logically evaluate alternatives; 2.) Intuitive, rely on hunches and feelings; 3.) Dependent, look to others for advice and direction; 4.) Avoidant, attempt to avoid making decisions; and 5.) Spontaneous, demonstrate a sense of urgency and desire to progress through the decision cycle as quickly as possible (Scott & Bruce, 1995).

The developers of the GDMS acknowledge that situations can affect the choice of decision style when actually making decisions. Additionally, Scott and Bruce (1995) suggest the decision-making styles are not mutually exclusive and individuals may use a combination of decision-making styles in making critical or important decisions. Naturalistic decision-making (NDM) suggests that people may not conduct and exhaustive search for the best alternatives, but may still make rational (i.e., logical) decisions based on experience and available information (Klein, 2008). The NDM explanation is similar to Bruce and Scott's (1995) explanation that people may self-describe as a certain 'style', but utilize multiple approaches in an actual DM context. Klein's use of the word 'rational' in the discussion of NDM differs slightly from the definition used to describe the rational decision-making style, i.e., NDM suggests people may be rational or logical even without thoroughly searching all alternatives, but Bruce and Scott (1995) suggest rational DM style is a preference to thoroughly search alternatives and make logical conclusions to base decisions. Since the DM styles represent a person's DM preference, it is plausible that rational decision-makers prefer less hostile environments in order to provide them more time to search for and evaluate multiple alternatives, even though they may utilize a different DM approach (i.e., style) in various contexts.

> *Hypothesis 3*: The hostility subscale will demonstrate a statistically significant negative relationship with a measure of rational decision-making style.

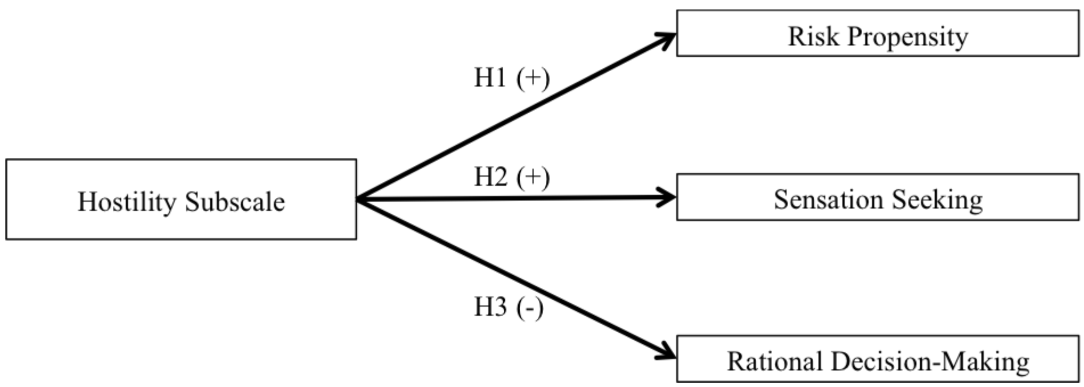

Figure 3. Partial Nomological Network: Hostility & Related Constructs.

Ambiguity.

Ambiguity is a specific type of uncertainty resulting from different interpretations of the same information. Ghirardato (2004) summarized past definitions of ambiguity, and suggested there are two types of uncertainty: uncertainty as known risks and as unknown risks. Where 'known risk' uncertainty allows a decision maker to assign a probability of making a correct decision and 'unknown risk' (i.e., ambiguity) "corresponds to situations in which some events do not have an obvious, unanimously agreeable, probability assignment" (Ghirardato, 2004, p. 36). Difficulties interpreting information and/or counterintuitive data could result in difficulty assigning a probability of making a correct decision. Ambiguity often exists when an individual experiences a situation where s/he does not have a mental model or similar experiences, i.e., there is no precedence to base decisions. Ambiguity can also occur when the person has adequate information or for that matter too much information, but encounters difficulty in the interpretation of the information or determining the significance of the factors influencing the situation (Shaffer & Zalewski, 2011).

Researchers across many domains have examined how individuals differ in regards to tolerance or intolerance of ambiguity. A segment of the literature refers to ambiguity tolerance-intolerance as a broad personality trait that denotes a person's reactions to perceived ambiguity in a broad spectrum of contexts (e.g., Frenkel-Brunswik, 1949, 1951; Budner, 1962; Jost, Kruglanski, & Sulloway, 2003). Tolerance and intolerance of ambiguity have been defined as "the tendency to perceive ambiguous situations as desirable" and "the tendency to perceive ambiguous situations as sources of threat", respectively (Budner, 1962, p. 29). Researchers from multiple disciplines have offered various conceptual definitions regarding in/tolerance of ambiguity, while maintaining the same construct label, adding to confusion and inconsistent measurement results (Lauriola, Foschi, Mosca, & Weller, 2016). For instance, intolerance of ambiguity has been described as an emotional reaction, while others have focused on the cognitive aspects (i.e., tendency to feel threatened versus the need for cognitive closure, respectively) (Lauriola et al., 2016).

Some have suggested the in/tolerance of ambiguity does not reflect a singular bipolar dimension, while McLain (1993) suggested in/tolerance of ambiguity can be viewed on a single continuum, but should take context into account. The author suggested that ambiguity and tolerance require separate definitions and concepts of the two can then be integrated (McLain, 1993). Specifically, McLain (1993) defines tolerance for ambiguity (TA) as "a range, from rejection to attraction, of reactions to stimuli perceived as unfamiliar, complex, dynamically uncertain, or subject to multiple conflicting interpretations" (p. 184). Extending McLain's (1993) suggestion to include context, Durrheim and Foster (1997) assert TA is not a personality trait and propose it as a context-specific construct.

More recent research on TA has shifted focus on how it influences situation perceptions and decision-making, focusing less on specific contexts and defining TA as an orientation toward complex, unfamiliar, and insoluble stimuli (McLain, 2009). Similarly, given the lack of consensus about the definition and structure of the TA concept, a recent study refers to the TA concept as "attitude toward ambiguity" (Lauriola et al., 2016). Lauriola et al (2016) examined the factor structure of the TA concept (e.g., attitude toward ambiguity) and found evidence for three major factors. They concluded that attitude toward ambiguity is best represented as a multidimensional construct involving: Discomfort with Ambiguity (i.e., affective), Moral Absolutism/Splitting (i.e., cognitive), and Need for Complexity and Novelty (i.e. epistemic—acquisition of knowledge) (Lauriola et al, 2016). *Discomfort with ambiguity* results in feelings of anxiety, distress, or dislike; *moral absolutism/splitting* represents a rigid and stereotyped way of thinking; and the *need for complexity and novelty* represents the opposite preference for predictability, clarity, and regularity (Lauriola et al, 2016).

In regards to the dimensionality of TA much debate remains; however, TA is usually measured as a one-dimensional concept (Furnham & Marks, 2013). It is generally accepted that individuals exposed to ambiguous situations experience more discomfort when TA is low than when TA is high (Furnham & Marks, 2013). Taken together, there are numerous reasons for the heterogeneous results from the TA literature--from various definitions, to consideration of various contexts and ambiguous stimuli. The TA concept encompasses multiple components of HAVUC and likely lends to the confusion and disparate results.

An individual's attitude toward ambiguity as measured in this study is related to but differs from their tolerance for ambiguity, as typically measured (e.g., McLain 1993, 2009; Lauriola et al, 2016). For instance, McLain (1993, 2009) and Lauriola et al (2016) both include aspects of complexity, uncertainty, and/or volatility, whereas I focus on the aspects of unfamiliarity and difficulty in interpreting information regarding the ambiguity subscale. I attempt to capture attitudes toward complexity, uncertainty, and volatility in separate subscales.

McLain (2009) suggests constructs that examine orientations toward situations defined by the availability of information (e.g., situations of risk or uncertainty) should also be related to TA. Based on previous empirical findings (e.g., McLain, 1993, 2009; Furnham & Marks, 2013) it is reasonable to expect that individual's with higher levels of TA and risk propensity have more favorable attitudes toward ambiguity. Following this logic, individuals with less favorable attitudes toward ambiguity are likely less tolerant of ambiguity and may attempt to avoid ambiguous stimuli. In general, TA and risk propensity should be positively related to the ambiguity subscale.

> *Hypothesis 4*: The ambiguity subscale will demonstrate a statistically significant positive relationship with a measure of risk propensity.

> *Hypothesis 5*: The ambiguity subscale will demonstrate a statistically significant positive relationship with a measure of tolerance for ambiguity.

Lastly, Furnham and Marks (2013) suggest individuals with low TA often have aversive reactions to ambiguity due to the lack of information (e.g., difficulty interpreting information) making it difficult to assess risk or make decisions. The ambiguous situation serves as a source of discomfort and/or threat and often results in increased stress, avoidance, delay, suppression, or denial (Budner, 1962; McLain, 1993; Furnham & Marks, 2013). Schere (1982) examined this phenomenon and demonstrated that entrepreneurs have a higher level of ambiguity tolerance than managers. Further, Busenitz and Barney (1997) demonstrated that entrepreneurs tended to utilize heuristics more often than managers during decision-making contexts (i.e., intuitive DM), suggestive of a link between the tolerance of ambiguity and use of heuristics—or lack thereof. Individuals' attitude toward ambiguous environments likely influences their perception of and their approach to decision-making contexts (e.g., favorable attitude toward ambiguity likely utilize experience and intuition more when making decisions). Thus, rational decision-makers should prefer less ambiguous environments.

> *Hypothesis 6*: The ambiguity subscale will demonstrate a statistically significant negative relationship with a measure of rational decision-making style.

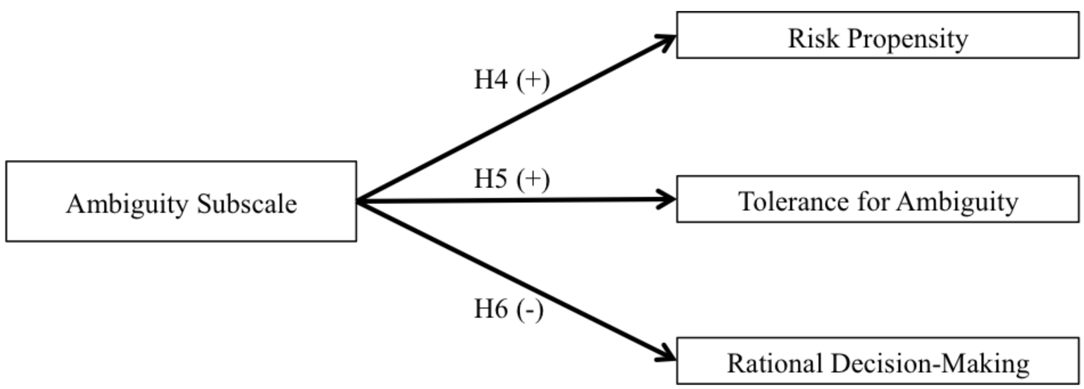

Figure 4. Partial Nomological Network: Ambiguity & Related Constructs.

Volatility.

Volatility is the rate of change within the environment (Gerras et al., 2010). Organizational theory literature often suggests environment stability-instability (i.e., volatility) is best-measured utilizing turnover, absence of pattern, and unpredictability (Dess & Beard, 1984). However, Jurkovich (1974) and Miles, Snow, and Pfeffer (1974) argued the importance of delineating between change in the environment and the unpredictable nature of the environment (Dess & Beard, 1984). I agree with Miles et al (1974) and Jurkovich (1974), as the unpredictable nature has conceptual overlap with uncertainty. Volatility makes it difficult to assess the current environment, due to the instability of the situation. The volatility of the situation places a burden on the individual to continually assess the information and attempt to anticipate changes over time that may influence the decision context (Gerras et al., 2010). Volatility is often inherent in unstable environments and is manifested as dynamic decision-making contexts (Shaffer & Zalewski, 2011). Rapid change in information as a result of volatility may fundamentally change the nature of perception of the situation.

A search of the literature did not reveal any individual difference measures explicitly addressing orientation or preference for environmental volatility. Although, measures of cognitive processing speed may conceivably be related to a person's attitude toward volatility, as faster processing speed would allow for consideration of multiple alternatives stemming from change. The ability to simultaneously consider multiple alternatives may allow for faster decision-making to meet the increased demands resulting from volatile situations. In a study examining decision-making of executives, Judge and Miller (1991) reported a significant correlation ($r=.68$, $p<.01$) between the number of alternatives simultaneously considered and decision speed, where decision speed was measured from first reference to deliberate action. Although potentially influencing attitudes toward volatility, cognitive processing speed does not represent a preference or attitude.

Focusing on change in the environment, a search of ‘resistance to change scale’ was conducted. Bareil (2013) suggests human resistance to change has been a source of interest for practitioners and scholars for more than sixty years. A large portion of the literature addresses resistance to organizational change and not necessarily rapid environmental change in general. Bareil (2013) suggests there are two paradigms on resistance to change. The traditional paradigm represents resistance as a behavior or action (e.g., fighting against change—viewed as an obstacle) and the modern paradigm representing resistance as a resource in the form of feedback regarding employee discomfort or concern to the proposed change. Several scales exist to measure a person’s dispositional inclination to resist change (e.g., Oreg, 2003; Oreg et al, 2008; Saksvik & Hetland, 2009).

Resistance to change (RTC) is related to, but distinct from several other individual difference measures. Oreg’s (2003) study demonstrated empirical relationships among several measures, including: ambiguity tolerance (Budner, 1962); sensation seeking and risk aversion (Zuckerman 1994; Slovic, 1972, respectively); dogmatism and openness to experience (Rokeach, 1960; Dingman, 1990, respectively). While resistance to change is related to aspects of these measures, the dimensionality of the RTC construct also lends to conceptual overlap, beyond one’s attitude toward or preference for change. Specifically, the RTC construct contains four dimensions: 1.) Routine seeking, tendency to seek routines and stable environments; 2.) Emotional reaction, the stress or discomfort individuals feel as a result of change; 3.) Short-term focus, the extent individuals are consumed by short-term inconveniences versus the potential long-term benefits; and 4.) Cognitive rigidity, the extent a person resists or is unwilling to consider options and/or other perspectives (Oreg et al., 2008).

On close inspection, the routine seeking and emotional reaction dimensions of RTC appear most closely related to the volatility subscale. Overall, evidence suggests that someone scoring high on RTC is less likely to "initiate changes and more likely to form negative attitudes toward the changes they encounter" (Oreg et al., 2008, p. 936). Additionally, Oreg et al (2008, p. 936) assert that "change is ubiquitous", suggesting change is universal and ever-present. This suggests that a person high on resistance to change likely experiences discomfort and have unfavorable attitudes toward any source of volatility. Changes within an organization fundamentally change a person's environment; therefore, resistance to change should be related to the volatility subscale.

Hypothesis 7: The volatility subscale will demonstrate a statistically significant negative relationship with a measure of resistance to change.

Another construct that involves a person's belief regarding outcomes and the environment is locus of control. Locus of control (LOC) is described in terms of internal or external LOC, referring to the degree a person feels they can affect the world around them (Schere, 1982). Individuals with higher levels of internal LOC perceive they have control of outcomes, subsequently believing they can influence the environment. Conversely, individuals possessing higher levels of external LOC perceive that outcomes are largely out of their control, believing external factors are responsible for the outcomes (e.g., luck or fate).

Individuals with higher internal LOC may experience less discomfort with changing environments as they feel they can affect the situation, thus maintaining a sense of control (Chen & Wang, 2006). Chen and Wang (2006) examined the relationship between the three components of commitment to change (e.g., Herscovitch & Meyer, 2002) and LOC (e.g., Rotter, 1966). As hypothesized, they found internal LOC was positively related to affective and normative commitments to change (CTC) and external LOC was positively related to continuance CTC. The three components of CTC are described as follows: 1.) Affective CTC is described as a desire to support the change (e.g., want to) based on beliefs regarding the benefits of change; 2.) Normative CTC is described as a sense of obligation (e.g., ought to) to support the change; and 3.) Continuance CTC is recognition of the costs associated with not supporting the change (Chen & Wang, 2006). These findings suggested individuals varying in LOC "experience different attitudes toward change since they hold different beliefs about their ability to manage change" (Chen & Wang, 2006).

Several widely used scales exist to measure locus of control, from general locus of control (Rotter, 1966) to more work specific locus of control (Spector, 1988). Research suggests internal locus of control is generally preferred, finding positive relationships between internal locus of control and performance (Judge &

Bono, 2001). Since individuals with internal locus of control perceive they have control of outcomes, they may have more favorable attitudes toward volatility.

> *Hypothesis 8*: The volatility subscale will demonstrate a statistically significant positive relationship with a measure of internal locus of control.

Lastly, as explained earlier in this section, volatility often results in rapid change of available information that places additional burden on the decision-maker. Individuals facing volatility in the environment must continually assess information and attempt to anticipate changes over time that influence the decision context. The Judge and Miller (1991) study found that when controlling for decision importance, executives' with more experience made faster strategic decisions and this (i.e., decision speed) was correlated with financial performance ($r=.63$, $p<.05$) in dynamic for-profit industries (e.g., biotechnology). Of note, the same study found a negative correlation with experience levels of board members working for a hospital. Judge and Miller (1991) suggested this may be due to the structure of a hospital's board of directors being comprised of outsiders and not actually making the strategic decisions. In addition the hospital was non-profit and operating in a less dynamic environment than the biotechnology industry. In summary, dynamic decision contexts favor individuals utilizing experience and/or intuitive decision-making (e.g., Judge & Miller, 1991), whereas individuals utilizing rational decision-making may experience frustration trying to make sense of the rapid change.

Hypothesis 9: The volatility subscale will demonstrate a statistically significant negative relationship with a measure of rational decision-making style.

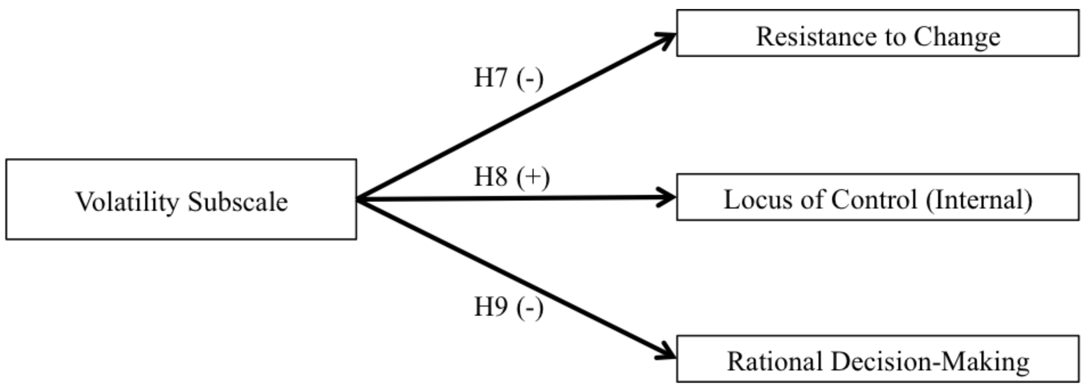

Figure 5. Partial Nomological Network: Volatility & Related Constructs.

Uncertainty.

Uncertainty is the inability to know everything about a situation (Gerras et al., 2010). Uncertainty involves the lack of information, which presents a separate challenge for problem solving as compared to difficulties interpreting the information (i.e., ambiguity). In uncertain conditions decision makers are more able to utilize mental models than in ambiguous situations, providing greater confidence regarding the probability of the decision being correct (Schrader et al., 1993; Ghirardato, 2004).

Unfortunately, the terms ambiguity and uncertainty, and subsequent measures of in/tolerance of each, are often used interchangeably within the literature (Grenier, Barrette, & Ladouceur, 2005). However, efforts have been made to delineate and measure the tolerance to each, i.e., in/tolerance for ambiguity

(IA/TA) and in/tolerance for uncertainty (IU/TU) (e.g., Buhr & Dugas, 2006). TA and TU are related, but TA is primarily used in the cognitive studies literature on decision-making, memory, and perception; whereas, TU is often used in the clinical literature focusing more on stress and emotion (Greco & Roger, 2001; Furnham & Marks, 2013). Increased IU tends to lead to increased worry, more so than IA does, as individuals high in IU tend to worry about the future (Buhr & Dugas, 2006). Reviewing factor analytic studies regarding IU, Birrell, Wilkinson, and Freeston (2011) found evidence for two general factors and suggest the two factors represent approach and avoidance responses to uncertainty: 1.) Desire for predictability and an active engagement in seeking certainty, and 2.) Paralysis of cognition and action in the face of uncertainty.

Grenier et al (2005) further delineate IA and IU, suggesting that IA represents a static component fixed in the present and IU represents a future oriented unpredictable component. Individuals high in IA are uncomfortable with ambiguous features of the current situation and individuals high in IU interpret the future as a source of discomfort, since the future is characterized by uncertainty (Grenier, et al, 2005). Similar to the measure of IU, the need for closure scale (NFCS, Webster & Kruglanski, 1994) was introduced as a one-dimensional measure of a person's desire to create structure, thus those scoring high on need for structure seek *any* answer in an effort to reduce ambiguity and/or uncertainty (Neuberg, Judice, & West, 1997). However, Neuberg et al (1997) suggest the

NFCS should distinguish between two separate motives, i.e., the preference for quick, decisive decisions and the need to create and maintain simple structure.

Taken together, uncertainty is the inability to know everything about a situation due to lack of information. IU/TU are related to risk propensity (e.g., McLain, 2009) in that the future generates uncertainty that can be perceived as threatening. The argument here for the uncertainty subscale is similar to the earlier discussion of ambiguity, as the two are similar, yet conceptually distinct. Buhr and Dugas (2006) reported a positive correlation ($r=.42$, $p<.001$) between TU and TA. Based on previous empirical findings (e.g., Furnham & Marks, 2013) it is reasonable to expect that individual's with higher levels of TU and risk propensities have more favorable attitudes toward uncertainty. Following this logic, individuals with less favorable attitudes toward uncertainty are likely less tolerant of uncertainty and may attempt to avoid uncertain situations and/or experience discomfort. In general, TU and risk propensity should be positively related to the uncertainty subscale. Further, individuals that are high in TU and/or have a favorable attitude toward uncertainty feel more comfortable making decisions using intuition when uncertainty is high (Gelatt, 1989).

> *Hypothesis 10*: The uncertainty subscale will demonstrate a statistically significant positive relationship with a measure of risk propensity.

> *Hypothesis 11*: The uncertainty subscale will demonstrate a statistically significant negative relationship with a measure of intolerance of uncertainty.

Hypothesis 12: The uncertainty subscale will demonstrate a statistically significant negative relationship with a measure of rational decision-making style.

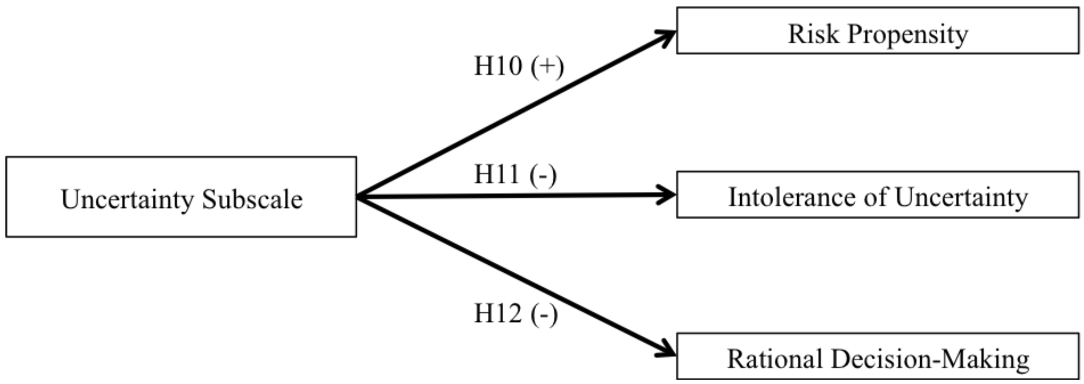

Figure 6. Partial Nomological Network: Uncertainty & Related Constructs.

Complexity.

Complexity refers to the difficulty of understating a situation, particularly situations with multiple interactive parts or factors in a highly interdependent system (Gerras et al., 2010). Situations with multiple interdependent factors often force individuals to make decisions without optimal or correct solutions, the options may range from bad to worse (Shaffer & Zalewski, 2011). Given that complexity has received attention in numerous bodies of research literature (e.g., information-processing and decision-making; task and job design; and goal-setting), Campbell (1988) suggested a simple scheme to classify complexity. The Campbell (1988) scheme suggests complexity is treated in three general ways: 1.) Mostly as a psychological experience; 2.) As an interaction between characteristics of the person and the task; and 3.) As a function of objective task characteristics.

The psychological experience approach to complexity stems from work on the psychological dimensions of a work task (e.g., task significance; Hackman & Oldham, 1975), where complexity represents an opportunity for enrichment (Campbell, 1988). The person-task interaction approach to complexity acknowledges that a task may be more or less complex based on a person's capabilities and/or interests (Campbell, 1988). Lastly, Schwab and Cummings (1976) suggest complexity should be viewed through the lens of objective environmental factors of the task; considering the magnitude and variation of the stimuli, and the number of the five sensory modalities affected (Campbell, 1988). In an effort to provide an integrative framework for complexity, Campbell (1988, p. 43) synthesized the literature and suggested "any objective task characteristic that implies an increase in information load, information diversity, or rate of information change can be considered a contributor to complexity". Further, he suggested complexity is comprised of four basic task (i.e., environmental) characteristics: 1.) Multiple potential ways or paths to arrive at an end-state; 2.) Multiple desired outcomes or end-states; 3.) Multiple interdependent variables among the paths to outcomes; and 4.) Multiple probabilistic (i.e., uncertain) links among paths and outcomes (Campbell, 1988). The Campbell (1988) framework can be used to examine complexity through the lens of the task/environment (i.e., objectively) and/or the person (i.e., cognitive demands).

The four characteristics described above imply increased information load and diversity or rate of change, further highlighting the conceptual overlap between complexity and other elements of HAVUC (particularly uncertainty and volatility). Situations that involve complexity place increased cognitive demands on individuals, i.e., detection of the information, where to search and focus, how to solve, etc. Theories concerning how individuals process information are plentiful in the psychological literature (Cacioppo, Petty, Feinstein, & Jarvis, 1996). Some suggest people engage in reasoned (i.e., effortful) problem solving to shape their environment (e.g., Fishbein & Ajzen, 1975; Ajzen & Fishbein, 2000), while others suggest information gathering and problem solving result mostly from automatic processes and/or cursory attention given to the environment (e.g., Bargh & Pietromonaco, P., 1982; Bargh, 1988). Cacioppo et al (1996) suggested the views above represent general laws of cognition and behavior, although the current literature recognizes neither reasoned nor automatic processing is always acceptable, as people often utilize both (e.g., Shiffrin & Schneider, 1977; Levin, Huneke, & Jasper, 2000; Ajzen & Fishbein, 2000).

Contemporary literature has focused on contextual factors that cause individuals to utilize a reasoned approach or rely on heuristics and also individual differences that influence cognitive processes (e.g., Cacioppo et al, 1996; Levin et al, 2000). Specifically, Cacioppo and Petty (1982) proposed the need for cognition (NFC) as an individual difference representing cognitive motivation, defined as an individual's tendency to engage in and enjoy effortful cognitive activity. Cacioppo & Petty (1982) differ from Cohen and his colleague's (1955) earlier concept of need for cognition, where they suggest NFC is a need to understand and make reason of the environment in order to provide structure, similar to intolerance of ambiguity. Both refer to NFC, but are measuring two completely different things, i.e., need to think versus the need for structure. Cacioppo and Petty's (1982) need for cognition concept has emerged as the acceptable construct definition. However, debate exists as to the factor structure of NFC. Several studies demonstrate one factor (e.g., Cacioppo & Petty, 1982; Cacioppo, Petty, & Kao, 1984; Dornic, Ekehammar, & Laaksonen, 1991), while Tanaka, Panter, and Winborne (1988) suggest NFC contains three factors--cognitive persistence, cognitive confidence, and cognitive complexity.

Despite the debate over factor structure, the Need for Cognition Scale demonstrates excellent reliability and validity evidence (see Cacioppo et al, 1996). People need to make sense of their environment, but they tend to approach situations and solve problems differentially, partially dependent on their need for cognition (Cacioppo & Petty, 1982, 1996). Individuals high in NFC actively seek, acquire, think about, and reflect on information, while those low in NFC rely on people around them (i.e., social comparisons, experts, etc.) or cognitive heuristics (Cacioppo & Petty, 1982, 1996). Cacioppo & Petty (1982) suggest people high in NFC are more likely to have positive attitudes toward complex stimuli or tasks (i.e., complex environments) that require effortful thought or problem solving. While the other elements of HAVUC point to the need for intuitive or experience-based decision-making, people high in NFC likely have a general tendency to be rational decision-makers. This juxtaposition regarding how the different attitudes towards the elements of HAVUC could relate differentially to decision-making style is discussed further in the next section.

> *Hypothesis 13*: The complexity subscale will demonstrate a statistically significant positive relationship with a measure of need for cognition.

> *Hypothesis 14*: The complexity subscale will demonstrate a statistically significant positive relationship with a measure of rational decision-making style.

In addition to the literature focusing on cognitive processing focusing on individuals' need for cognition (e.g., cognitive motivation), others have focused on individual differences in processing style, similar to research on decision-making style. Originally Berzonsky (1989) conceptualized three styles regarding how "people negotiate or manage to evade the challenge of constructing, maintaining, and/or reconstructing their sense of identity" (Berzonsky, 2010, p. 13). Berzonsky (1989) offers the following identity styles: 1.) *Information Orientation*, which involves the active pursuit, elaboration, and evaluation of relevant information; 2.) *Normative Orientation,* which involves a focus on internal conventions, standards, and expectations; and 3.) *Diffuse Orientation,* characterized by avoidance or procrastination often resulting in affect driven behavior based on the situation.

Berzonsky (1990) suggests a process perspective regarding identity formation, e.g., identity processing style. The original identity style measure was revised, subsequently adding *identity commitment* as another factor and forming the widely accepted Identity Style Inventory (ISI-3) (Berzonsky, 1992). Commitment is not viewed as an identity processing style. Instead it is utilized to determine the strength of identity commitment (Berzonsky, 2004). In general informational and normative style are associated with firm commitments, as well as goals and sense of purpose, whereas diffuse-avoidant style is more likely to lack firm commitment (Berzonsky, 2004). In addition to the addition of commitment, diffuse orientation is referred to as *diffuse-avoidant* processing style, adding clarity.

Past empirical evidence demonstrates positive and negative relationships with the need for cognition and information and diffuse-avoidant processing styles respectively (Berzonsky & Sullivan, 1992). Therefore, a person's attitude toward complexity may be related to identity processing style.

> *Hypothesis 15*: The complexity subscale will demonstrate a statistically significant negative relationship with a measure of diffuse-avoidant processing style.

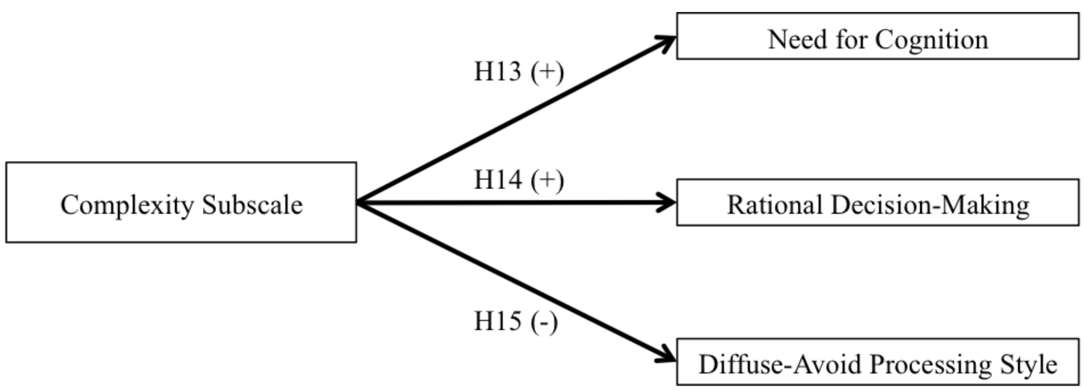

Figure 7. Partial Nomological Network: Complexity & Related Constructs.

Discussion of Conceptual Overlap

A brief discussion of the most often conflated HAVUC constructs may highlight the measurement challenges due to conceptual overlap. Arguably, the most often conflated HAVUC factors are uncertainty and ambiguity. Partly due to the fact that ambiguity is a type of uncertainty, where uncertainty involves the lack of information and ambiguity has less to do with the amount of information, but rather how to interpret the information. Uncertainty is also related to volatility (i.e., change), since volatility may lead to uncertainty. In sum, all the factors of HAVUC may influence or be influenced by each other, impacting the decision-making context.

Regardless of the unique characteristics the factors of HAVUC may have on the objective environment, individuals may have difficulty differentiating between the factors. Instead, during the primary appraisal process of environmental stimuli, individuals may simply evaluate the stimuli as threatening. The primary appraisal determines the extent of threat a particular event poses and the secondary appraisal determines if they have the resources necessary to address the threat (Salas, Driskell, & Hughes, 2013). Salas et al (2013) suggests that an environmental stimulus becomes salient, and individuals, through an appraisal process, evaluate the stimuli as positive (i.e., seen as a challenge) or negative (i.e., seen as a threat). This process highlights the potential for further conceptual overlap between the HAVUC dimensions, and potential confusion on the part of respondents when completing a measure. However, I propose that by clearly defining and developing items to tap the separate HAVUC factors, it is possible to measure individuals' attitudes toward specific aspects of the environment and gain insights into the evaluation process.

Discussion of the HEFS

The subscales discussed above are summated to form the overall attitude toward HAVUC environments, i.e. the HAVUC Environment Fitness Scale (HEFS). In general, higher HEFS scores suggest a more favorable attitude toward HAVUC situations and/or environments, which should be an indicator of a person's comfort level dealing with these situations. The previous sections proposed partial nomological networks and hypotheses for each subscale. The following section focuses on the summated HEFS. First, relationships of the previously discussed measures and the HEFS are discussed and hypotheses are provided. Lastly, a further discussion of the HEFS and the relationship to stress and performance outcomes and the overall nomological network to be tested is presented.

HEFS and related measures.

Nine total measures were identified to demonstrate potential convergent and discriminant validity evidence for the subscales representing the HEFS. I propose that the related measures likely have stronger relationships with the respective subscales, rather than the total score on the HEFS. The subscale scores will likely prove more valuable for selection of training curricula and developmental strategies for individuals. However, the total score on the HEFS may prove useful as a screening tool, if considering extremes (e.g., scores that are extremely low or extremely high). Additionally, total scores on the HEFS are proposed to predict outcome measures, specifically stress and performance.

However, further convergent and discriminant validity evidence may exist when comparing the previously discussed measures with the overall summated HEFS. Drawing from the theoretical basis discussed with each subscale, the measures are discussed and compared with the summated HEFS. The discussion below follows a similar order as the previous subscale discussions, with a few exceptions. Risk propensity and rational decision-making style are discussed once, although both had multiple relationships with the separate subscales. Additionally, the need for cognition (NFC) is discussed in conjunction with decision-making style since it may help explain adaptability in regards to decision-making. The related measures and their hypothesized relationship with the summated HEFS are discussed and offered below. Table 1 presents the previously discussed relationships with each subscale for reference and recap of hypotheses to this point.

Table 1.

Related Measures & Hypothesized Relationships with the Subscales

Related Measures	Hostility Subscale	Ambiguity Subscale	Volatility Subscale	Uncertainty Subscale	Complexity Subscale
Risk Propensity	H1(+)	H4(+)		H10(+)	
Sensation Seeking	H2(+)				
Rational DM Style	H3(-)	H6(-)	H9(-)	H12(-)	H14(+)
Need for Cognition					H13(+)
Tolerance of Ambiguity		H5(+)			
Resistance to Change			H7(-)		
Locus of Control (Int.)			H8(+)		
Intolerance of Uncertainty				H11(-)	
Diffuse-Avoid Processing Style					H15(-)

Relationship between the HEFS, risk propensity, & sensation seeking.

The previous discussion hypothesized a positive relationship between risk propensity and the subscales for Hostility, Ambiguity, and Uncertainty. All three subscales involve an evaluation and/or perception of risk. In the case of hostility the risk is explicit, whereas ambiguity and uncertainty involve embedded risk, due to the unknown. Constructs examining orientations toward risk, whether explicit or defined by the availability of information should be related (McLain, 2009). Given HAVUC situations involve risk and difficulties interpreting and/or knowing all relevant information, the HEFS should be positively related to risk propensity.

Similar to the risk propensity argument, individuals high in sensation seeking likely have more favorable attitudes toward HAVUC environments. Given that HAVUC environments are by nature ever-changing, novel, complex, and provide multiple opportunities for external stimulus related to risk, individuals high in sensation seeking may gravitate to these types of environments (e.g., Zuckerman, 2014). It is reasonable to expect a positive relationship between sensation seeking and the summated HEFS.

> *Hypothesis 16*: The HEFS will demonstrate a statistically significant positive relationship with a measure of risk propensity.

> *Hypothesis 17*: The HEFS will demonstrate a statistically significant positive relationship with a measure of sensation seeking.

Relationship between the HEFS, DM style, & need for cognition.

Rational decision-making style was hypothesized to have a negative relationship with the Hostility, Ambiguity, Volatility, and Uncertainty subscales, whereas a positive relationship with the Complexity subscale. It makes logical sense that people with favorable attitudes toward complexity and/or a high need for cognition may prefer or identify with a rational decision-making style, as discussed previously. However, it also makes sense that decision-making in a HAVUC situation requires flexibility and significant reliance on intuition and experience. This juxtaposition was alluded to in the section covering complexity and is discussed below.

The developers of the general decision-making style (GDMS) measure concede that situations may influence an individual's decision style; the key word is ‘general’ (Scott & Bruce, 1995). Meaning that individuals may self-identify as a ‘rational’ decision-maker; however, that does not necessarily mean that they will utilize rational decision-making across all decision contexts. Galotti, Tandler, and Wiener (2014, p. 40) suggest individual difference measures of decision-making (DM) style and how individuals actually make real-life decisions were not related in a study of how undergraduate students determined what classes to take. They do not claim that differences in DM style are not related to DM behavior, as the study did not capture every aspect of the decision-making process (Galotti, et al., 2014). However, the Golotti et al. (2014) study did demonstrate that individuals, in their sample population, identifying with rational DM style and/or the need for cognition did not differ in the amount of information they considered or used for making choices. Golotti, et al. (2014, p. 41) suggests that while the GDMS has proven reliable and valid across multiple studies, decision-making styles “may reflect the way people construct narratives about their own decision-making experiences.” These findings suggest DM style is analogous to learning-styles. Much like a person can still learn if information is presented in a manner not congruent with his/her learning-style, likewise, a person may make decisions not congruent with their DM style depending on the situation.

Payne, Bettman, and Johnson (1993) suggest the strategy people choose in a decision context is highly dependent on the properties of the decision problem. Payne et al. (1993, p. 2) argue “that the specific strategies used to solve particular decision problems are usually intelligent responses under the assumption that people have multiple goals for decisions, including both the desire to be accurate and the desire to conserve limited cognitive responses." In essence people determine how to decide based on cost and benefit of a particular strategy they deem appropriate to the context (Payne et al., 1993). The cost and benefit does not imply there is always a rational analysis, as biases, preferences, and other contextual factors (e.g., social context) influence individuals differentially. The argument is that adaptive responses are represented by the use of various decision strategies and that individuals vary on the information processing abilities (Payne et al., 1993). The decision strategies utilized under stressful conditions (i.e., time pressure, threats, etc.) must conform to characteristics of the situation, forcing individuals to rely more on past experiences and likely has very little to do with a self-described DM style (e.g., Klein, 1996).

Lastly, in regards to rational DM style, Levin et al. (2000) suggests more individual differences must be accounted for in order to understand DM processes at the individual level (e.g., experience, expertise, motivation, etc.). Based on the Payne et al. (1993) adaptive decision-making concept, the Levin et al. (2000) study suggests individuals high in need for cognition (NFC) were more adaptive when making decisions. Specifically, individuals high in NFC are less consistent in the strategies they use across multiple decision-making contexts. This suggests that even if a person identified with rational decision-making style but was high in NFC, they would adapt their strategies based on the situation. Taken together, it is reasonable to expect that decision-making style may be related differentially to the separate subscales as hypothesized. However, when considering a person's attitude toward HAVUC as a whole (i.e., HEFS), the target of the attitude becomes much more broad and the person's DM style likely becomes less of a predictor (i.e., averages out across the subscales).

Remembering that NFC is an individual difference representing an individual's tendency to engage in and enjoy effortful cognitive activity (Cacioppo & Petty, 1982). It is reasonable to expect that individuals high in NFC will hold more favorable attitudes toward HAVUC situations. HAVUC situations present a target rich environment full of novelty and complexity that require substantial thought. Regardless of what decision-making style a person identifies with, the person will likely require a high NFC in order to identify the problem and adjust his/her approach (e.g., adaptive decision making and/or recognizing the need to alter DM style) accordingly to be successful (e.g., Payne et al., 1993; Levin et al., 2000). Individuals with higher scores on the HEFS likely have high NFC resulting in more adaptive decision-making processes.

> *Hypothesis 18*: The HEFS will not demonstrate a statistically significant relationship with a measure of rational decision-making style.

> *Hypothesis 19*: The HEFS will demonstrate a statistically significant positive relationship with a measure of need for cognition (NFC).

Relationship between the HEFS & tolerance for ambiguity.

The interaction between the multiple components of HAVUC often increases and/or produces additional ambiguity. Budner (1962) describes tolerance and intolerance for ambiguity on a spectrum, ranging from a tendency to perceive ambiguity as desirable to a tendency to perceive ambiguity as a source of threat, respectively. Regardless of the debate surrounding the measure of tolerance for ambiguity (TA), it is generally accepted that individuals with higher levels of TA will be more comfortable in ambiguous environments (Furnham & Marks, 2013). In order to comfortably operate in HAVUC environments, individuals will require some level of tolerance for ambiguity. The higher a person scores on the HEFS, the more likely the person has increased levels of tolerance for ambiguity.

> *Hypothesis 20*: The HEFS will demonstrate a statistically significant positive relationship with a measure of tolerance for ambiguity.

Relationship between the HEFS & resistance to change.

HAVUC environments also experience frequent change, e.g., volatility. In order to deal with the change in the environment, individuals need to process the change and adapt accordingly. Similar to ambiguity, volatility is influenced by other components as new information becomes available in HAVUC situations; new information often changes the decision context, which may fundamentally change the situation (Shaffer & Zalewski, 2011). These changes often cause frustration or discomfort, particularly in individuals that prefer structure and/or a level of perceived control. Individuals experiencing discomfort from the volatility and other components of HAVAC contributing to the instability may attempt to resist the change (e.g., Bareil, 2013). People that are uncomfortable with change may also view other elements of HAVUC as a threat, either based on the unknown and/or a potential disruption to their routine, resulting in lower scores on the HEFS.

> *Hypothesis 21*: The HEFS will demonstrate a statistically significant negative relationship with a measure of resistance to change.

Relationship between the HEFS & locus of control (internal).

While some individuals may resist change, others may accept the change even if they prefer certainty and structure. Specifically, individuals with high levels of internal locus of control, as they believe they have some control of the outcomes and that they can potentially influence the environment (Rotter, 1966). While individuals with higher levels of external locus of control feel the environment is responsible for the outcomes. HAVUC environments present multiple challenges and regardless of the turbulence, individuals that feel they have some control will likely score higher on the HEFS.

> *Hypothesis 22*: The HEFS will demonstrate a statistically significant positive relationship with a measure of internal locus of control.

Relationship between the HEFS & intolerance of uncertainty.

As mentioned above, even if a person accepts turbulence and has high internal locus of control, it doesn't necessarily mean they enjoy unpredictability. Conversely, individuals may desire predictability and actively seek certainty and/or essentially suffer from paralysis of cognition and action when faced with uncertainty (Birrell, Wilkinson, & Freeston, 2011). Of course, individuals differ regarding their desire for predictability and how they react when faced with uncertainty depending on their level of intolerance of uncertainty (IU). HAVUC environments present situations that are routinely unpredictable. Thus making individuals high in IU uncomfortable, due not only to lack of information, but also the unpredictable nature of the future (Grenier et al., 2005). It is reasonable to expect that individuals high in IU have will have lower scores on the HEFS.

> *Hypothesis 23*: The HEFS will demonstrate a statistically significant negative relationship with a measure of intolerance of uncertainty.

Relationship between the HEFS & diffuse-avoidant processing style.

Unpredictability is part of life and ever-present in HAVUC environments. Individuals process the available information differentially, in attempt to make sense of their environment and also to form their sense of identity (Berzonsky, 2010). In attempt to make sense of the environment and/or develop a sense of identity, individuals can actively seek information, look to others for cues or advice, or attempt to avoid challenging situations (e.g., Berzonsky, 1989). Attempting to avoid the challenges presented by HAVUC environments will not likely make the situation go away. In fact, failing to address the challenges of a HAVUC situation may make things worse. Seeking information and/or looking to others for cues and advice may be the more logical approach when dealing with HAVUC situations. It is plausible that individuals that prefer to avoid challenging situations may have lower scores on the HEFS.

> *Hypothesis 24*: The HEFS will demonstrate a statistically significant negative relationship with a measure of diffuse-avoidant processing style.

HEFS and related outcomes.

Each element of HAVUC can be conceptualized as existing on a spectrum from low to high, e.g., low complexity to high complexity. When the components of HAVUC are combined, the resulting environment or situation may contain more or less HAVUC. The objective nature of the HAVUC situation, as well as a person's perception of the situation, likely moderate the relationship between an individual's HEFS score and stress and performance outcomes. This moderated relationship is outside the scope of the current study. However, acknowledging that HAVUC arguably exists to some degree in most everyday situations, this study will collect stress and performance data to examine these outcomes relationships with the HEFS.

The relationship between stress and performance outcomes is based on the Yerkes-Dodson Law (Yerkes & Dodson, 1908). The Yerkes-Dodson Law essentially states that if a person experiences too little or too much arousal, his/her performance will not be optimal; suggesting an inverted-U relationship with arousal on the x-axis and performance on the y-axis. Additionally, HAVUC impacts organizations across the spectrum (i.e., business, military, government). However, the impact on organizations largely depends on how the individual actors deal with the turbulence.

A person's attitudes toward the environment (i.e., HEFS score) likely have an effect on their stress and performance levels, partly due to perceived comfort with the situation (i.e., PE fit). Salas et al (2013) suggests individuals perform a primary appraisal of salient environmental stimuli, resulting in a positive or negative evaluation (i.e., attitude). A secondary appraisal follows to determine the resources available to overcome the perceived threat or challenge (depending on the valence of the attitude). Based on resource allocation theories (e.g., Kanfer & Ackerman, 1989; Beal, Weiss, Barros, & MacDermid, 2005), a person with negative attitudes toward aspects of a HAVUC environment may experience increased stress and decreased performance. Specifically, Beal et al (2005) explains that if a person 'likes' a task or situation (i.e., positive attitude), the more likely the person will engage by directing resources to meet the challenge, thus increasing performance. Conversely, people 'disliking' a task or situation (i.e., negative attitude) are more likely to divert resources to off task attentional demands (or at least less resources to task attentional demands), decreasing performance. Similarly, Kanfer and Ackerman (1989) suggests that people have a limited amount of resources and those resources are directed at the task, off the task, or to self-regulate. Combining the two models, a person with negative attitudes toward HAVUC will likely lack the task attentional pull to achieve optimal performance, simultaneously diverting resources to assist with self-regulation to cope with the increased feelings of discomfort in the environment.

The HEFS may provide insight into person-environment fit, beyond existing available measures. This insight may assist in selection for jobs containing high degrees of HAVUC and/or as an initial assessment for individuals' training requirements. Individuals with higher HEFS scores should experience lower stress levels and higher job performance in HAVUC environments. The hypotheses offered directly below pertain to the relationship between the HEFS and the outcome measures of stress and performance. However, post hoc analysis between the five separate subscales and the criterion measures of stress and performance were also conducted and discussed within the results section. I proposed that the subscales would predict stress and performance in a similar way as the HEFS, although I did not offer specific hypotheses.

> *Hypothesis 25*: The HEFS will demonstrate a statistically significant negative relationship with stress outcome measures.

> *Hypothesis 26*: The HEFS will demonstrate a statistically significant positive relationship with performance outcome measures.

Alternatively, based on the potential for moderation effects mentioned earlier, individuals with high HEFS scores operating in low HAVUC environments may potentially sustain little effect to their stress level, but perform more poorly. Specifically, individuals with high HEFS scores may react aggressively or make quick decisions in low HAVUC environments that do not require aggressive or intuitive decision-making. This moderated relationship is not examined in this study, but should be considered for future studies. Figure 7 presents all the relationships and hypotheses discussed within the chapter and Figure 8 presents the overall nomological network to be tested.

Related Measures	Hostility Subscale	Ambiguity Subscale	Volatility Subscale	Uncertainty Subscale	Complexity Subscale	HEFS
Risk Propensity	H1(+)	H4(+)		H10(+)		H16 (+)
Sensation Seeking	H2(+)					H17(+)
Rational DM Style	H3(-)	H6(-)	H9(-)	H12(-)	H14(+)	H18(ns)
Need for Cognition					H13(+)	H19(+)
Tolerance of Ambiguity		H5(+)				H20(+)
Resistance to Change			H7(-)			H21(-)
Locus of Control (Int.)			H8(+)			H22(+)
Intolerance of Uncertainty				H11(-)		H23(-)
Diffuse-Avoid Processing Style					H15(-)	H24(-)
Perceived Stress[1]						H25(-)
Performance[1]						H26(+)
[1] Represent criterion outcome measures.						

Figure 7. Hypotheses & Relationships with the Subscales & HEFS.

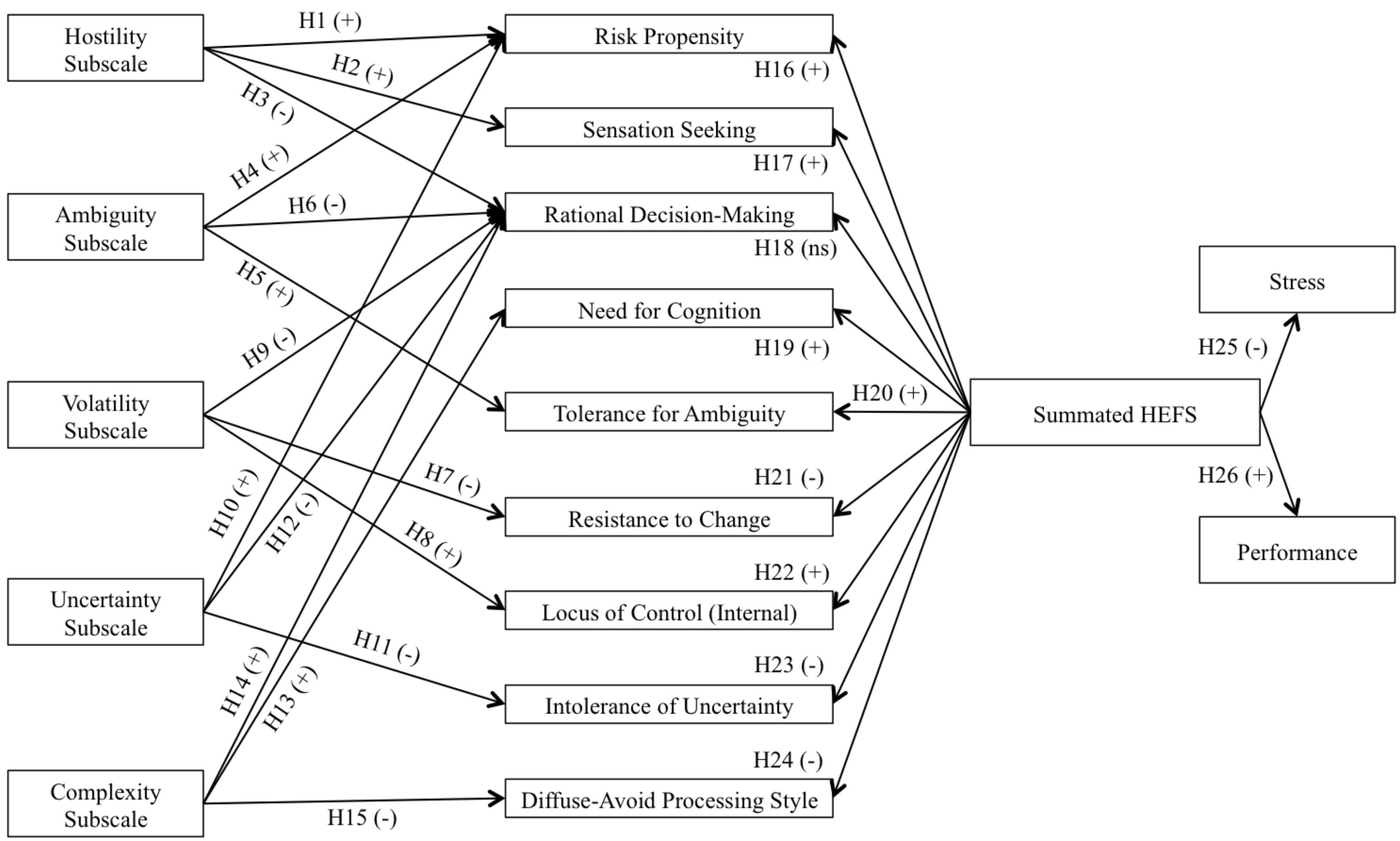

Figure 8. Nomological Network: Subscales, HEFS, & Related Constructs.

Chapter 3: Methodology

This study was executed in four phases, following the commonly accepted steps of scale development and evaluation described by Spector (1992). Phase 1 consisted of item generation and item sorting to develop the initial scale. Phase 2 consisted of a series of two pilot studies to conduct item analysis in order to refine the scale prior to executing the focal studies. Phase 3 was conducted as focal study 1 to provide the data necessary to provide construct validity evidence and hypotheses testing. Lastly, phase 4 was conducted as focal study 2 to provide criterion validity evidence and testing of remaining hypotheses.

Phase 1: Item Generation

As discussed in Chapter 2, the HAVUC Environment Fitness Scale (HEFS) was developed based on various domains of literature, and the psychometric principles described by DeVellis (2012) and Spector (1992). The principles suggest clearly defining the construct of interest and construction of a nomological network to identify related constructs to be tested. A review of the literature informed the revision of the definitions by identifying and synthesizing the different perspectives on the focal constructs. The HEFS is comprised of five related, but separate constructs: hostility, ambiguity, volatility, uncertainty, and complexity (HAVUC). The initial 100 items representing the HEFS were written to measure individuals' overall attitudes toward HAVUC environments, with the

20-items per subscales intended to measure individuals' attitudes toward each of the HAVUC elements.

The HEFS and each of the subscales will be analyzed separately to determine dimensionality, reliability, and validity of the five subscales. Example items for each of the subscales follow:

1.) Hostility, “I like situations that involve competition.”
2.) Ambiguity, “I enjoy situations that can be interpreted in multiple ways.”
3.) Volatility, “I am comfortable working in rapidly changing situations.”
4.) Uncertainty, “I get frustrated when I lack information about a situation.” (Reverse Coded)
5.) Complexity, “I enjoy coming up with new solutions to complex problems.”

The original 100 items were randomized and provided to a panel of five SMEs familiar with scale development. The five-person panel consisted of two performance psychology PhDs, one performance psychology doctoral candidate, and two industrial organizational psychology graduate students. The five-person panel was provided with the theoretically grounded definitions of each of the HAVUC dimensions and asked to place each of the items into the category the item was intended to represent. Items that were placed into the category they were intended to represent by a majority of the panel (i.e., 3 out of 5) were retained, while items that were identified as difficult to interpret and/or placed into the wrong category by the majority of the panel were rewritten or replaced. The initial sorting exercise resulted in 75% retention of the original 100-items (i.e., 75-items).

Therefore, 25-items were revised and/or replaced to better reflect the construct of interest.

The revised 25-items were subjected to a second sorting exercise comprised of three members from the original panel (i.e., the two performance psychology PhDs and the performance psychology doctoral candidate). Complete agreement was achieved on 20 of the 25-items (i.e., 80%). The remaining 5-items were discussed with the three-person panel and revised to achieve consensus. The result of the two sorting exercises produced 100 revised items to be used for the initial pilot study, 20 items per dimension.

The HAVUC Environment Fitness Scale (HEFS) and the corresponding sub-scales (e.g., H, A, V, U, & C) are measured on a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). Positive valence is used to score the HEFS and its subscales, i.e., a higher score represents a more positive attitude and is indicative of more comfort with the overall environment and/or a specific dimension. The initial 100-item pool, see Appendix C, representing the HEFS was comprised of 48 reverse coded items; 9, 10, 10, 13, and 6 reverse coded items for the respective subscales (i.e., HAVUC).

Phase 2: Pilot Studies

The purpose of the pilot studies was to conduct item analyses in order to reduce the overall number of items, while maintaining reasonable internal consistency reliabilities, and also obtain a preliminary factor structure for the HEFS and the five subscales. A series of two pilot studies were conducted to refine the initial HEFS. The two pilot studies (1 and 2) were conducted online through Amazon's Mechanical Turk (MTurk) to garner participants, utilizing Qualtrics as the survey platform. The items were presented in a randomized fashion for each of the two pilot studies.

Pilot study 1.

Measures. Based on feedback from the panel of experts in phase 1, a total of 100-items were revised for the initial pilot study, see Appendix C. Pilot study 1 was conducted using 99-items on a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). One item from the original 100-item pool was eliminated due to a technical issue with the online platform; however, after comparing the item to the other items the loss did not result in any deficiency in construct coverage. All subscales were represented by 20-items, with the exception of ambiguity, which was represented by 19-items. Additionally, one attention-check item was included within the survey and the following demographic information was collected: gender, ethnicity, tenure at current job, employment status, and age range.

Participants. A total of 112 participants from the MTurk workforce completed pilot study 1. Participants identifying as U.S. citizens were able to access the survey and eligible to participate upon reading and accepting informed consent. Eligible participants had to pass the one attention-check item to be eligible for payment (i.e., $1 per participant). After reviewing the data for insufficient responding (e.g., answers straight down the column) and/or failed attention check, a total of 100 participants were retained. As shown in Table A1 (i.e., Appendix A, Table 1), the 100 retained participants for pilot study1 consisted of 58 males (58%) and 42 females (42%), with 72% identifying as white, 11% Asian, 9% Black, 3% American Indian or Alaska Native, and 5% other. The average tenure with the current employer was 50 months (4yr, 2mo) and employment status was reported as follows: 69% full time employment, 16% part time, 14% unemployed, and 1% retired. A majority of the participants (82%) were between the ages of 18 and 44; 43% ranged 25 to 34, 21% ranged 35-44, 18% ranged 18 to 24, 14% ranged 45 to 54, and 4% ranged 55 to 64.

Results. Item analyses were conducted on the 99-items data set collected from pilot study 1 to determine which items to remove and still maintain reasonable internal consistencies for the HEFS and the five subscales. Appendix C contains the 50-items retained, 10-items per subscale, with internal reliabilities and mean inter-item correlations (i.e., Cronbach's alpha, α and r) as follows: HEFS, α=.95, r=.26; hostility subscale, α=.82, r=.31; ambiguity subscale, α=.86, r=.38; volatility subscale, α=.90, r=.46; uncertainty subscale, α=.82, r=.32; and complexity subscale, α=.87, r=.39. Corrected item-total correlations for all retained subscale items were > .30. Item-total correlations, Cronbach's alpha, means, standard deviations, skewness, and kurtosis of the 50 retained items, subscales, and summated HEFS are reported in Table A2.

Correlations between the subscales were examined to provide evidence the subscales were measuring separate constructs. The average correlation between the five subscales was $r=.54$, $p<.01$; with the lowest correlation of $r=.30$, $p<.01$ between the hostility and uncertainty subscales and the highest correlation of $r=.74$, $p<.01$ between the uncertainty and volatility subscales, as reported in Table A3.

Pilot study 2.

Measures. Pilot study 2 was conducted using the 50-items retained from pilot study 1; see Appendix C. As in pilot 1, the items were measured using a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). All subscales were represented by 10-items. Additionally, one attention-check item was included within the survey and the following demographic information was collected: gender, ethnicity, tenure at current job, employment status, and age range.

Participants. A total of 101 participants from the MTurk workforce completed pilot study 2. Participants identifying as U.S. citizens were able to access the survey and eligible to participate upon reading and accepting informed consent. Eligible participants had to pass the one attention-check item to be eligible for payment (i.e., $0.75 per participant). After reviewing the data for insufficient responding (e.g., answers straight down the column) and/or failed attention check, a total of 100 participants were retained for pilot 2. As shown in Table A1, the 100 retained participants for pilot study 2 consisted of 47 males

(47%) and 53 females (53%), with 83% identifying as white, 7% Black, 5% Asian, 3% other, 1% American Indian or Alaska Native, and 1% Native Hawaiian or Pacific Islander. The average tenure with the current employer was ~58 months (4yr, 10mo) and employment status was reported as follows: 66% full time employment, 19% part time, 13% unemployed, and 2% retired. A majority of the participants (77%) were between the ages of 18 and 44; 38% ranged 25 to 34, 27% ranged 35-44, 17% ranged 45 to 54, 12% ranged 18 to 24, 5% ranged 55 to 64, and 1% ranged from 65-74.

Results. Item analyses were conducted on the 50-item data set collected from pilot study 2 (n=100) to determine if the reliability and inter-item correlations produced similar results to pilot study 1. Analyses of the 50 retained items, 10-items per subscale, using the sample from pilot study 2 produced similar results as pilot study 1. Internal reliabilities and mean inter-item correlations (i.e., Cronbach's alpha, α and r) are as follows, with results from pilot 1 in parentheses for comparison: HEFS, α=.96 (.95), r=.34 (.26); hostility subscale, α=.87 (.82), r=.40 (.31); ambiguity subscale, α=.90 (.86), r=.46 (.38); volatility subscale, α=.91 (.90), r=.49 (.46); uncertainty subscale, α=.86 (.82), r=.39 (.32); and complexity subscale, α=.90 (.87), r=.44 (.39). Corrected item-total correlations for the 50 retained items remained > .30 for each of the subscales, with two exceptions; item # 4 from the complexity subscale and item # 25 from the uncertainty subscale were <.30. Pilot 2 item-total correlations, Cronbach's alpha, means, standard deviations, skewness, and kurtosis of the 50 retained items, subscales, and summated HEFS are reported in Table A4.

Correlations between the subscales for pilot 2 were examined to provide evidence the subscales were measuring separate constructs. The average correlation between the five subscales was $r=.66$, $p<.01$, an increase from the pilot study 1 mean subscale correlations of $r=.54$, $p<.01$. The moderate mean correlation between the subscales is not surprising given the theoretical relatedness of the separate HAVUC dimensions; however, correlations amongst some of the subscales did demonstrate high correlations, which is indicative of the subscales measuring similar constructs. The lowest correlation between subscales was consistent with pilot study 1 with the hostility and uncertainty subscales correlating at $r=.41$, $p<.01$, up from $r=.30$, $p<.01$ from the observed relationship from pilot study 1. The highest subscale correlations for pilot 2 was slightly different, $r=.81$, $p<.01$ between the ambiguity and volatility subscales, versus $r=.74$, $p<.01$ between the uncertainty and volatility subscales in pilot study 1. However, a similar pattern of moderate to high correlations were observed in both pilot studies between the ambiguity, volatility, and uncertainty subscales, see Table A5 for pilot 2 subscale correlations.

Pilot studies 1 and 2 combined.

Measures. The 50 retained items and corresponding subscales behaved similarly when comparing pilot 1 and pilot 2 data, although reliabilities and correlations between items and subscales generally increased in pilot 2. The increase in reliabilities and correlations are likely due to having a more focused item-set for pilot 2 (i.e., 50-items) versus the initial 100-items pilot 1 started with. In order to further reduce the number of items, while maintaining adequate internal consistencies among the subscales and also provide initial evidence of the proposed factor structure, the data (i.e., the 50 common items, 10-items per subscale) from pilot studies 1 and 2 were combined. The combined data set from pilot studies 1 and 2 maintained the same 7-point Likert scale measurements for each of the 50-items.

Participants. Combined data from the 50 common items from pilot 1 (n=100) and pilot 2 (n=100) resulted in a total sample size of n=200. The demographics for the combined data set (see, Table A1) consisted of 105 males (52.5%) and 95 females (47.5%), with 77.5% identifying as white, 8% Asian, 8% Black, 2% American Indian or Alaska Native, 0.5% Native Hawaiian or Pacific Islander and 4% other. The average tenure with the current employer was 54 months (4yr, 6mo) and employment status for the combined group was reported as follows: 67.5% full time employment, 17.5% part time, 13.5% unemployed, and 1.5% retired. A majority of the participants (79.5%) were between the ages of 18 and 44; 40.5% ranged 25 to 34, 24% ranged 35-44, 15% ranged 18 to 24, and 20% represented age range 45 to 64. One participant (0.5%) reported an age range of 65 to 74.

Results. Item analyses conducted on the combined 50-item data set (n=200) produced similar internal reliabilities and mean inter-item correlations as the separate results from pilot 1 and 2. Internal reliabilities and mean inter-item correlations (i.e., Cronbach's alpha, α and r) are as follows: HEFS, α=.96, r=.30; hostility subscale, α=.85, r=.36; ambiguity subscale, α=.88, r=.42; volatility subscale, α=.90, r=.48; uncertainty subscale, α=.84, r=.35; and complexity subscale, α=.89, r=.42. Corrected item-total correlations for 48 of the 50 retained items remained > .30 for each of the subscales, with the same two items identified from pilot 2 item analysis displaying item-total correlations <.30 (i.e., Items #4 and #25 from the complexity and uncertainty subscales, respectively). Discussion of item removal is discussed later in this section. The combined pilot 1 and 2 data item-total correlations, Cronbach's alpha, means, standard deviations, skewness, and kurtosis of the 50 retained items, subscales, and summated HEFS are reported in Table A6.

The combined pilot 1 and pilot 2 data (n=200) were examined to determine correlations between the subscales to provide evidence the subscales were measuring separate constructs. The average correlation between the five subscales was r=.60, p<.01. The lowest correlation between subscales was consistent with pilot studies 1 and 2, with the hostility and uncertainty subscales correlating at r=.36, p<.01. Similar patterns of moderate to high correlations were also observed in correlations between the ambiguity, volatility, and uncertainty subscales (i.e., all between r=.72 to .76, p<.01), with the highest correlation between the uncertainty and volatility subscales, r=.76, p<.01, see Table A7.

The combined data (n=200) for the 50-item HEFS were then further analyzed using principal component analysis (PCA) with and without orthogonal rotation (i.e., Varimax). The PCA produced ten (10) factors with Eigen values >1; however, the scree plot appeared to flatten considerably after four factors. Factors 5 and 6 were slightly lower on the y-axis, but factors 4, 5, and 6 were much closer together than factors 1 through 4, see Figure B1. Factors 1 through 10 accounted for 68.84% of the total variance; factors 1 through 5 all accounted for >3.5% of the variance, accounting for 56.59% of the cumulative variance, Table A8. An additional PCA was conducted in a similar manner with items #4 and #25 removed; i.e., the complexity and uncertainty items, respectively, failing to load >.30 in pilot 2 and the combined data set. The removal of items #4 and #25 produced similar results, although the 48-item data set resulted in 9 factors with Eigen values >1 versus the 10 factors when all 50-items were included. To be conservative, I continued analyses with the full 50-item set.

Next an exploratory factor analysis (EFA) of the 50-items using principal axis factoring was performed first by rotating the data set orthogonally using Varimax rotation and fixing the factors to extract to five, as supported by theory, with the rotated solution accounting for 51.80% variance. The Kaiser-Meyer-Olkin (KMO) measure was .91 and Bartlett's Test of Sphericity was significant (χ^2 (1225)=6903.42, p<.001), indicative that the data was appropriate for factor analyzing. The orthogonal approach (i.e., Varimax rotation), resulted in the items loading generally as developed; however, there were several items cross-loading on multiple factors in the 0.3 to 0.4 range making the results difficult to interpret. The cross loading was not unexpected, as the subscale correlations from the previous analyses demonstrated significant correlations between all five subscales.

Given the significant correlations between factors with several items, principal axis factoring was conducted utilizing an oblique rotation (i.e., Promax). Tabachnick and Fidell (2007) suggest that when item correlations (i.e., loadings) exceed .32 among factors, there is sufficient variance to warrant an oblique rotation. The five factor oblique rotated solution similarly accounted for 51.80% variance, all five factors had Eigen values >1, and the scree plot appeared to reasonably account for five factors. The item loadings were easier to interpret, but still required individual item analysis in regards to content; particularly in regards to the ambiguity and uncertainty items. The decision to reduce certain items was based on both the item loadings and a reevaluation of the content of each item to ensure adequate construct coverage. The item loadings from the 50-item EFA with oblique rotation are found in Table A9, with the bolded items identified for retention. The results from the EFA with Promax rotation, coupled with a review of item content, resulted in retention of 6-items per subscale for a total of 30-items.

The 30-items identified for retention were then subjected to an additional EFA using principal axis factoring with an oblique rotation (i.e., Promax), fixing the number of factors to five. The Kaiser-Meyer-Olkin (KMO) measure was .90

and Bartlett's Test of Sphericity was significant (χ^2 (435)=3510.61, p<.001), indicative that the data was appropriate for factor analyzing. A total of 6 factors had Eigen values >1, although the scree plot (Figure B2) leveled off after five factors. The rotated five factor solution accounted for 54.91% of the cumulative variance, with factor 1 through 5 accounting for the following variances respectively: 35.44%; 7.65%; 5.40%; 3.87%%; and 2.56%. The 5-factor solution was preferred due to the theoretical underpinning, leveling off of the scree plot, and difficulty of interpreting the 6-factor solution.

The item loadings from the 30-item EFA with oblique rotation are found in Table A10. Three of the items demonstrated cross-loadings with one other factor, other than the factor it was intended to represent. A review of the three items reveals the potential for conceptual overlap, which makes the cross-loading unsurprising; however, removal of the items degrades the extent to which the focal construct is covered. For this reason and the fact that the loadings on the focal construct are slightly higher, the three items were retained.

The results from the item analyses and initial EFAs informed further reduction of the 50-items used in the combined pilot studies. The proposed HAVUC Environment Fitness Scale (HEFS) used in the follow-on focal studies consisted of 30 retained items; representing five factors, 6-items per subscale. The retained 30-item scale is found in Appendix D. Internal reliabilities and mean inter-item correlations (i.e., Cronbach's alpha, α and r) of the summated HEFS and each of the 6-item subscales are as follows: HEFS, α=.94, r=.33; hostility subscale,

α=.81, r=.41; ambiguity subscale, α=.82, r=.43; volatility subscale, α=.88, r=.54; uncertainty subscale, α=.86, r=.50; and complexity subscale, α=.88, r=.55. Corrected item-total correlations for all retained subscale items were > .30. Descriptive statistics for the 30-items and respective subscales are displayed in Table A11.

Lastly, the combined pilot 1 and pilot 2 data (n=200) were examined to determine correlations between the 6-item subscales to provide evidence the subscales were measuring separate constructs. Using the retained 30-items, 6-items per subscale, the average correlation between the five subscales was r=.52, p<.01. The correlations between subscales were consistent with the 10-item subscales, with the lowest correlation between the hostility and uncertainty subscales at r=.38, p<.01 and the highest between the volatility and uncertainty subscales at r=.70, p<.01, Table A12.

Phase 3: Focal Study 1—Construct Validity

Participants.

Approximately 600 surveys were administered via a survey link, hosted on Qualtrics, to Army Special Operations Force (ARSOF) Soldiers in training at a facility in the Northeast United States for focal study 1. The 600 Soldiers were in three separate training courses and consisted of more than four different cohorts (i.e., surveys to one of the courses were administered to multiple classes/cohorts). The participating Soldiers were comprised of both officer and enlisted ranks, and different military occupational specialties (MOSs). Response rate was 84% (i.e., 506 total responses; Sample 1=252 responses and Sample 2=254 responses); however, due to insufficient responding, failed attention checks, and/or outliers only 85% of the 506 were retained as usable cases resulting in an n=431 (i.e., Sample 1, n=204; Sample 2, n=227). The retest response rate was 88%--221 of the original 252 responses for Sample 1. After merging the test-retest data for Sample 1 and screening for insufficient responses and/or attention check failures, 37% of the 221 retest responses were retained, n=82.

The combined demographics for focal study 1 (see, Table A13) consisted of 417 males (97%) and 14 females (3%), with 79% identifying as White, 9% Hispanic, 4% Black, 4% Asian, and 4% other. A large portion of the participants had a tenure of one to six years time in service, 75%; with 42% between 4-6 years, 33% 1-3 years, 13% 7-9 years, 8% >10 years, and 4% <1 year. The majority of the participants were active duty military versus National Guard, 94% and 6% respectively; consisting of 67% enlisted personnel and 33% officers. Lastly, 92% of the participants were between the ages of 18 and 32; 52% ranged 23 to 27, 34% ranged 28-32, 7% ranged 33 to 37, 6% ranged 18-22, and 1% represented age range 38 to 42 with no one above 42 years of age.

Measures.

Focal study 1 was conducted using the 30-item HEFS, 6-items per subscale, retained from the pilot studies, Appendix D. The HEFS and the corresponding subscales (e.g., H, A, V, U, & C) were measured on a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7) and scored as positive valence (i.e., higher score represents positive attitude).

A total of nine separate measures of external correlates, identified in Chapter 2, were used to provide evidence for convergent and discriminant validity of the HEFS. The correlates in this section are discussed in the following order: 1.) Risk propensity; 2.) Sensation seeking; 3.) Rational decision-making style; 4.) Need for cognition; 5.) Tolerance for ambiguity; 6.) Resistance to change; 7.) Locus of control (internal); 8.) Intolerance of uncertainty; 9.) Diffuse-avoid processing style. All measures were measured utilizing a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), in order to maintain consistency with the HEFS and to make it easier on the respondents. Reliabilities are provided in the following description of the nine utilized measures and are available in Table A14 for ease of reference.

Risk propensity. Risk propensity was measured using Meertens and Lion's (2008) seven-item risk propensity scale (RPS). All items were rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), with exception of the last item, which is from 1 ('strong' risk avoider) to 7 ('strong' risk seeker). An example item from the scale is: "I usually view risks as a challenge." The scale has demonstrated acceptable internal consistency reliability of $\alpha=.80$ and a 2-week test-retest reliability of $r=.75$, $p<.001$ (Meertens & Lion, 2008). In addition, the RPS has demonstrated evidence of convergent and discriminant validity from other theoretically-related scales (e.g., sensation seeking and need for cognition, respectively) (Meertens & Lion, 2008). Internal consistency reliability for the RPS in this study was α=.74, n=203.

Sensation seeking. Sensation seeking is considered a dispositional risk factor for various problem behaviors and was measured using the Brief Sensation Seeking Scale (BSSS; Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002). The BSSS is an adaption of Zuckerman, Eysenck, and Eysenck's (1978) 40-item sensation seeking scale, version V (SSS-V). The main benefit for utilizing the BSSS, rather than the SSS-V, is the length of the scale, which is 8 items versus 40 items, respectively.

The eight item BSSS consists of two items for each of the following dimensions: experience seeking, boredom susceptibility, thrill and adventure seeking, and disinhibition. An example item is: "I like to do frightening things", tapping the thrill and adventure seeking dimension. The internal consistency reliability estimate of the BSSS is adequate at α=.80 (Hoyle et al., 2002). The BSSS has demonstrated consistent evidence of validity across multiple attitudes and behaviors (Hoyle et al., 2002). Internal consistency reliability for the BSSS in this study was α=.77, n=203.

Rational decision-making. The general decision-making scale (GDMS; Scott & Bruce, 1995) will be used to measure rational decision-making style. The GDMS is a 25-item measure that has demonstrated reliability and validity evidence for each of the five separate decision-making (DM) style subscales: rational, intuitive, dependent, avoidant, and spontaneous DM styles. The GDMS utilizes a seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7).

There is a negative correlation ($r=-.25$, $p<.001$) between rational and intuitive DM style (Bruce & Scott, 1995). Additionally, Loo (2000) provides evidence of a small ($r=.19$, $p<.05$), but positive correlation between the rational DM style subscale and social desirability. This study is only concerned with the rational DM style. However, given the negative correlation between rational and intuitive DM style subscales and the potential for socially desirable answers concerning the rational DM style subscale this study combined the 10 items for the two subscales (i.e., 5-items per subscale) in order to measure rational DM style. Thus, the intuitive DM style items were reverse coded and used as additional items to measure rational DM style. Samples of the rational and intuitive DM style items are: "I make decisions in a logical and systematic way" and "When making decisions, I tend to rely on my intuition", respectively. Bruce and Scott (1995) reported an average internal consistency reliability for the rational and intuitive DM style scales across four samples of $\alpha=.81$ for each and Loo's (2000) psychometric review of the GDMS reported similar findings for rational and intuitive DM styles ($\alpha=.81$ and .79, respectively). Evidence for the validity of the rational and intuitive DM style subscales have been exhibited in previous empirical studies (e.g., Bruce & Scott, 1995; Loo, 2000).

The internal consistency reliability for the hybrid rational decision making style measure (i.e., rational items plus reverse coded intuitive items) initially proposed for this study proved rather poor at α=.59, n=429. Suggesting rational and intuitive decision making styles are not on the same continuum, thus the two separate constructs as suggested by Bruce & Scott (1995). Internal consistency reliability for the five rational decision making style (RDMS) items and the five intuitive decision making style (IDMS) items when calculated separately for this study were α=.75 (n=429) and .73 (n=430), respectively. This issue is discussed further during hypotheses testing, as the a priori hypothesis was based on the hybrid measure.

Need for cognition. Need for cognition was measured with the need for cognition scale—short form (NCS-S) (Cacioppo, Petty, & Feng Kao, 1984). The NCS-S is an 18-item scale intended to measure a person's tendency to engage in and enjoy effortful cognition. The NCS-S utilizes a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). A sample item is: "Thinking is not my idea of fun" (reverse coded). Cacioppo et al. (1984) found internal consistency reliability of α=.90 for the shortened scale and evidence for the validity of the original NCS has been demonstrated in previous empirical research (Cacioppo & Petty, 1982). Internal consistency reliability for the NCS-S in this study was α=.85, n=225.

Tolerance for ambiguity. Tolerance for ambiguity was measured using the Multiple Stimulus Types Ambiguity Test (MSTAT-I; Mclain, 1993). The MSTAT-I is comprised of 22-items, measured on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). A sample item from the MSTAT-I is: “I prefer a situation in which there is some ambiguity.” The MSTAT-I has demonstrated internal consistency reliability of α=.86 (McLain, 1993) and good convergent and discriminant validity (e.g., McLain, 1993; Bors, Gruman, & Shukla, 2010). Internal consistency reliability for the MSTAT-I, also referred to as the Tolerance for Ambiguity Scale (TAS) in this study was α=.89, n=201.

Resistance to change. Participants’ resistance to change, conceptualized as a person’s dispositional inclination to resist change, was measured using the resistance to change scale (RTCS; Oreg, 2003). The RTCS is a 17-item scale comprised of four factors: routine seeking (5 items), emotional reaction to imposed change (4 items), short-term focus (4 items), and cognitive rigidity (4 items). Items for the RTCS are measured using a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7). A sample item from the RTCS is: “I generally consider changes to be a negative thing.” The RTCS has demonstrated good internal consistency reliability of α=.92 (Oreg, 2003) and a mean alpha of .80 in a study across 17 countries (Oreg et al., 2008). Additionally, the RTCS has consistently demonstrated validity evidence (e.g., Oreg, 2003; Oreg et al., 2008) in empirical research. Internal consistency reliability for the RTCS in this study was α=.81, n=225.

Locus of control. Locus of control (internal) was measured using Levenson’s (1974) multidimensional locus of control scale (referred to hereafter as LOC). This scale was developed after Rotter’s (1966) internal-external control scale in attempt to help clarify the target of control, since internal-external is fairly broad. Specifically, Levenson's (1974) scale has three dimensions/subscales: internal, powerful others, and chance. I used the 8-item internal subscale, which is scored on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). An example item is: "I can pretty much determine what will happen in my life".

Levenson (1974) reported acceptable internal consistency reliabilities of α=.77 for the internal subscale which is comparable to the internal consistency reported by Rotter (1966) for the original dichotomous internal-external control scale (i.e., Kuder-Richardson reliabilities ranging from .69 to .79). The LOC scale has demonstrated discriminant validity with the Marlowe-Crowne Social Desirability Scale, i.e., all items were near 0.00 correlation (Levenson, 1974). Levenson's (1974) measure and other measures of LOC consistently demonstrated validity evidence and is a generally accepted measure (e.g., Cheng, Cheung, Chio, & Chan, 2013). Internal consistency reliability for the LOC-Internal in this study was slightly low at α=.68, n=225.

Intolerance of uncertainty. Intolerance of uncertainty was measured using the Intolerance of Uncertainty Scale—Short Version (IUS-12; Carleton, Norton, & Asmundson, 2007), which was adapted from Freeston, Rhéaume, Letarte, Dugas, & Ladouceur's (1994) original 28-item IUS. The IUS-12 is a 12-item scale, which utilizes a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). A sample item from the IUS-12 is: "I must get away from all uncertain situations."

The IUS-12 has demonstrated internal consistency reliability of α=.91 (Carleton et al., 2007). The IUS-12 has exhibited consistent validity evidence and evidence suggesting little to no loss of validity from the original IUS as a result of item reduction (e.g., Carleton et al., 2007; Khawaja & Yu, 2010). Internal consistency reliability for the IUS in this study was α=.77, n=201.

Diffuse-avoid processing style. Participants' diffuse-avoid processing style was measured using the Berzonsky et al. (2013) Identity Style Inventory—Version 5 (ISI-5). The ISI-5 is a revision from the original Identity Style Inventory (ISI-1; Berzonsky, 1989). The main reason for the fifth revision was to capture a person's current processing style, where previous versions included a mix of items reflecting retrospective and current time points. The ISI-5 is a 27-item scale consisting of three factors, 9-items each: Diffuse-avoidant, Informational, and Normative styles. The ISI-5 utilizes a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). This study utilized the 9-item Diffuse-avoidant style scale (DAPS). A sample item from the DAPS is: "I try not to think about or deal with problems as long as I can."

The DAPS demonstrated internal consistency reliability of mean alpha=.78 across three samples and 1-week test-retest reliability of .85 (Berzonsky et al., 2013). All versions of the ISI, to include ISI-5, have consistently exhibited validity evidence (Berzonsky et al., 2013). Internal consistency reliability for the DAPS in this study was α=.84, n=225.

Demographics. The following demographic information was collected from the focal study 1 participants: gender, ethnicity, tenure (i.e., time in service), employment information (i.e., component of service, occupational specialty, and rank), and age, Table A13.

Procedures.

Focal study 1 was conducted using the 30-item HEFS, resulting from the two pilot studies, Appendix D. As mentioned in the participants section, links to the survey, hosted on Qualtrics, were provided in the form of information posted in the classroom and/or individual handouts to approximately 600 Soldiers attending training. The 600 survey links were evenly split into two different batteries for Sample 1 and 2, in efforts to reduce survey fatigue. All participants received the HEFS and the rational decision making style measure, the remaining 8 correlates were split evenly for the two samples, Table 2. Additionally, Sample 1 received only the HEFS approximately 2-3 weeks after the initial survey battery in order to assess stability of the new measure.

Instructors of the Soldiers and in some cases groups of participants were briefed prior to providing the link in order to provide situational awareness and also to provide clarification about the research. In the case where instructors were briefed, they relayed information about the research to the participants. The opening page of the Qualtrics hosted survey was the informed consent information; participants were not allowed to participate if the informed consent was not acknowledged. Data collection was halted once the minimum target n-size of 400 usable cases was obtained; i.e., new cohorts of students were not engaged.

The full participant pool resulted in n=431 usable cases; n=204 and n=227 for Sample 1 and Sample 2 respectively. Data collected from Samples 1 and 2 were combined for analysis purposes when feasible.

Table 2.

Measures Provided to Each of the Two Samples in Focal Study 1

Measures	Sample	
	Sample 1 n=204	Sample 2 n=227
HAVUC Environment Fitness Scale	X	X
Risk Propensity	X	
Sensation Seeking	X	
Rational Decision-making Style	X	X
Need for Cognition		X
Tolerance for Ambiguity	X	
Resistance to Change		X
Locus of Control (internal)		X
Intolerance of Uncertainty	X	
Diffuse-avoid Processing Style		X
Demographics	X	X
Retest (HEFS only)	X	

Analysis.

The purpose of focal study 1 was to test hypotheses 1 through 24 regarding the proposed nomological network (Chapter2, Figure 9) and to test the factor structure of the HEFS in order to provide construct validity evidence. Assumptions of normality and outliers were assessed and the HEFS was re-examined to assess internal consistency and test-retest coefficients of the five subscales and the full-scale measure for reliability evidence. Next, the HEFS was assessed using confirmatory factor analyses (CFA) with maximum likelihood solution using SPSS AMOS for the three a priori measurement models (Figures B4 through B6). The measurement scale of unobserved variables were established by fixing a regression weight to one to permit model identification and assessment of model fit. Following the CFA of the three a priori models, a principal component analysis (PCA) with and without orthogonal rotation (i.e., Varimax) was performed to determine if the data from focal study 1 produced similar results to the pilot study data in regards to factor structure. The PCA was followed by an exploratory factor analysis (EFA) of the 30-items (n=429) using principal axis factoring by rotating the data set orthogonally using Varimax rotation and alternatively utilizing Promax to examine the oblique rotation, given the significant correlations between factors with several items. Extraction of factors was fixed to five for both EFA analyses, as supported by theory. The information garnered from the EFA and the modification indices on the first CFA was then utilized to conduct an additional CFA in order to explore three additional measurement models (Figures B7 through B9). Lastly, convergent and discriminant validity evidence was garnered by analyzing the proposed relationships in the partial nomological network utilizing SEM and correlational analysis to test hypotheses by examining correlations between the HAVUC Environment Fitness subscales and the observed convergent and discriminant scales.

Phase 4: Focal Study 2—Criterion Validity

Participants.

In focal study 2, 360 surveys were administered to Soldiers being assessed and selected for Army Special Operations Force (ARSOF) training at a facility in the Northeast United States (i.e., the Soldiers are not in ARSOF training yet). The 360 Soldiers were comprised of both officer and enlisted ranks, and various military occupational specialties (MOSs). Response rate on the survey was 99%, with 357 participants filling out the survey; discussed further in the procedure section. A review of the data for insufficient responding and/or missed attention checks, resulted in a 96.6% usable case rate at n=348.

The demographics for focal study 2 (Table A18) consisted of 100% male participants (n=357), with 77.6% identifying as White, 11.8% Hispanic, 5% Black, 2.5% Asian, and 3.1% other. A large portion of the participants had a tenure of less than three years time in service, 65%; with 38.7% between 1-3 years, 26.6% <1 year, 23.5% 4-6 years, 9% 7-9 years, and 2.2% >10 years. The majority of the participants were active duty military versus National Guard or Reserve, 89.4% and 10.6% respectively; consisting of 86% enlisted personnel and 14% officers. Lastly, 96.9% of the participants were between the ages of 19 and 32; 56.3% ranged 23 to 27, 21.6% ranged 28-32, 19% ranged 18-22, and 3.1% ranged 33 to 37; with no one above 35 years of age.

Measures.

Focal study 2 was conducted using the same 30-item HEFS, 6-items per subscale, used for focal study 1 as the data collection efforts were in parallel, Appendix D. The HEFS and the corresponding sub-scales (e.g., H, A, V, U, & C) were measured on a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7) and scored as positive valence (i.e., higher score represents positive attitude).

A total of 2 separate criterion measures were used to provide evidence for criterion validity of the HEFS. The criterion measures in this section are discussed in the following order: 1.) Perceived stress; 2.) Performance; and 3.) Demographics.

Perceived stress. Perceived stress of the participants in focal study 2 were measured using Cohen and Williamson's (1988) ten-item perceived stress scale (PSS-10). The PSS-10 utilizes a 5-point frequency scale ranging from never (0) to very often (4). The question stems from the PSS-10 were modified from 'In the last month' to 'During your time here'; where 'here' was explained in the instructions to encompass the time at the assessment course. The summated PSS-10 score will be used to represent the perceived stress score. Of note, an additional PSS-10 was provided to the participants early in the course in order to assess their perceived 'pre-stress' levels prior to arriving at the course. The question stems for the pre-PSS-10 were 'In the last month', where 'In the last month' was explained in the instructions as prior to arriving to the course (i.e., not accounting for any stress pertaining to in-processing at the course, etc.). Although not required for hypotheses testing, further discussion of the pre-PSS-10 is provided in the procedures and results section.

Factor analysis of the PSS-10 has revealed a 2-factor structure measuring ‘perceived helplessness’ and ‘perceived self-efficacy’ (Roberti, Harrington, & Storch, 2006). Smith, Rosenberg, and Haight (2014) also suggest a 2-factor structure for the PSS-10; however, they refer to the two factors as ‘general distress’ and ‘ability to cope’. Both studies found the 2-factors loaded onto the overall factor of perceived stress and that the PSS-10 has consistently demonstrated internal reliability and validity evidence. Smith et al. (2014) reported that internal reliability coefficients exceeded .70 for the full scale and each of the factors. In addition, Roberti et al. (2006) reported Cronbach’s alpha reliability coefficient of .89 for the full scale and .85/.82 for perceived helplessness and perceived self-efficacy factors respectively. Internal consistency reliability for the PSS-10 in this study was α=.81 (n=348) and α=.80 (n=319) for the pre and post measure respectively.

Performance. Performance data for the participants in focal study 2 was collected from the committee responsible for the assessment course. Existing performance measures already in use for assessment purposes were utilized. This study utilized two separate measures and relationships with each are discussed in the results chapter. The first measure of performance was the overall assessment ranking for each participant following the three-week training. The overall assessment ranking is an established measure that captures performance in the numerous events, as well as peer, and instructor evaluations; resulting in a 1 to n ranking system for each student in the course. The overall ranking serves as an acceptable measure for performance, given that it captures performance throughout the training course.

In addition, performance on a multiple-event land navigation course was also used in order to provide criterion evidence using a more direct measure of performance in a specific turbulent context. The land navigation performance measure simply accounts for the total number of points accumulated over the course of two multi-hour events; where the students start from a known location and are given map coordinates to locate a physical marker on the ground at various distances and directions from their current location. Points are accumulated for each marker students physically locate. The task of land navigation appears relatively straight forward; however, various environmental factors (e.g., daylight and darkness), complexity, and getting lost, to name a few, places the performance context firmly on the HAVUC spectrum.

Demographics. The participants' student roster numbers were collected to facilitate merging of the study data with the training committee's demographic and performance data, already collected during in-processing and throughout the training course, respectively. The following demographic information were merged and reported for the focal study 2 participants: gender, ethnicity, tenure (i.e., time in service), employment information (i.e., component of service, occupational specialty, and rank), and age (Table A18).

Procedures.

The HEFS was administered to the participants as part of in-processing (i.e., day 3) for the three-week assessment for selection into additional specialized training; during other psychometric testing, such as various personality measures. Directly following administration of the HEFS, the participants received the perceived stress scale (i.e., the pre-PSS-10). As mentioned in the measures section, the pre-test for perceived stress was not required for the study, but the supporting committee asked to administer the pre-PSS-10 for future program evaluations and additional insights regarding student perceived stress pre and post assessment course. The assessment committee accepted the study's approved IRB and made the decision to include the HEFS and PSS-10 measures with the existing battery of measures they routinely collect from the student population and include them on their existing informed consent. The decision was made because the assessment committee was interested in how the new measure and the perceived stress measure may provide additional insights to their existing battery of measures. This allowed the HEFS and subsequent PSS-10 measures to be collected in a high-stakes context, likely producing different results than if the participants were told the measures were not part of their assessment.

In addition to the initial HEFS and pre-PSS-10 during in-processing, the participants were provided with the PSS-10 (i.e., post-test, criterion measure for the study) at the end of the assessment course. Instructors from the committee included the post-PSS-10 as part of the out-processing paperwork for each participant, this assisted with capturing perceived stress data on participants completing the course, as well as those that left the course early. Reasons for leaving the course early vary, e.g., voluntary withdraw, medical reasons, etc. Having the post-PSS-10 as part of the out-processing system proved extremely valuable in capturing perceived stress data on participants; however, the dynamic nature of the course makes it difficult to capture 100% of the participants, particularly ones exiting the course early. In the end, the effort resulted in capturing 91.6% of the usable cases, i.e., n=319 of the usable n=348.

Lastly, performance and demographic data was obtained from the course committee as part of an official data-use agreement; the primary researcher was not part of this data collection effort. Included in the performance data were codes indicating reasons participants exited the course early and/or whether they were selected at the end of the course or were non-selects; which was utilized to garner additional criterion validity inferences for the HEFS. Once the data from the study was merged with the performance and demographic data, personally identifiable information (PII) was removed from the dataset to ensure anonymity of the participants.

Analysis.

The HEFS was tested for evidence of criterion validity. The HEFS was re-examined to assess internal consistency of the five subscales and the full-scale measure for reliability evidence. In addition, a five factor model CFA was performed on the data from focal study 2 in the same manner as was performed in focal study 1 to examine differences in model fit, as well as potential differences in the target populations. Next, evidence for predictive validity was obtained by regressing stress and performance measures separately onto the HEFS in order to test hypotheses 25 and 26. Lastly, the relationships of the five subscales with stress and performance was also examined for exploratory purposes in order to garner further insights.

Chapter 4: Results

This purpose the focal studies were to evaluate the construct and criterion validity evidence for the newly developed HEFS. Results from focal study 1 provide information regarding the reliability and structure of the HEFS using both confirmatory and exploratory methods, as well as results from hypothesis testing and construct validity evidence. Results from focal study 2 provide additional reliability evidence of the HEFS and CFA results of the five-factor model utilizing a different population and context, as well as hypothesis testing and criterion validity evidence.

Focal Study 1 Results—Construct Validity Evidence

Data Screening and Reliabilities.

Tests for normality and outlier analysis on the 30-item HEFS (n=431) were conducted using SPSS and AMOS. Skewness for the 30-items was negative for 28 of the 30 items, although none of the skewness statistics exceeded +/- 2. However, a total of nine items exceeded +/- 2 on the kurtosis statistic. Additionally, the Shapiro-Wilk statistic for each of the items was significant, indicating that the data was not univariate normal. A visual inspection of the histograms indicated that the data were approximately normal, but with a negative skew and the Q-Q Plot normal lines tending to underestimate the values at the low end of the scale (i.e., observed values were slightly above the normal line towards the bottom of the scale). Lastly, a review of the subscales and the summated HEFS revealed more favorable distributions, as none of those variables exceeded +/- 0.5 skewness or kurtosis. The decision was made to proceed with the remainder of analyses; implications are discussed in the following chapter (e.g., the potential for inflated χ^2 statistics during CFA).

Next, AMOS was used to examine outliers by calculating Mahalanobis d-squared, there were 85 cases identified with p2 <.001 (.i.e., ~20% of the 431 cases). Two cases were identified as being >56% further away from the centroid as the next case in the 85-case set. Further examination of the item responses for these two cases also suggested insufficient responding; therefore, these two cases were dropped from the dataset. The remaining 83 cases identified were examined for insufficient responding and for extreme cases (i.e., +/- 3.29) at the standardized item, subscale, and scale level and were deemed adequate to remain in the dataset. Normality tests were re-examined on the dataset with the two outliers removed (n=429); results were similar, although the total number of items exceeding +/- 2 kurtosis dropped from nine to five items (Table A14).

After removing cases for insufficient responding, failed attention checks, and/or outliers, there was only one case of a missing data point. There were instances where participants failed to complete an entire correlated measure. However, no correlated measure was missing more than two complete cases (i.e., ≤ 2 cases); in which case it simply degrades the usable cases for that particular analysis. In the one case with a missing data point (i.e., one item on the rational decision making style), the missing data point was replaced with the mean of the other responses on that scale. There were no missing data or cases in regards to the HEFS.

Item analyses conducted on the focal study 1 dataset for the 30-items resulted in lower internal reliabilities and mean inter-item correlations as compared to the combined pilot study data on the same items (30-items, Appendix D). Internal reliability coefficients dropped an average of .12 and the mean inter-item correlations dropped .15 when comparing pilot study results (Table A11) with focal study 1 (Table A14). Internal reliabilities, test-retest coefficients, and mean inter-item correlations (i.e., Cronbach's alpha (α), test-retest, and r) are as follows: HEFS, α=.91, test-retest .80 ($p<.01$), r=.26; hostility subscale, α=.75, test-retest .73 ($p<.01$), r=.34; ambiguity subscale, α=.72, test-retest .68 ($p<.01$), r=.31; volatility subscale, α=.66, test-retest .53 ($p<.01$), r=.27; uncertainty subscale, α=.77, test-retest .76 ($p<.01$), r=.37; and complexity subscale, α=.77, test-retest .67, r=.37. The Cronbach's alpha (α) for the test-retest sample (n=82), pre and post are reported as follows, respectively: HEFS α=.90/.94; hostility subscale α=.70/.73; ambiguity subscale α=.70/.78; volatility subscale α=.60/.76; uncertainty subscale α=.79/.83; and complexity subscale α=.75/.81.

Despite the decrease in internal consistency reliabilities for all subscales from the pilot study, all scales demonstrated an acceptable level of reliability $\geq$ .70, with the exception of the volatility subscale at α=.66. Internal consistency reliabilities in the .60 to .70 range have been characterized from questionable to acceptable particularly when dealing with newly developed scales in a new population (e.g., Nunnally, 1967; Peterson, 1994; Taber, 2017). The volatility subscale did contain one item (i.e., V18) that if removed would improve α to .70; no items were removed.

Corrected item-total correlations for 28 of the 30 items remained > .30 for each of the subscales, with items #8 and #18 from the volatility subscale displaying item-total correlations <.30 at .29 and .25 respectively. The focal study 1 item, subscale, and scale descriptive statistics are located in Table A14.

Examination of Structure.

The data (n=429) were examined to determine correlations between the subscales to provide evidence that the subscales were measuring separate constructs. The average correlation between the five subscales was $r=.54$, $p<.01$ (Table A15). The highest observed subscale correlations were between volatility and uncertainty at $r=.63$, $p<.01$. The average subscale correlations and the observed correlation patterns between the subscales were similar to the results in the pilot studies. Results from the correlation matrix provide preliminary evidence that the subscales are measuring separate constructs. However, correlations amongst some of the subscales did demonstrate relatively high correlations, which is indicative of the subscales measuring similar constructs. These results were not surprising given the theoretical relatedness of the separate HAVUC dimensions.

Confirmatory Factor Analyses. A CFA was conducted using AMOS version 24 to examine the three measurement models originally proposed: the proposed 5-factor model (Figure B4); a 1-factor model with all 30 items loading, (Figure B5); and a general factor model (Figure B6). This study utilized several indices to assess model fit, as suggested by many researchers (e.g., Hu & Bentler, 1999; Brown, 2006; Bollen, 1990, etc.). I purposely used *assess*, based on Barrett's (2007) compelling argument that the chi-square (χ^2) is the only statistic for binary decisions on model fit (i.e., accept/reject). Although, Kenny (2015) suggests that the chi-square test is a reasonable measure of fit for models with 75 to 200 cases, but almost always is statistically significant for models with > 400 cases. Therefore, in addition to the chi-square test, the following fit indices will be reviewed and reported in order to provide useful inferences for continued research: the standardized root mean square (SRMR; good fit < .08); the root mean-square error of approximation (RMSEA; good to adequate < .06 to .08); the Tucker Lewis Index (TLI; good fit ≥ .95); and the comparative fit index (CFI; good fit ≥ .95), (e.g., Hu & Bentler, 1999; Kenny, 2015). I use the common term of *fit*, but transparently address the models as accepted or rejected (i.e., failed) as per the χ^2 statistic.

The 5-factor model failed to fit via the chi-square statistic, producing a $\chi^2 =$ 1373.28 (395), p <.001. Additionally, CFI and TLI suggest poor fit to the data with values of .77 and .75 respectively. However, it is important to note that Kenny (2015) suggests that CFI and TLI should not be utilized when the null model (i.e., the independence model in AMOS) has an RMSEA of <.158, as a low value for CFI/TLI will be obtained. In the case of this analysis, the independence model had an RMSEA of .152. Lastly, RMSEA for the 5-factor model was .08, suggesting fit was adequate (<.06 for good fit) and the SRMR=.07 suggested good fit (i.e., SRMR <.08). Evidence of fit was mixed, so I utilized Hu and Bentler's (1999) recommended two-index presentation strategy suggesting a combination of RMSEA $\leq$ .06 and SRMR $\leq$ .09 as a cutoff for good fit. The model failed to meet the recommended combination parameters, so acceptance 'as is' elevates risks to Type I and II errors. Taken together, the 5-factor model was rejected by χ^2, but demonstrated mediocre fit when considering RMSEA and SRMR in combination.

The 1-factor model was also rejected in regards to the χ^2 test, 1661.55 (405), p<.001. The independence model remained RMSEA=.152, and the CFI and TLI indices were .71 and .69 respectively, comparatively lower than the 5-factor indices for CFI and TLI. The 1-factor RMSEA of .09 falls above the commonly accepted .08 and was slightly higher than the 5-factor RMSEA of .08. Additionally, a chi-square difference test between the 1-factor and 5-factor models found a $\Delta\ \chi^2(10) = 288.27$, $p<.05$, indicating that the 5-factor model had a better fit to the data.

Similar to the first two examined models, the second order general factor model was also rejected for absolute fit, with $\chi^2(400) = 1380.52$, $p<.001$. As reported in Table 3, the general factor model produced the same fit indices results as the 5-factor model. The chi-square statistics differed slightly, but a chi-square difference test between the 5-factor and general factor was not significant, $\Delta\ \chi^2(5) = 7.24$, $p>.05$. This suggests there was no statistically significant improvements to model fit from a general factor accounting for the variance in the 5 latent factors to the 5-factor with no higher order factor. This is not completely unexpected, particularly given the conceptual overlap and correlations between the subscales.

Table 3.

Fit statistics for the three a priori models—Focal Study 1

Fit Statistics for CFA						
Models	χ^2	df	CFI	TLI	RMSEA	SRMR
5-Factor	1373.28^{***}	395	.77	.75	.08	.07
1-Factor	1661.55^{***}	405	.71	.69	.09	.07
General Factor	1380.52^{***}	400	.77	.75	.08	.07

Note: n=429; χ^2 = chi square goodness of fit statistic; df = degrees of freedom; CFI= Comparative Fit Index; TLI= Tucker Lewis Index; RMSEA= Root Mean Square Error of Approximation; SRMR= Standard Square Root Mean Residual. *** Indicates χ^2 is statistically significant at $p<.001$.

Exploratory Models. The results from the confirmatory factor analyses on the a priori models were promising, but demonstrated there was room for improvement. For this reason, additional exploratory research was conducted in order to gain further insights to assist future research. First, principle component analyses (PCA) and exploratory factor analyses (EFA) were conducted on the focal study 1 data in the same manner utilized for the pilot studies, in order to determine if the data maintained a similar structure as observed in the pilot studies.

The PCA and EFA (n=429; 30-item HEFS) produced slightly different results than observed in the pilot study analyses. The PCA produced fewer components (i.e., 7 versus 10), with factors 1 through 5 accounting for 50.83% of the total variance (i.e., ≈ 6% less variance), (Table A16). Additionally, the scree plot appeared to flatten considerably after three factors and demonstrate another slight drop after factor 4 (Figure B3), whereas the scree plots from the pilot studies appeared to better account for the five factors.

Next, the EFA utilizing principal axis factoring with oblique rotation (i.e., Promax), given the significant correlations between factors with several items, also deviated from the results from the EFA for the pilot study. Specifically, the observed loadings did not match the observed loadings from the pilot study data. The 30-items from the pilot study data all loaded on the intended factors, despite three items demonstrating cross-loadings >.30 (Table A10). However, the 30-items from the focal study 1 data resulting in main loadings on at least two different factors for each intended construct; four items also demonstrated cross-loadings (Table A17). Close inspection of the pattern matrix revealed unpredicted, but discernable patterns. These patterns and the potential for an alternative model will be discussed further below.

The totality of evidence from item analyses through the EFA suggests the data from the focal study 1 is behaving differently than the pilot study data. The populations were known beforehand to be quite different, with the focal study 1 population being particularly range restricted (i.e., homogeneous). Therefore, three additional models were explored using CFA in the same manner as the a priori models to provide further insights: 1.) A reduced (i.e., modified) 5-factor using modification indexes from the a priori 5-factor model (Figure B7); 2.) The proposed 5-factor utilizing two testlets per factor (Figure B8); and 3.) An exploratory 5-factor model based on how the items loaded in this study (i.e., alternative constructs) (Figure B8). Fit statistics for all models are provided in Table 4.

The first exploratory model evaluated was the modified 5-factor model. This model simply explored the effects of removing ‘problem’ items from the original 30-item 5-factor model. The intent was to explore whether or not removal of certain items would improve the model in order to provide insights for future development, implications of this reduction are covered in the discussion chapter. The modified 5-factor was also rejected in regards to chi-square, $\chi^2(160) = 417.59$, $p<.001$. The CFI and TLI demonstrated improved indices at .90 and .89, respectively, but still failed to meet the $\geq .95$ cutoff. However, the RMSEA and SRMR were .06 and .05, suggestive of good fit utilizing Hu and Bentler’s (1999) two-index strategy. Not surprisingly, the chi-square difference test between the original 5-factor and the modified 5-factor models was significant, $\Delta\ \chi^2(235) = 955.69$, $p<.001$; indicating that the modified 5-factor was an improvement in regards to fit from the original 5-factor.

Another, technique utilized to examine the 5-factor model was the use of two testlets per latent construct, i.e., testlet 5-factor. Testlets for each of the subscales consisted of two to four items each, as determined by extracting two components using PCA with oblique rotation and attempting to keep the loadings similar for each testlet. Thompson and Melancon (1996) explain testlets or parcels in SEM as groups of items representing a content area and represented as a singular unit (e.g., like items combined to represent a singular observed variable, Figure B8). The testlet 5-factor model failed to fit with a $\chi^2(25) = 164.70$, $p<.001$. The CFI was reasonable at .92, but failed to meet the .95 cutoff and the TLI remained slightly lower at .85. The RMSEA indicated poor fit at .11, but the SRMR was indicative of a good fit at .05. Given the mixed evidence of fit, I utilized Hu and Bentler's (1999) recommended two-index presentation strategy suggesting a combination of CFI ≥ .96 and SRMR ≤ .09 as a cutoff for good fit. The model failed to meet the recommended combination parameters, so acceptance 'as is' elevates risks to Type I and II errors. Taken together, the testlet 5-factor model was rejected by χ^2, but when considering CFI and SRMR in combination the model demonstrated mediocre fit comparable to the a priori 5-factor model.

Lastly, an exploratory 5-factor model was constructed based on review of the items and insights gleaned from the EFA. Close inspection of the items in the EFA and the modification indices of the CFA for the original 30-item 5-factor model suggest that the subscales may not be measuring the 'attitudes toward' a specific construct within HAVUC (e.g., the hostility subscale is supposed to measure a person's attitude toward hostility). Instead, preliminary review suggests there may still be five factors, but they may be: *comfort*, *frustration*, *self-efficacy*, *competitiveness*, and *projection*. Obviously, none of these are definite, as these constructs were not addressed in the proposed theory and are strictly exploratory. This topic is addressed further in the discussion chapter.

In short, all 30-items were retained and reorganized to load onto the 'new' constructs: comfort (9-items, α=.85); self-efficacy (9-items, α=.81); frustration (6-items, α=.79); competitiveness (3-items, α=.76); and 'projection' (3-items, α=.62), (Figure B9). Of course, this was an initial review, but 'projection' is least obvious; I simply chose the word based on the fact that two of the items appeared extreme and possibly reflected how a person may think other people feel (e.g., "No one likes ambiguity."). The exploratory 5-factor also failed to pass the chi-square test, $\chi^2(395) = 1091.83$, $p<.001$. The independence model for this analysis also had an RMSEA <.152, which tends to attenuate the CFI/TLI indices, although the CFI and TLI improved (i.e., .84 and .82 respectively) from the original organization of the 30-items. The RMSEA of .06 and SRMR of .06 were also slight improvements and suggest good fit to the data utilizing Hu and Bentler's (1999) two-index strategy (i.e., good fit ~ RMSEA $\leq$ .06 and SRMR $\leq$ .09). Despite the good fit of the exploratory model and improvement over the a priori 5-factor model, the modified a priori 5-factor demonstrated slightly better fit indices than both the a priori and exploratory 5-factor models. Suggesting the original theory-based 5-factor model should be retained for further development.

Table 4.

Fit statistics for the six examined models—Focal Study 1

Fit Statistics for CFA						
Models	χ^2	df	CFI	TLI	RMSEA	SRMR
5-Factor	1373.28***	395	.77	.75	.08	.07
1-Factor	1661.55***	405	.71	.69	.09	.07
General Factor	1380.52***	400	.77	.75	.08	.07
Modified 5-Factor	417.59***	160	.90	.89	.06	.05
Testlet 5-Factor	164.70***	25	.92	.85	.11	.05
Exploratory 5-Factor	1091.83***	395	.84	.82	.06	.06

Note: n=429; χ^2 = chi square goodness of fit statistic; df = degrees of freedom; CFI= Comparative Fit Index; TLI= Tucker Lewis Index; RMSEA= Root Mean Square Error of Approximation; SRMR= Standard Square Root Mean Residual. *** Indicates χ^2 is statistically significant at *p*<.001.

All models tested failed the chi-square goodness of fit test. However, the three a priori models (i.e., 5-factor, 1-factor, and higher order general factor) provided relevant inferences about the constructs of the new instrument. There is sufficient evidence for five factors, although there may be a general factor that influences them. Reasonable fit indices (particularly RMSEA and SRMR) indicate the developed items and structure may require improvement, but can serve as a basis of knowledge moving forward. The next section addresses hypothesis testing utilizing the a priori 5-factor model.

Hypothesis Testing—H1 through H24 (Construct).

AMOS was used to construct structural equation models in order to test the partial nomological networks for each of the subscales, observed variables were used for all testing. Additionally, SPSS was utilized to produce a bivariate correlation table of all HEFS subscales and their relationships with the nine correlates and was used to draw inferences supporting or denying convergent and discriminant validity, Table 5. The Pearson correlations from the correlation table and the standardized regression weights found on the partial nomological network (i.e., figures for the subscales and the HEFS) may vary slightly, but match in patterns and significance. The hypotheses are discussed in subscale order, followed by the hypotheses associated with the summated HEFS.

Table 5.

Correlation Table for HEFS, Subscales, & Related Measures

	HEFS Subscales					
Related Measures	**H** α=.75	**A** α=.72	**V** α=.66	**U** α=.76	**C** α=.77	**HEFS** α=.91
RPS (n=203; α=.74)	H1(+) .32**	H4(+) .35**	.29**	H10(+) .42**	.21**	H16 (+) .40**
BSSS (n=203; α=.77)	H2(+) .30**	.32**	.24**	.21**	.20**	H17(+) .31**
RDMS (n=429)	H3(-)	H6(-)	H9(-)	H12(-)	H14(+)	H18(ns)
Rational/Intuitive[1] (α=.59)	-.19**	.03	-.02	-.10*	.04	-.07
Rational ONLY (α=.75)	.15**	.21**	.27**	.10*	.35**	.26**
Intuitive ONLY[2] (α=.73)	.33**	0.12*	.23**	.19*	.23**	.28**
NFCS (n=225; α=.85)	.23**	.47**	.37**	.34**	H13(+) .54**	H19(+) .50**
MSTAT-I (n=201; α=.89)	.58**	H5(+) .67**	.59**	.68**	.68**	H20(+) .78**
RTC (n=225; α=.81)	-.17*	-.39**	H7(-) -.62**	-.47**	-.44**	H21(-) -.53**
LOC-I (n=225; α=.68)	.21**	.19**	H8(+) .24**	.13	.26**	H22(+) .26**
IUS (n=201; α=.77)	-.37**	-.39**	-.47**	H11(-) -.56**	-.41**	H23(-) -.54**
DAPS (n=225; α=.84)	-.18**	-.26**	-.27**	-.39**	H15(-) -.40**	H24(-) -.39**

[1] The rational/intuitive measure combined the 5-items from each, but reverse coded the intuitive items; [2] The intuitive only are NOT reversed when examined independently; α=Cronbach's alpha; n=size; *p<.05 (2-tailed); **p<.01 (2-tailed); H=the hypothesis #, inside the parentheses is the hypothesized relationship; RPS=risk propensity scale; BSSS=brief sensation seeking scale; RDMS=rational decision making scale; NFCS=need for cognition scale; MSTAT-I=multiple stimulus types ambiguity test (tolerance of ambiguity measure); RTC=resistance to change scale; LOC-I=internal locus of control scale; IUS=intolerance for uncertainty scale; DAPS=diffuse-avoid processing style scale.

Hostility subscale. The hypotheses for the hostility subscale, H1 through H3, listed below were all supported, Figure 9. The hostility subscale was positively related to risk-propensity and sensation seeking, while negatively related to rational decision-making[1].

> *Hypothesis 1 (Supported)*: The hostility subscale will demonstrate a statistically significant positive relationship with a measure of risk propensity.

> *Hypothesis 2 (Supported)*: The hostility subscale will demonstrate a statistically significant positive relationship with a measure of sensation seeking.

> *Hypothesis 3 (Supported)*: The hostility subscale will demonstrate a statistically significant negative relationship with a measure of rational decision-making style.

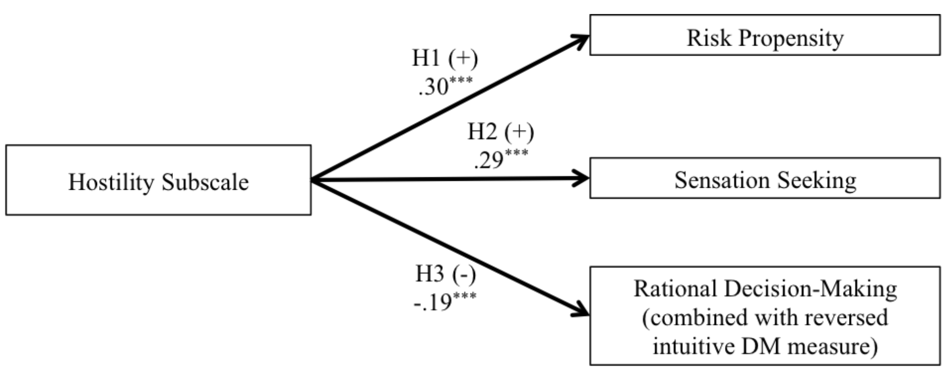

Figure 9. Hypotheses 1 through 3: Hostility & Related Constructs.

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[1] It is important to highlight some nuisances with the rational decision-making style measure: 1.) The composite RDMS demonstrated poor reliability (α=.59) as discussed previously (i.e., combining the 5-items for rational and reverse coding the 5-items for intuitive), and 2.) As highlighted in Table 5, when the rational and intuitive decision-making items are separated and coded normally, they both correlate positively with each subscale and the summated HEFS.

Ambiguity subscale. The ambiguity subscale was also positively related to risk propensity, supporting H4, Figure 10. Additionally, the ambiguity subscale was positively related to tolerance for ambiguity, but so high as to duplicate the existing measure, supporting H5. However, the ambiguity subscale demonstrated a non-significant relationship with the rational decision-making measure; although close to zero, it was actually in the positive direction. Closer inspection of the correlations in Table 5 indicate the ambiguity subscale correlates more positively with the separate measure of rational decision-making than the separate measure of intuitive decision-making, H6 was not supported.

> *Hypothesis 4 (Supported)*: The ambiguity subscale will demonstrate a statistically significant positive relationship with a measure of risk propensity.
>
> *Hypothesis 5 (Supported)*: The ambiguity subscale will demonstrate a statistically significant positive relationship with a measure of tolerance for ambiguity.
>
> *Hypothesis 6 (Not Supported)*: The ambiguity subscale will demonstrate a statistically significant negative relationship with a measure of rational decision-making style.

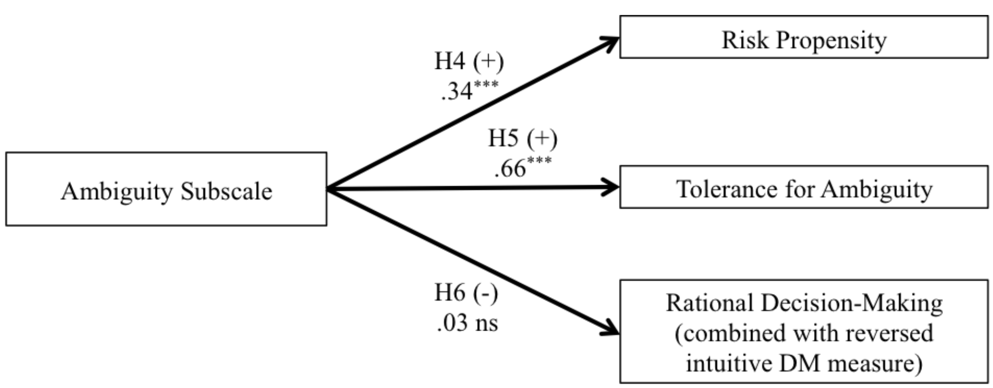


Figure 10. Hypotheses 4 through 6: Ambiguity & Related Constructs.

Volatility subscale. The volatility subscale demonstrated statistically significant negative and positive relationships with the resistance to change and internal locus of control measures, respectively. The observed relationships, Figure 11, provide support for hypotheses 7 and 8. However, the volatility subscale demonstrated a negative relationship, but was negligible and non-significant, r=-.01, ns. Additionally, a review of the correlations in Table 5, reveals that the volatility subscale had a slightly larger correlation with the 'pure' rational DM measure than the 'pure' intuitive DM measure, the inferences failed to support H9.

> *Hypothesis 7 (Supported)*: The volatility subscale will demonstrate a statistically significant negative relationship with a measure of resistance to change.
>
> *Hypothesis 8 (Supported)*: The volatility subscale will demonstrate a statistically significant positive relationship with a measure of internal locus of control.
>
> *Hypothesis 9 (Not Supported)*: The volatility subscale will demonstrate a statistically significant negative relationship with a measure of rational decision-making style.

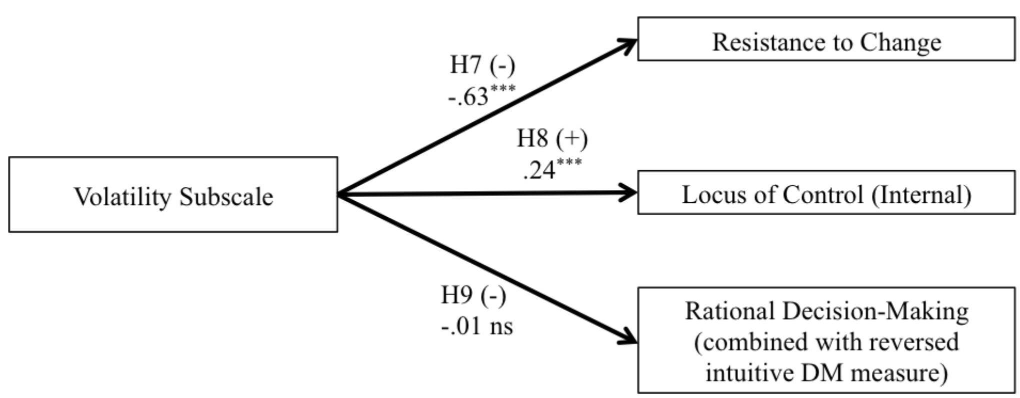


Figure 11. Hypotheses 7 through 9: Volatility & Related Constructs.

Uncertainty subscale. Hypotheses 10 through 12 for the uncertainty subscale were all supported, Figure 12. The uncertainty subscale was positively related to the risk propensity scale and negatively related to intolerance of uncertainty. Like the hostility subscale, uncertainty demonstrated a statistically significant negative relationship with the composite measure of rational DM style. A review of correlations in Table 5 also reveals that the uncertainty subscale was correlated more strongly with the 'pure' intuitive DM measure (although at a smaller magnitude than the hostility subscale demonstrated), providing additional support for H12.

> *Hypothesis 10 (Supported)*: The uncertainty subscale will demonstrate a statistically significant positive relationship with a measure of risk propensity.
>
> *Hypothesis 11 (Supported)*: The uncertainty subscale will demonstrate a statistically significant negative relationship with a measure of intolerance of uncertainty.
>
> *Hypothesis 12 (Supported)*: The uncertainty subscale will demonstrate a statistically significant negative relationship with a measure of rational decision-making style.

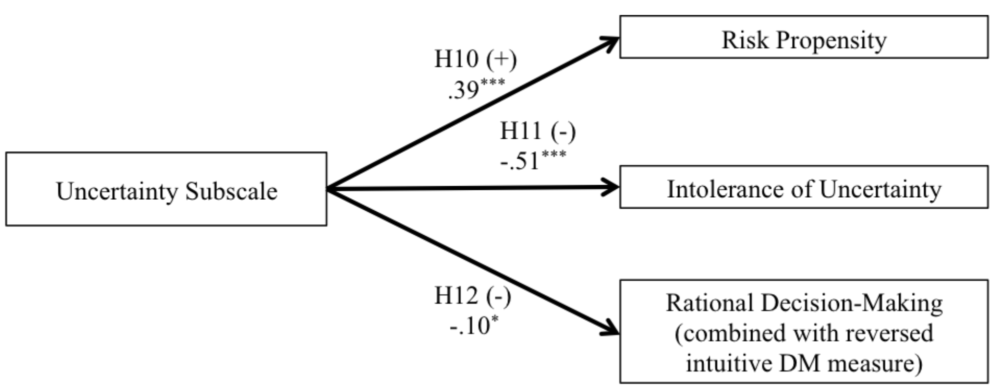


Figure 12. Hypotheses 10 through 12: Uncertainty & Related Constructs.

Complexity subscale. The complexity subscale was positively related to the need for cognition measure, but did not correlate so high as to indicate duplication, supporting H13, Figure 13. However, the complexity subscale failed to demonstrate statistical significance with the composite measure of rational decision-making. Similar to the discussion of the hostility subscale, the complexity subscale did demonstrate the highest correlation of all the HEFS subscales with a pure measure of rational DM and a noticeably lower correlation with the intuitive DM measure, Table 5. The correlations suggest hostility is the highest on intuitive DM and complexity is the highest on rational DM, this provides partial support for H14. Lastly, the complexity subscale was negatively related to the diffuse-avoid processing style measure, supporting H15.

> *Hypothesis 13 (Supported)*: The complexity subscale will demonstrate a statistically significant positive relationship with a measure of need for cognition.
>
> *Hypothesis 14 (Partial Support)*: The complexity subscale will demonstrate a statistically significant positive relationship with a measure of rational decision-making style.
>
> *Hypothesis 15 (Supported)*: The complexity subscale will demonstrate a statistically significant negative relationship with a measure of diffuse-avoidant processing style.

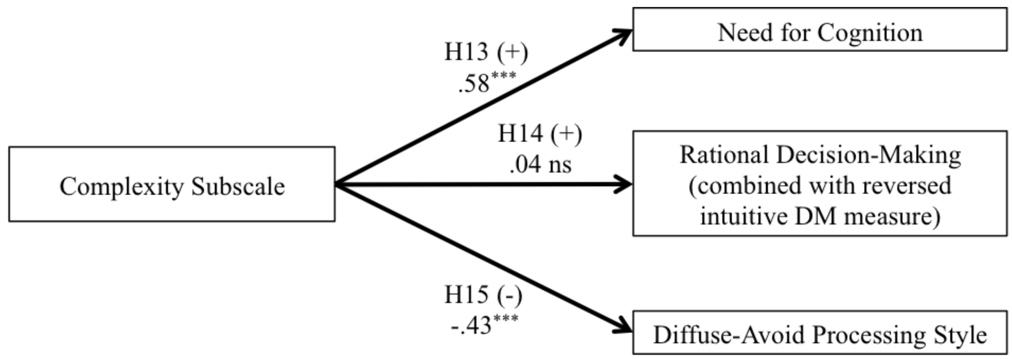


Figure 13. Hypotheses 13 through 15: Complexity & Related Constructs.

Summated HEFS. Next, hypotheses 16 through 24 were examined in the same manner as the individual subscales, only this time examining the relationships between the nine correlated measures and the summated HEFS. Hypotheses 16 through 24 were all supported, Figure 14. Although the HEFS demonstrated a high correlation and standardized regression weight (i.e., r=.78 and β=.75, Table 5 and Figure 14 respectively) with the tolerance of ambiguity measure (H20), implications are covered in the discussion chapter.

> *Hypothesis 16 (Supported)*: The HEFS will demonstrate a statistically significant positive relationship with a measure of risk propensity.
>
> *Hypothesis 17 (Supported)*: The HEFS will demonstrate a statistically significant positive relationship with a measure of sensation seeking.
>
> *Hypothesis 18 (Supported)*: The HEFS will not demonstrate a statistically significant relationship with a measure of rational decision-making style.
>
> *Hypothesis 19 (Supported)*: The HEFS will demonstrate a statistically significant positive relationship with a measure of need for cognition (NFC).
>
> *Hypothesis 20 (Supported)*: The HEFS will demonstrate a statistically significant positive relationship with a measure of tolerance for ambiguity.

Hypothesis 21 (Supported): The HEFS will demonstrate a statistically significant negative relationship with a measure of resistance to change.

Hypothesis 22 (Supported): The HEFS will demonstrate a statistically significant positive relationship with a measure of internal locus of control.

Hypothesis 23 (Supported): The HEFS will demonstrate a statistically significant negative relationship with a measure of intolerance of uncertainty.

Hypothesis 24 (Supported): The HEFS will demonstrate a statistically significant negative relationship with a measure of diffuse-avoidant processing style.

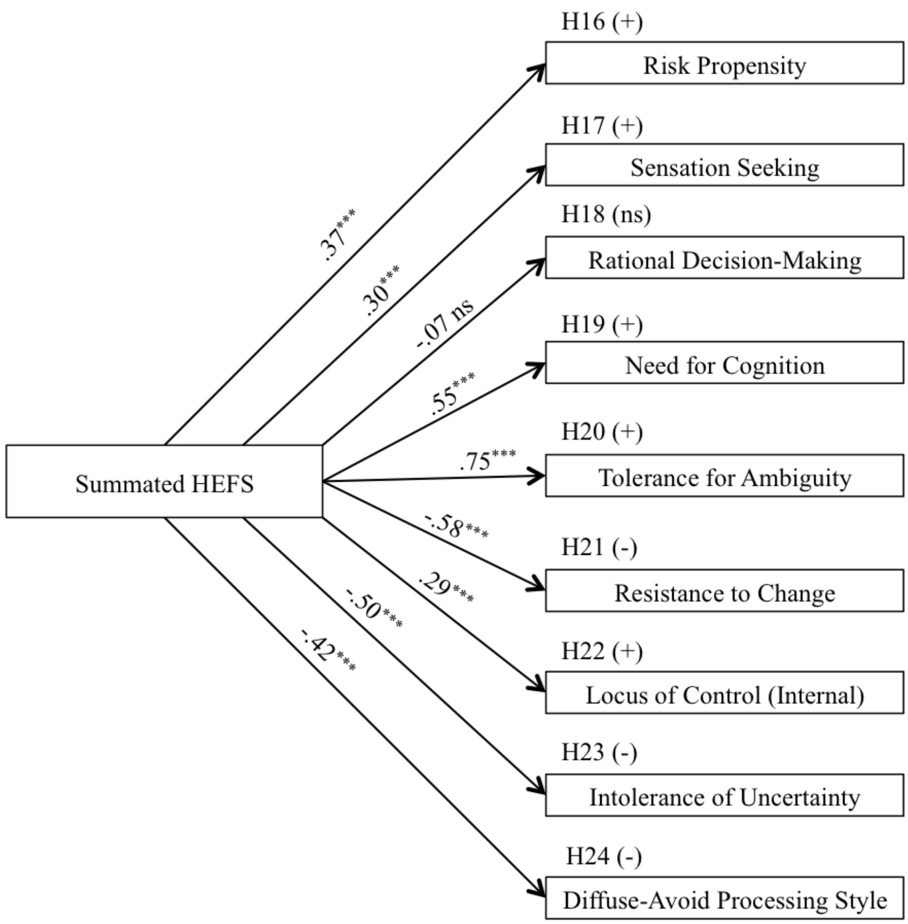


Figure 14. Hypotheses 16 through 24: HEFS & Related Constructs.

Focal Study 2 Results—Criterion Validity Evidence

Data Screening and Reliabilities.

The same screening procedures utilized for focal study 1 were utilized for the focal study 2 data; 30-item HEFS, n=348. The results were generally the same, with a few exceptions. No outliers were identified for removal and all 30 items were negatively skewed versus 28 items in focal study 1. Focal study 2 also had five items that exceeded +/- 2 kurtosis; two of the five items were common to both studies, V3 and V8. After removing cases for insufficient responding or failed attention checks, there were only three instances of missing data. Missing data points were replaced with the mean of the other responses on that particular scale or subscale.

Item analyses were conducted on the focal study 2 dataset (n=348) for the 30-items resulted in increased internal reliabilities and mean inter-item correlations in relation to the focal study 1 data on the same items (30-items, Appendix D). Except in the case of the hostility subscale, where both the reliability and the mean inter-item correlations dropped slightly. The Cronbach's α for the volatility subscale did improve slightly, but remained marginally acceptable. Internal reliabilities and mean inter-item correlations (i.e., Cronbach's alpha (α) and r) are as follows: HEFS, α=.91, r=.27; hostility subscale, α=.69, r=.29; ambiguity subscale, α=.79, r=.38; volatility subscale, α=.68, r=.30; uncertainty subscale, α=.79, r=.40; and complexity subscale, α=.81, r=.43.

Corrected item-total correlations for the 30 items remained > .30 for each of the subscales, although item #18 (i.e., V18) was again identified as a prospect for removal or revision moving forward in future research. In this study the item-total correlation for V18 was acceptable at .33, but indicated a minor increase in reliability (α) if removed (i.e., .68 to .69). The focal study 2 item, subscale, and scale descriptive statistics are located in Table A19.

Examination of Structure.

Correlations between the subscales were reexamined to provide evidence the subscales were measuring separate constructs. The average correlation between the five subscales was $r=.51$, $p<.01$ (Table A20) which was similar to the observed $r=.54$, $p<.01$ (Table A15) in focal study 1. The correlation patterns were similar to the focal study 1 results, although with this population volatility, uncertainty, and complexity ranged between $r=.62$ and .67, up from the highest observed correlation of $r=.63$ for focal study 1. The subscales show some distinctiveness, but still demonstrate considerable overlap and subscale correlations are approaching reliability levels in regards to volatility.

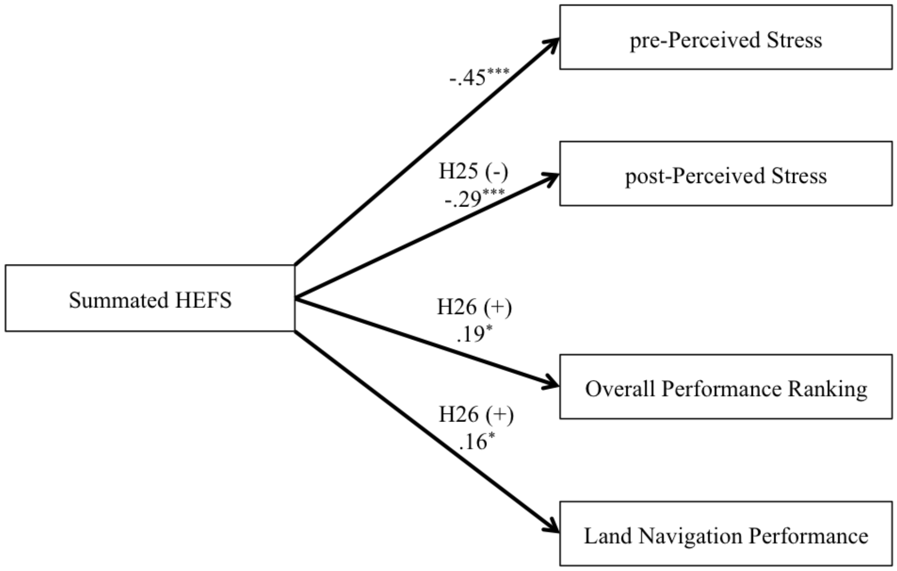
As a final analysis before proceeding to hypothesis testing to garner criterion related evidence a CFA on the focal study 2 data was conducted. The CFA was conducted in the same manner as focal study 1, although only the proposed 5-factor model was examined. Comparison of the 5-factor model between the focal study 1 and 2 data indicated the model fit the focal study 2 data slightly better, $\Delta\,\chi^2(0) = 165.38$. Fit statistics for the 5-factor focal study 2 data were: $\chi^2 = 1207.90$ (395), p <.001; CFI=.79; TLI=.77; RMSEA=.08; and SRMR=.08. Failing to pass the χ^2 test and the two-index good-fit cutoff suggested by Hu and Bentler (1999) in regards to RMSEA and SRMR (i.e., RMSEA ≤ .06 and SRMR ≤ .09). Suggestive of a mediocre model fit.

Hypothesis Testing—H25 through H26 (Criterion).

The same procedures were used in focal study 2 to test hypotheses, as were used in focal study 1. Structural equation models utilized observed variables and the standardized regression weights are illustrated. Both criterion related hypotheses (H25 and H26) listed below were supported, Figure 15. The HEFS related negatively with the perceived stress outcome measure (i.e., post-test) and was positively related to an overall performance measure, as well as a relatively short—in context performance measure.

Hypothesis 25 (Supported): The HEFS will demonstrate a statistically significant negative relationship with stress outcome measures.

Hypothesis 26 (Supported): The HEFS will demonstrate a statistically significant positive relationship with performance outcome measures.



Note: *p<.05; ***p<.001

Figure 15. Hypotheses 25 & 26: Stress & Performance Criterion.

The subscales demonstrated relationships with the criterion measures as well, illustrated in Table 6. All five subscales demonstrated a statistically significant negative relationship to both pre- and post- perceived stress measures. However, only the uncertainty and complexity subscales demonstrated statistically significant relationships with overall performance. Interestingly, the ambiguity and complexity were the only subscales to demonstrate a statistically significant positive relationship with land navigation performance—the event does pose significant challenges, particularly to participants that do not have much experience in the woods. Additionally, SEM was utilized to explore the subscale relationships with the four criterion measures further. Observed variables were used and the subscales were allowed to covary. Only three subscales demonstrated significant standardized regression coefficients (β): ASS→Land Navigation, $\beta=.20$, $p<.05$;

VSS→preStress, β= -.23, p<.001; VSS→postStress, β= -.26, p<.001; and CSS→preStress, β= -.23, p<.05. The abbreviations used are located in the notes of Table 6 if needed.

Table 6.

HEFS, Subscale, & Criterion Correlation Matrix

Measures	1	2	3	4	5	6	7	8	9	
1 HEFS	1.00									
2 HSS	$.66^{**}$	1.00								
3 ASS	$.76^{**}$	$.38^{**}$	1.00							
4 VSS	$.80^{**}$	$.43^{**}$	$.47^{**}$	1.00						
5 USS	$.81^{**}$	$.32^{**}$	$.49^{**}$	$.62^{**}$	1.00					
6 CSS	$.86^{**}$	$.47^{**}$	$.58^{**}$	$.64^{**}$	$.67^{**}$	1.00				
7 preStress	$-.45^{**}$	$-.23^{**}$	$-.27^{**}$	$-.43^{**}$	$-.39^{**}$	$-.43^{**}$	1.00			
8 postStress	$-.29^{**}$	$-.14^{*}$	$-.18^{**}$	$-.32^{**}$	$-.25^{**}$	$-.26^{**}$	$.41^{**}$	1.00		
9 P-Rank	$.19^{*}$	.06	.10	.14	$.20^{*}$	$.22^{**}$	$-.28^{**}$	$-.18^{*}$	1.00	
10 L-Nav	$.16^{*}$	.10	$.20^{**}$	.08	.09	$.15^{*}$	-.08	.09	$-.40^{**}$	1

Note: n=348; *p<.05; **p<.01 (2-tailed); HSS=hostility subscale, same pattern for remainder; preStress=the pre-Perceived Stress score; postStress=post-Perceived Stress score; P-Rank=Overall Performance Ranking; L-Nav=land navigation performance.

Lastly, predicting stress and performance outcomes is fundamental, but whether or not scores on the HEFS differentiated between groups of people within the performance context is another. Given the population this study was conducted with, additional exploratory analyses were performed by first coding the participants by their status in the assessment course: 1.) Selected for further training; 2.) Completed but not selected, reasons vary; 3.) Dropped for medical reasons; 4.) Involuntary withdraw, fail to meet a particular gate and are released from the course; 5.) Voluntary withdraw, remove themselves from the course—

quit; and 6.) Failure to meet standard to enter the assessment course, e.g., show up to the assessment course and fail to meet the minimum physical assessment. The initial analysis of variance (ANOVA) provides inferences that there are statistically significant mean differences between the groups. The most obvious and substantial difference was that of the selected group (1) and the group that failed to meet the standard to enter the assessment course (6).

Both the HEFS and the subscales provided evidence for criterion validity. The subscales relate to the various criterion measures differentially, providing additional evidence of discriminant validity.

Chapter 5: Discussion

Conventional wisdom suggests the current operating environment is turbulent and may continue to become even more chaotic in the future. Organizations of all types, as well as the individuals working within these organizations, must deal with some degree of ubiquitous turbulence (e.g., Hoehn et al., 2017; WEF, 2016; Camps, Oltra, Aldás-Manzano, Buenaventura-Vera, & Torres-Carballo, 2016). The purpose of this study was to develop and evaluate an attitude scale aimed at determining individuals' attitudes toward the elements of HAVUC (hostility, ambiguity, volatility, uncertainty, and complexity), as the HAVUC conceptual framework parsimoniously captures five fundamental constructs influencing the current operating environment. The study proposed that individuals' attitudes toward the elements of HAVUC would provide an indicator of person-environment (PE) fit and subsequently provide insights into PE interactions and the related outcome measures of stress and performance. Thus, the HAVUC Environment Fitness Scale (HEFS) was developed and evaluated; consisting of five separate subscales (i.e., one for each element of HAVUC).

This chapter provides a summary of the results, moving from scale development through the initial pilot studies and into construct and criterion validity evidence. Next, implications of the results are discussed and are followed by limitations and recommendations for future research. Lastly, a short conclusion is provided.

Summary

Following a thorough review of the literature utilizing HAVUC as a conceptual framework, 100 items were initially developed which allowed for 20 items per subscale. A panel of five subject matter experts was utilized to assist with revisions to the items. Once consensus was achieved, the initial items were subjected to a series of pilot studies, using participants from Amazon's Mechanical Turk (MTurk), to enable item analyses, item reduction, and an initial check for the proposed 5-factor structure. The results of the pilot studies produced a 30-item scale, 6-items per subscale, with good internal consistency reliabilities (i.e., the scale/subscales all had $\alpha>.80$, Table A11), with an average correlation between the subscales at $r=.52$, $p<.01$ (Table A12). Additionally, the initial exploratory factor analysis (EFA) using an oblique rotation (i.e., Promax) indicated the items for the proposed 5-factors were generally loading as developed; although three items displayed cross-loadings $>.30$ on one other factor (Table A10).

The 30-items resulting from the pilot studies were then utilized to conduct focal studies 1 and 2, concurrently. Focal study 1 was designed to garner inferences for construct validity evidence. All subscale reliabilities remained above $\alpha>.70$, with the exception of the volatility subscale $\alpha=.66$ (Table A14). The confirmatory factor analyses (CFA) conducted on the three a priori models (Figure B4 thru B6) provided evidence for a 5-factor solution (Table 3). While the proposed 5-factor solution fit the data much better than a 1-factor solution, the data suggested that there may be a higher order general factor accounting for variance within the subscales (Table 3).

Following the CFA on the three a priori models, further exploratory research was conducted by conducting an EFA on the focal study 1 data. Results from the EFA, following the same procedures used with the pilot studies, helped shed some light on the difference in reliabilities, as the results of the EFA were notably different than the observations in the pilot studies. Specifically, some items had different loading patterns (Table A17), which may have influenced internal consistency. CFAs were conducted on the three modified models that were created based on observations from the EFA and modification indices from the initial 5-factor (Figures B7 thru B9).

The further exploration indicated that model fit of the proposed 5-factor model could be improved with removal of items (Table 4). However, given the departure in observations between the pilot study and focal study datasets and the potential of reducing construct coverage, the decision was made to continue analyses without changing the proposed 5-factor model. Lastly, based on how the items loaded during focal study 1, it appeared there were observable response biases based on the item stems (e.g., comfortable, frustrated, etc.) that resulted in the measurement scale measuring constructs not intended (Figure B9).

Despite these differences, a priori analyses were conducted as originally proposed. Convergent and discriminant validity evidence was garnered through hypotheses testing of the proposed nomological network, providing additional inferences of construct validity evidence. Of the 24 hypotheses involving the nomological network, 21 were supported. The three remaining hypotheses all revolved around the rational decision-making style measure; two were unsupported and one was partially supported based on the totality of evidence (Table 5). The relationships of the subscales and the proposed nomological network provided evidence of both convergent and discriminant validity, as the subscales were differentially related to various correlate measures.

Focal study 2, which was conducted on a separate population concurrently with focal study 1, also utilized the 30-item HEFS. The hypotheses for criterion related validity evidence were supported. The HEFS demonstrated a statistically significant relationship with outcome measures of stress and performance as predicted; i.e., higher scores on the HEFS related negatively with a self-report measure of perceived stress and positively with measures of performance (Figure 15). The subscales were also examined in regards to criterion outcomes; the results provided additional inferences of criterion validity evidence, as well as additional evidence of discriminant validity between the subscales (Table 6).

Implications

Structure of the HEFS.

I chose to start this program of research with the structure of the HEFS, because it has implications for development and evaluation. It was immediately apparent that the differing populations used for the pilot studies and focal studies impacted the structure of the measure. There are potentially numerous reasons for these findings, although the environment in which the population operates may have a plausible impact. Specifically, the MTurk population from the pilot studies likely represented a more occupationally and demographically diverse population than did the focal study population. Research with the Soldiers in this training environment is frequent, and it is possible that the focal study population experienced some survey fatigue, which could be inferred given the failure rate on attention checks approaching ~20%. Additionally, given the focal study participants' training environment, social desirability may have impacted the results; e.g., answering favorably to 'comfort' and 'frustrated' related questions, despite being told the surveys were for research purposes only. It is equally plausible that there could be a real difference in the populations and how they interpret HAVUC related questions. Specifically, the focal study population tended to respond to keywords in the question stem, rather than the actual content of the question; e.g., "I am comfortable working in rapidly changing environments" and "I am comfortable working through novel and complex problems" tended to load together rather than load on volatility and complexity separately. It is conceivable that a more general population may takes more time to interpret the meaning of each item, whereas populations operating in 'high HAVUC' simply key on threats based on their perceived strengths or weaknesses. This possibility was discussed in chapter two and is suggested by Salas et al (2013), where individuals may simply evaluate stimuli as a challenge or a threat—thus failing to differentiate between the factors. In summary, Salas et al (2013) explains that the primary appraisal determines the extent of threat a particular event poses and the secondary appraisal determines if they have the resources necessary to address the threat. It could be that populations like the focal study simply evaluate the questions in regards to their comfort level and belief in their ability to overcome, regardless of item content.

I originally proposed that by clearly defining and developing items to tap the separate HAVUC factor that it would be possible to measure individuals' attitudes toward specific aspects of the environment and gain insights into the evaluation process. I still believe that it is possible; however, the results imply that individuals may respond differentially depending on the current environment they are operating in. The data revealed some evidence of this as the stakes increased, so did the mean scores on the HEFS and its subscales; e.g., focal study 1 scored higher than the pilot study population and in the highest stake environment, focal study 2 scored higher than focal study 1. While social desirability likely plays a role in mean scores regarding different stake environments, it seems plausible that the individuals drawn to high HAVUC environments may also appraise the items differently than a more 'general' population. These findings have potential implications for interpretation of the HEFS when deciding whether to use as an evaluation tool to assist with further training or as a potential screening tool to assess PE fit.

The item loadings in focal study 1 loaded in such a way to suggest a pattern demonstrating five different factors: *comfort*, *efficacy* (or potentially challenge), *frustration*, *competitiveness*, and *projection*. The comfort factor contained items from each of the a priori subscales and seemed to indicate how comfortable the individual feels in a 'HAVUC' environment. The efficacy factor seemed to indicate an individuals' belief in being successful in a turbulent environment. The preliminary name I chose for illustration purposes was efficacy, but 'challenge' is arguably equally deserving—as it seemed to tap whether an individual viewed the item as a challenge versus a threat. The efficacy factor had items from four of the five subscales, with the uncertainty subscale as the exception. Alternatively, the frustration factor contained six items and was made up primarily of uncertainty items; four of the six, with a volatility and complexity item rounding out the factor. The frustration factor seemed straightforward as well, indicating the perceived frustration level of an individual in a turbulent environment. Fourth was the competitiveness factor, which simply included the hostility subscale items pertaining to competition. The final factor, fifth, was termed projection. This was the least obvious and further research may find it unnecessary and/or uninformative. However, the projection factor consisted of three ambiguity subscale items, two of which potentially tap how a person feels other people perceive ambiguity or turbulence; e.g., "No one likes ambiguity" and "Ambiguity in a situation is ALWAYS bad". Interestingly the following lends some credibility to the potential of 'projection':

"Frenkel-Brunswik (1949) identified intolerance of ambiguity as a personality trait and emphasized its role in forming judgments of other people, identifying ambiguity intolerant people as *'those with a tendency to resort to black white solutions, to arrive at premature closure as to valuative aspects, often at the neglect of reality, and to seek unqualified and unambiguous over-all acceptance and rejection of other people'*", (McLain, Kefallonitis, & Armani, 2015).

I am not suggesting the attitudes toward HAVUC constructs be restructured, nor I am not offering the above-mentioned potential factors as well defined theory, although further exploration and theory refinement/development is needed, particularly in differing populations. Implications of the observed competitive factor, highlights an a priori challenge of developing items for the hostility subscale when hostility is likely a multidimensional construct. Future refinement of the HEFS will require careful attention for the hostility items in order to ensure construct coverage or an alternative measure specifically to measure the elements of hostility.

The exploratory 5-factor model is interesting and deserves consideration in future research. However, the theory derived, proposed 5-factor model exhibited additional promise for refinement as the modified 5-factor model demonstrated better fit statistics than the exploratory 5-factor and all other competing models. The improvement gained from modifying the 30-item, 5-factor model provides inferences that the theoretical underpinning remains valuable. This is promising, given the different population sets and environments utilized for the development and evaluation of the new measure. That said, I do not recommend proceeding with the modified 5-factor, as 10 items were removed and construct coverage was impacted. Most notably was the reduction of hostility down to the three competition items (i.e., altering the proposed hostility construct). Additionally, the volatility subscale reduced to four items appeared to have adequate construct coverage, but still suffered from a relatively low Cronbach's alpha, α=.65. In sum, more work is needed in item development and further studies are needed to refine and further validate the HEFS.

Lastly, there was evidence for the potential of a higher order general factor potentially accounting for the variance in the subscales for the focal study data. However, there was competing evidence that demonstrated the 5-factor model fit slightly better than the higher order general factor when utilizing the pilot study data (i.e., $\Delta \chi^2(5) = 17.45$, $p>.05$.). Taken together, I recommend the 5-factor model be retained for further development and research. Specifics on future research are covered later in the chapter.

Construct Validity Evidence.

As mentioned in the summary, 21 of the 24 hypotheses regarding the nomological network were supported. More importantly, the observed correlations in Table 5 demonstrate that the subscales relate to the various correlated measures differentially—providing initial evidence of both convergent and discriminate validity. However, not surprisingly given the conceptual overlap and inter-correlations between the subscales, all subscales demonstrated statistically significant correlations with all external measures. The differences in many cases are not large in magnitude; therefore, as refinement to the HEFS continues, careful attention should be given to these relationships to ensure the subscales continue to be differentiated.

In many cases a subscale that was not hypothesized to have a relationship with a correlated measure demonstrated a correlation > or ≈ the hypothesized relationship; albeit it was usually the hypothesized subscale and one other subscale. One exception to this was the resistance to change scale (RTC), where the volatility subscale was hypothesized and was correlated > .15 more than the next closest subscale. I view the relationships in Table 5 as encouraging, in that they provide further insights for theory refinement and to consider in measurement, selection of potential training interventions, and selection research. For example, ambiguity was not specifically hypothesized to relate to sensation seeking, although it correlated at roughly the same magnitude as the hostility subscale—this provides inferences that people with increased scores in hostility and ambiguity could also tend to seek sensations for better or for worse. Another pattern that seemed to develop was the relationships of the ambiguity and complexity subscales and external measures. Specifically, the ambiguity subscale was hypothesized to positively relate to a measure of internal locus of control (LOCI), while this prediction was supported, the complexity subscale correlated at roughly the same magnitude. At least two implications and inferences are plausible here: 1.) People with high scores on complexity may perceive they have the 'cognitive horsepower' to manipulate the environment; and 2.) Ambiguity and complexity are intrinsically linked as previous research has demonstrated complexity is a factor of ambiguity tolerance (e.g., Lauriola et al, 2016).

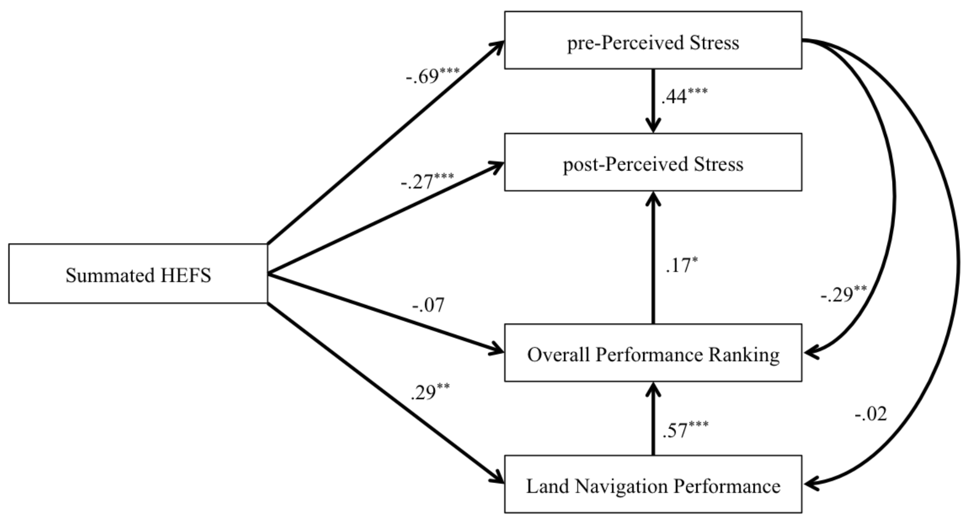
The discussion regarding ambiguity and complexity brings us to an important implication of this study. As observed in Table 5, the ambiguity, uncertainty, and complexity subscales all correlated with the multiple stimulus types ambiguity test (MSTAT-I) at $r \approx .68$, $p < .01$; relationship between MSTAT-I and the summated HEFS was $r = .78$, $p < .01$. This study highlights the importance of clearly defining the constructs to be measured, as well as the potential use of the measurement. This is by no means a fatal flaw on the MSTAT-I (McLain, 1993), as it is a reliable and validated measure. In fact, McLain, Kefallonitis, and Armani (2015) clearly distinguish ambiguity tolerance from ambiguity; offering that ambiguity is a perception and a function of information received, whereas ambiguity tolerance is an individual's tendency to react to perceived ambiguity with greater or lesser intensity. The MSTAT-I measure is transparent, as McLain (1993) defined ambiguity tolerance as, "a range, from rejection to attraction, of reactions to stimuli perceived as unfamiliar, complex, dynamically uncertain, or subject to multiple conflicting interpretations" (p. 184). The point is that researchers using tolerance of ambiguity measures need to understand the measure, as ambiguity tolerance is comprised of multiple factors. Depending on the how the measure is being utilized, this may be perfectly acceptable; however, measuring the individuals' attitudes toward the HAVUC factors may provide valuable insights that may be otherwise lost at the aggregate level, e.g., summated MSTAT-I or HEFS.

Lastly, in regards to construct validity implications, the relationships between the subscales and a measure of rational decision making (DM) style provided some interesting patterns (Table 5). As hypothesized, the hostility and uncertainty subscales suggested there was a preference for a more intuitive DM style. Although volatility was in the predicted direction, it was non-significant and when comparing the correlations with the separated rational and intuitive DM measures, rational DM was slightly higher (i.e., the two essentially cancelled out). Conversely, it was predicted that people scoring high on the complexity subscale would prefer a rational DM style; however, the observation was non-significant, but magnitudes of the rational and intuitive DM styles measured separately provided partial support for the hypothesis. Similar to the discussion of ambiguity and complexity displaying similar results with internal LOC, ambiguity followed a similar pattern with complexity when comparing rational DM style as well. The observations involving rational DM style and ambiguity ran counter to the prediction. It was predicted that individuals scoring high on the ambiguity subscale would prefer an intuitive DM style; instead, like complexity, individuals scoring high on the ambiguity subscale seemed to prefer a rational DM style. In all, the observations provided partial support for the theoretical argument, as it was predicted DM style would not matter overall when considered in the aggregate, i.e., the HEFS demonstrated a non-significant relationship with DM style. The implication here is for researchers and practitioners to not ‘bin’ employees and/or potential candidates based on a DM style, as DM style is just that--a style--not how the person will make decisions (e.g., Scott & Bruce, 1995; Klein, 2008).

Criterion Validity Evidence.

The two hypotheses involving criterion related validity evidence were supported, i.e., the HEFS demonstrated a statistically significant negative relationship with stress and positive relationship with performance (Figure 15 and Table 6). These results highlight the importance of broadening the criterion of interest beyond performance when examining the effects of individual differences on work related criterion. Performance helps organizations meet the bottom line, but stress plays a significant role in the overall equilibrium of workers and the organization. Examination of the results from this study reveals that the HEFS is actually a better predictor of stress (although, perceived self-report) than performance. However, to help explain the potential implication more thoroughly, an exploratory analysis was conducted utilizing SEM and modifying the model used for testing the criterion related hypotheses, i.e., Figure 15. The modified model (Figure 16) provides standardized regression weights and demonstrates how an individuals’ perceived stress (i.e., pre-assessment course) accounted for much of the variance in the overall performance, previously attributed to the HEFS in Figure

15. However, the HEFS still accounted for variance in the contextualized performance event (i.e., land navigation), above and beyond a person's perceived stress prior to the overall assessment and accounted for post-stress variance after considering the effects of overall performance and pre-stress, providing further criterion related evidence in support of the HEFS.



Note: *p<.05; **p<.01; ***p<.001

Figure 16. Exploration of the Stress & Performance Criterion.

In addition to the overall HEFS demonstrating inferences to support criterion related evidence, the subscales demonstrated differential relationships with both stress and performance (Table 6). The results section briefly discussed the composite SEM where all subscales were allowed to covary in order to observe the relationships with the criterion measures; recall, ambiguity displayed the only significant standardized regression coefficient with land navigation performance (β=.20) and the volatility and complexity subscales performed similarly in regards to the stress measures (i.e., complexity to pre stress, β=-.23; and volatility to pre and post stress, β=-.23 and -.26). In addition, exploratory regression analyses were performed by loading the HEFS first, followed by the subscales in 'HAVUC' order and then regressing stress and performance measures separately onto the set. In regards to performance, both overall and land navigation, the subscales failed to provide incremental validity evidence. Although, when regressing land navigation performance onto the set, the model in which ambiguity was introduced fell just shy of significance (i.e., p=.059). However, the subscales did provide incremental validity above the summated HEFS in regards to both pre and post stress; accounting for an additional ≈2 and 1% of the variance. These findings suggest use of the subscales for criterion related purposes may provide additional insights above what the summated HEFS provides. Additionally, use of the subscales may prove beneficial if trying to create stress and/or performance profiles for successful individuals in varying performance contexts.

There were numerous insights to highlight from the series of ANOVAs regarding the groups during selection; however, the main point is that the HEFS, as well as the subscales captured differences among the groups. These findings add to the criterion related validity evidence, as well as supporting the intent of the scale to provide an indication of person-environment fit. In addition to the series of ANOVAs, the means plots for the subscales and various groups also suggest a potential for performance profiling in various contexts. For example, in the current study the ANOVA did not suggest a statistical difference between the selected (1) and non-selected (2) participants; however, there was a visible decline on the means plots for the non-selected population in regards to the volatility and uncertainty subscales. In fact, the non-selected individuals had the lowest mean scores on these two subscales of all the groups. Could it be that volatility and uncertainty caused frustration that affected their ability to communicate within teams and thus, influenced their peer and instructor ratings, despite being able to complete the course? These preliminary observations suggest potential avenues for future research (e.g., individual/group differences, stress and performance profiling, etc.).

Limitations and Future Research

This study may have made some contribution to the literature; however, like most it also has some significant limitations. A significant strength of the study is that it provided a glimpse into the difficulty of cross-validating a measure across differing populations and/or organizations. Specifically, the pilot study population could be considered a 'normally diverse' sample, whereas the focal study population could be considered a very homogeneous and range restricted population training to operate in a uniquely challenging environment. However, this may be framed as a limitation to the study in that the population used for evaluation purposes was range restricted and further, demonstrated issues with normality of the data. This limitation may have impacted the inferences surrounding the CFA; therefore, I recommend further validation studies on the HEFS using a more diverse population across multiple contexts. In addition, further validation of the HEFS within a similar population used in the focal studies would also be beneficial. In the case of validation efforts within a similar population used in this study, it may be beneficial to consider revision of some of the items and/or adding items from the original item-pool to better determine how the items load in the restricted population.

This study could also benefit from longitudinal research to better understand the causality of the relationships, as well as the duration and strength as they relate to criterion outcomes of interest. Additionally, future research should consider the effects of training interventions to determine the stability of the individual differences. Lastly, additional measures should be considered for inclusion into the nomological network to provide a better understanding of how people's attitudes toward HAVUC influence related measures, both construct (e.g., positive and negative affect) and criterion (e.g., job satisfaction and/or engagement).

Another limitation of this study is the issue of response bias. All measures within the study, with the exception of the performance criterion, utilized a self-report Likert style measure. The study did mitigate this to some extent by administering the post-perceived measure at a different time than the original HEFS measure. However, much like applicants have been found to score higher on personality measures than incumbents (e.g., Birkeland, Manson, Kisamore, Brannick, & Smith, 2006), similar phenomena was observed with the HEFS when considering participants (i.e., applicants) in the assessment course scored higher than the 'incumbents' that were already in the advanced training course. Research suggests that applicants are likely to falsify answers in high-stakes assessments (e.g., Dilchert, Ones, Viswesvaran, & Dellar, 2006), and the criterion study population would certainly qualify as high-stakes. Future research, particularly in high-stakes environments, should consider techniques to test for response bias to include applicant faking behavior (e.g., inclusion of seemingly plausible, but bogus items—similar to Donovan, Dwight, & Schneider, 2008; within-subjects designs—Griffith, Chmielowski, & Yoshita, 2007; measure of affect as a control—Steelman, 1998).

Lastly, the HEFS was designed to measure an individual's attitudes toward the elements of HAVUC. Future research may also consider looking at differences between management/leadership and workers and how the differences may impact important individual and organizational level constructs, e.g., decision-making, engagement, leader-member exchange (LMX), turnover, etc. In addition to continuing validation efforts regarding the HEFS, future research should also consider individuals' perceptions of these environmental factors in context and how they relate to their attitudes.

Conclusion

Having thoroughly discussed the development and evaluation of the HAVUC Environment Fitness Scale, I submit that the HEFS requires further work before use in a high stakes screening or selection context. However, the proposed

5-factor measure provides sufficient validity evidence to garner additional research attention and contribute to the body of literature involving individual differences and person-environment fit. The structure of the HEFS should be retained for further research and development, as it provides a solid foundation to better understand the interaction of individuals and turbulent environments. Lastly, no dissertation would be complete without uttering four infamous words, "more research is needed."

References

Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude-behavior relation: Reasoned and automatic processes. *European review of social psychology*, *11*(1), 1-33.

Allen, D. (2011). Information behavior and decision making in time-constrained practice: A dual-processing perspective. *Journal of the American Society for Information Science and Technology, 62*(11), 2165-2181. doi:10.1002/asi.21601

Bareil, C. (2013). Two paradigms about resistance to change. *Organization Development Journal*, *31*(3), 59-71.

Bargh, J. A. (1988). Automatic information processing: Implications for communication and affect. *Communication, social cognition, and affect*, *9*, 37.

Bargh, J. A., & Pietromonaco, P. (1982). Automatic information processing and social perception: The influence of trait information presented outside of conscious awareness on impression formation. *Journal of personality and Social psychology*, *43*(3), 437.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, *51*(6), 1173.

Barrett, P. (2007). Structural equation modeling: Adjudging model fit. *Personality and Individual differences*, *42*(5), 815-824.

Bennett, N., & Lemoine, J.G. (2014). *What VUCA really means for you.* Retrieved from https://hbr.org/2014/01/what-vuca-really-means-for-you

Berzonsky, M. D. (1989). Identity style: Conceptualization and measurement. *Journal of adolescent research*, *4*(3), 268-282.

Berzonsky, M. D. (1990). Self-construction over the life-span: A process perspective on identity formation. *Advances in personal construct psychology*, *1*, 155-186.

Berzonsky, M. D. (1992). Identity Style Inventory - Revised Version [Database record]. Retrieved from PsycTESTS. doi: http://dx.doi.org/10.1037/t21352-000

Berzonsky, M. D. (2010). Cognitive Processes and Identity Formation: The Mediating Role of Identity Processing Style. *Psychologia Rozwojowa*, *15*(4), 13-27.

Berzonsky, M. D., & Sullivan, C. (1992). Social-cognitive aspects of identity style need for cognition, experiential openness, and introspection. *Journal of Adolescent Research*, *7*(2), 140-155.

Berzonsky, M. D., Soenens, B., Luyckx, K., Smits, I., Papini, D. R., & Goossens, L. (2013). Development and validation of the revised Identity Style Inventory (ISI-5): Factor structure, reliability, and validity. *Psychological assessment*, *25*(3), 893.

Berzonsky, M. D., Soenens, B., Luyckx, K., Smits, I., Papini, D. R., & Goossens, L. (2013). *Identity style inventory--version 5* doi:http://dx.doi.org.portal.lib.fit.edu/10.1037/t29546-000

Birkeland, S. A., Manson, T. M., Kisamore, J. L., Brannick, M. T., & Smith, M. A. (2006). A meta-analytic investigation of job applicant faking on personality measures. *International Journal of Selection and Assessment*, *14*(4), 317-335.

Birrell, J., Meares, K., Wilkinson, A., & Freeston, M. (2011). Toward a definition of intolerance of uncertainty: A review of factor analytical studies of the Intolerance of Uncertainty Scale. *Clinical Psychology Review*, *31*(7), 1198-1208.

Bollen, K. A. (1990). Overall fit in covariance structure models: Two types of sample size effects. *Psychological bulletin*, *107*(2), 256.

Bonabeau, E. (2002). Agent-based modeling: Methods and techniques for simulating human systems. *Proceedings of the National Academy of Sciences of the United States of America*, *99*(Suppl 3), 7280-7287.

Borman, W. C., & Motowidlo, S. M. (1993). Expanding the criterion domain to include elements of contextual performance. *Personnel Selection in Organizations; San Francisco: Jossey-Bass*, 71.

Bors, D. A., Gruman, J. A., & Shukla, S. (2010). Measuring tolerance of ambiguity: Item polarity, dimensionality, and criterion validity. *Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology*, *60*(4), 239-245.

Bowrin, A. R., & King, J. (2010). Time pressure, task complexity, and audit effectiveness. *Managerial auditing journal*, *25*(2), 160-181.

Bromiley, P. (1991). Testing a causal model of corporate risk taking and performance. *Academy of Management journal*, *34*(1), 37-59.

Brown, T. A. (2006). Confirmatory factor analysis for applied research.

Budner, S. (1962). Intolerance of ambiguity as a personality variable. *Journal of personality*.

Buhr, K., & Dugas, M. J. (2006). Investigating the construct validity of intolerance of uncertainty and its unique relationship with worry. *Journal of Anxiety Disorders*, *20*(2), 222-236.

Busenitz, L. W., & Barney, J. B. (1997). Differences between entrepreneurs and managers in large organizations: Biases and heuristics in strategic decision-making. *Journal of business venturing*, *12*(1), 9-30.

Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of personality and social psychology*, *42*(1), 116.

Cacioppo, J. T., Petty, R. E., Feinstein, J. A., & Jarvis, W. B. G. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. *Psychological bulletin*, *119*(2), 197.

Cacioppo, J. T., Petty, R. E., & Feng Kao, C. (1984). The Efficient Assessment of Need for Cognition. *Journal of Personality Assessment*, *48*(3), 306-307.

Campbell, D. J. (1988). Task complexity: A review and analysis. *Academy of management review*, *13*(1), 40-52.

Camps, J., Oltra, V., Aldás-Manzano, J., Buenaventura-Vera, G., & Torres-Carballo, F. (2016). Individual performance in turbulent environments: The role of organizational learning capability and employee flexibility. *Human Resource Management,* 55(3), 363-383.

Carleton, R. N., Norton, M. P. J., & Asmundson, G. J. (2007). Fearing the unknown: A short version of the Intolerance of Uncertainty Scale. *Journal of anxiety disorders*, *21*(1), 105-117.

Carleton, R. N., Norton, M. A. P., & Asmundson, G. J. G. (2007). *Intolerance of uncertainty scale--short version* doi:http://dx.doi.org.portal.lib.fit.edu/10.1037/t12830-000

Carlson, R. E. (1969). Degree of job fit as a moderator of the relationship between job performance and job satisfaction. *Personnel Psychology*, *22*(2), 159-170.

Casey, G.W. (2014). *How to lead in hazy, changing times.* Retrieved from http://for.tn/1gpSCJu

Chapman, M. (1996). Preface: Social anthropology, business studies, and cultural issues. *International Studies of Management & Organization*, 3-29.

Chen, J., & Wang, L. (2006). Locus of control and the three components of commitment to change. *Personality and individual differences*, *42*(3), 503-512.

Cheng, C., Cheung, S. F., Chio, J. H. M., & Chan, M. P. S. (2013). Cultural meaning of perceived control: a meta-analysis of locus of control and psychological symptoms across 18 cultural regions.

Cohen, A. R., Stotland, E., & Wolfe, D. M. (1955). An experimental investigation of need for cognition. *The Journal of Abnormal and Social Psychology*, *51*(2), 291.

Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the US In S. Spacapam & S. Oskamp (Eds.), The social psychology of health: Claremont symposium on applied social psychology (pp. 31-67).

Costa, P. T., & McCrae, R. R. (1995). Primary traits of Eysenck's PEN system: three-and five-factor solutions. *Journal of personality and social psychology*, *69*(2), 308.

Covin, J. G., & Slevin, D. P. (1998). Adherence to plans, risk taking, and environment as predictors of firm growth. *The Journal of High Technology Management Research*, *9*(2), 207-237.

Dane, E., & Pratt, M. G. (2007). Exploring intuition and its role in managerial decision making. *Academy of Management Review*, *32*(1), 33-54.

Davis, D., Morris, M., & Allen, J. (1991). Perceived environmental turbulence and its effect on selected entrepreneurship, marketing, and organizational characteristics in industrial firms. *Journal of the Academy of Marketing Science*, *19*(1), 43-51.

Dawar, N., & Parker, P. (1994). Marketing universals: Consumers' use of brand name, price, physical appearance, and retailer reputation as signals of product quality. *The Journal of Marketing*, 81-95.

Dess, G. G., & Beard, D. W. (1984). Dimensions of organizational task environments. *Administrative science quarterly*, 52-73.

DeVellis, R. F. (2012). *Scale development theory and applications* (Vol. 3). Los Angeles, CA: Sage.

Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual review of psychology*, *41*(1), 417-440.

Dilchert, S., Ones, D. S., Viswesvaran, C., & Deller, J. (2006). Response distortion in personality measurement: born to deceive, yet capable of providing valid self-assessments?. *Psychology Science*, *48*(3), 209.

Donovan, J. J., Dwight, S. A., & Schneider, D. (2008). Faking in the real world: Evidence from a field study. In *RG Griffith & MH Peterson (Chairs), Understanding faking in the real-world: Using within-subjects designs and applicant data. Symposium conducted at the 23rd annual meeting for the Society for Industrial and Organizational Psychology, San Francisco, California*.

Dornic, S., Ekehammar, B., & Laaksonen, T. (1991). Tolerance for mental effort: Self-ratings related to perception, performance and personality. *Personality and Individual Differences*, *12*(3), 313-319.

Durrheim, K., & Foster, D. (1997). Tolerance of ambiguity as a content specific construct. *Personality and individual differences*, *22*(5), 741-750.

Erbring, L., & Young, A. A. (1979). Individuals and social structure contextual effects as endogenous feedback. *Sociological Methods & Research*, *7*(4), 396-430.

Fischhoff, B., Lichtenstein, S., Slovic, P., Derby, S. L., & Keeney, R. L. (1981). Acceptable risk.

Fishbein, M., & Ajzen, I.(1975). Belief, Attitude, Intention, and Behaviour: An Introduction to Theory and Research.

Folkman, S., Lazarus, R. S., Dunkel-Schetter, C., DeLongis, A., & Gruen, R. J. (1986). Dynamics of a stressful encounter: cognitive appraisal, coping, and encounter outcomes. *Journal of personality and social psychology*, *50*(5), 992.

Frenkel‐Brunswik, E. (1949). Intolerance of ambiguity as an emotional and perceptual personality variable. *Journal of personality*, *18*(1), 108-143.

Frenkel-Brunswick, E. (1951). Personality theory and perception. In R. Blake, & E. Ramsey (Eds.), *Perception: An approach to personality*. New York: Ronald.

Fried, Y., Shirom, A., Gilboa, S., & Cooper, C. L. (2008). The mediating effects of job satisfaction and propensity to leave on role stress-job performance relationships: Combining meta-analysis and structural equation modeling. *International Journal of Stress Management*, *15*(4), 305.

Furnham, A., & Marks, J. (2013). Tolerance of ambiguity: A review of the recent literature. *Psychology*, *4*(09), 717.

Galotti, K. M., Tandler, J. M., & Wiener, H. J. (2014). Real-Life Decision Making in College Students II: Do Individual Differences Show Reliable Effects?. *The American journal of psychology*, *127*(1), 33-42.

Gelatt, H. B. (1989). Positive uncertainty: A new decision-making framework for counseling. *Journal of Counseling Psychology, 36*(2), 252-256. doi:10.1037//0022-0167.36.2.252

Gelfand, M. J., Nishii, L. H., & Raver, J. L. (2006). On the nature and importance of cultural tightness-looseness. *Journal of Applied Psychology, 91*(6), 1225-1244. doi:http://dx.doi.org/10.1037/0021-9010.91.6.1225

Gerras, S. J., Clark, M., Allen, C., Keegan, T., Meinhart, R., Wong, L., & Reed, G. (2010). *Strategic leadership primer*. ARMY WAR COLL CARLISLE BARRACKS PA.

Ghirardato, P. (2004). Defining ambiguity and ambiguity attitude. *Uncertainty in economic theory: A collection of essays in honor of David Schmeidler's 65th birthday*, 36-45.

Ghosh, D., & Ray, M. R. (1997). Risk, ambiguity, and decision choice: Some additional evidence. *Decision Sciences*, *28*(1), 81-104.

Greco, V., & Roger, D. (2001). Coping with uncertainty: The construction and validation of a new measure. *Personality and individual differences*, *31*(4), 519-534.

Grenier, S., Barrette, A. M., & Ladouceur, R. (2005). Intolerance of uncertainty and intolerance of ambiguity: Similarities and differences. *Personality and individual differences*, *39*(3), 593-600.

Griffith, R. L., Chmielowski, T., & Yoshita, Y. (2007). Do applicants fake? An examination of the frequency of applicant faking behavior. *Personnel Review, 36*, 341–355.

Hackman, J. R., & Oldham, G. R. (1975). Development of the job diagnostic survey. *Journal of Applied psychology*, *60*(2), 159.

Hall, W. K. (1980). Survival strategies in a hostile environment. *Harvard Business Review*, *58*(5), 75-85.

Herscovitch, L., & Meyer, J. P. (2002). Commitment to organizational change: extension of a three-component model. *Journal of applied psychology*, *87*(3), 474.

Hoehn, A. R., Solomon, R. H., Efron, S., Camm, F., Chandra, A., Knopman, D., …&Yost, C. (2017). *Strategic Choices for a Turbulent World: In Pursuit of Security and Opportunity* (Vol. 6). Rand Corporation.

Hofstede, G. H. (2001). *Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations*. Thousand Oaks, Calif: Sage Publications.

Hofstede, G. (2002). Dimensions do not exist: A reply to Brendan McSweeney. *Human relations*, *55*(11), 1355-1361.

Hofstede, G., Jonker, C., & Verwaart, T. (2008). Modeling culture in trade: Uncertainty avoidance. Paper presented at the 143-150.

Holland, J. H. (1995). *Hidden order: How adaptation builds complexity*. Basic Books.

Hoyle, R. H., Stephenson, M. T., Palmgreen, P., Lorch, E. P., & Donohew, R. L. (2002). *Brief sensation seeking scale* doi:http://dx.doi.org.portal.lib.fit.edu/10.1037/t04251-000

Hoyle, R. H., Stephenson, M. T., Palmgreen, P., Pugzles Lorch, E., & Donohew, R. L. (2002). Reliability and validity of a brief measure of sensation seeking. *Personality and Individual Differences, 32*(3), 401-414. doi:http://dx.doi.org.portal.lib.fit.edu/10.1016/S0191-8869(01)00032-0

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, *6*(1), 1-55.

Hung, K. T., & Tangpong, C. (2010). General risk propensity in multifaceted business decisions: Scale development. *Journal of Managerial Issues*, 88-106.

Jacobs, T. O. (2002). *Strategic Leadership: The Competitive Edge.* Unpublished manuscript.

Jacobs, T. O. (2008). *Strategic leadership: The competitive edge*. National Defense University, Industrial College of the Armed Force.

Joe, V. C. (1971). Review of the internal-external control construct as a personality variable. *Psychological reports*, *28*(2), 619-640.

Jahoda, M. (1961). A social-psychological approach to the study of culture. *Human Relations*.

Jansen, J. J., Vera, D., & Crossan, M. (2009). Strategic leadership for exploration and exploitation: The moderating role of environmental dynamism. *The Leadership Quarterly*, *20*(1), 5-18.

Johnson, J. E., & Powell, P. L. (1994). Decision making, risk and gender: Are managers different?. *British Journal of Management*, *5*(2), 123-138.

Jost, J. T., Glaser, J., Kruglanski, A. W., & Sulloway, F. J. (2003). Political conservatism as motivated social cognition.

Judge, T. A., & Bono, J. E. (2001). Relationship of core self-evaluations traits—self-esteem, generalized self-efficacy, locus of control, and emotional stability—with job satisfaction and job performance: A meta-analysis. *Journal of applied Psychology*, *86*(1), 80.

Judge, T. A., Thoresen, C. J., Bono, J. E., & Patton, G. K. (2001). The job satisfaction–job performance relationship: A qualitative and quantitative review. *Psychological bulletin*, *127*(3), 376.

Judge, W. Q., & Miller, A. (1991). Antecedents and outcomes of decision speed in different environmental context. *Academy of Management Journal*, *34*(2), 449-463.

Jurkovich, R. (1974). A core typology of organizational environments. *Administrative Science Quarterly*, 380-394.

Kach, A. P. (2012). *The impact of environmental hostility on firm performance: A strategic orientation of manufacturing industries perspective*. New Mexico State University.

Kahneman, D. (2011). *Thinking, fast and slow*. Macmillan.

Keinan, G., Meir, E., & Gome-Nemirovsky, T. (1984). Measurement of risk takers' personality. *Psychological Reports*.

Kenny, D. A. (2015, November 24). *Measuring Model Fit*. Retrieved May 19, 2018, from http://davidakenny.net/cm/fit.htm

Khandwalla, P. N. (1977). The design of organizations.

Khawaja, N. G., & Yu, L. N. H. (2010). A comparison of the 27-item and 12-item intolerance of uncertainty scales. *Clinical Psychologist*, *14*(3), 97-106.

Klein, G. (2008). Naturalistic decision making. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *50*(3), 456-460.

Klein, G. (1996). The effect of acute stressors on decision making. *Stress and human performance*, 49-88.

Klein, G.A., & Klinger, D. (1991). Naturalistic decision-making. *Human Systems IAC Gateway, Vol. XI*, Number 3.

Kogan, N., & Wallach, M. A. (1964). Risk taking: A study in cognition and personality.

Kuhn, T. S. (1970). The structure of scientific revolutions. *Chicago/London*.

Lauriola, M., Foschi, R., Mosca, O., & Weller, J. (2016). Attitude Toward Ambiguity: Empirically Robust Factors in Self-Report Personality Scales. *Assessment*, *23*(3), 353-373.

Lazarus, R. S. (1966). Psychological stress and the coping process.

Lefcourt, H. M. (1966). Internal versus external control of reinforcement: A review. *Psychological bulletin*, *65*(4), 206.

León, O. G., & Lopes, L. L. (1988). Risk preference and feedback. *Bulletin of the Psychonomic Society*, *26*(4), 343-346.

Levenson, H. (1974). Activism and powerful others: Distinctions within the concept of internal-external control. *Journal of personality assessment*, *38*(4), 377-383.

Levenson, H. (1974). Multidimensional Locus of Control Scales [Database record]. Retrieved from PsycTESTS. doi: http://dx.doi.org/10.1037/t04693-000

Levin, I. P., Huneke, M. E., & Jasper, J. D. (2000). Information processing at successive stages of decision making: Need for cognition and inclusion–exclusion effects. *Organizational behavior and human decision processes*, *82*(2), 171-193.

Lipshitz, R., Klein, G., Orasanu, J., & Salas, E. (2001). Taking stock of naturalistic decision making. *Journal of Behavioral Decision Making*, *14*(5), 331-352.

Loo, R. (2000). A psychometric evaluation of the general decision-making style inventory. *Personality and Individual Differences*, *29*(5), 895-905.

Luo, Y., & Peng, M. W. (1999). Learning to compete in a transition economy: Experience, environment, and performance. *Journal of International Business Studies*, 269-295.

Lynn, M., Zinkhan, G. M., & Harris, J. (1993). Consumer tipping: A cross-country study. *Journal of Consumer Research*, 478-488.

Macal, C. M., & North, M. J. (2010). Tutorial on agent-based modelling and simulation. *Journal of simulation*, *4*(3), 151-162.

Martins, I., & Rialp, A. (2013). Entrepreneurial orientation, environmental hostility and SME profitability: A contingency approach/Orientación emprendedora, hostilidad del entorno y la rentabilidad de la pyme: Una propuesta de contingencias. *Cuadernos De Gestión, 13*(2), 67-88. Retrieved from http://search.proquest.com.portal.lib.fit.edu/docview/1418199865?accountid=27313

Mauboussin, M.J., & Callahan, D. (2014). Lessons from Freestyle Chess Merging Fundamental and Quantitative Analysis. *Global Financial Strategies Credit Suisse, September 10.*

McLain, D. L. (1993). The MSTAT-I: A new measure of an individual's tolerance for ambiguity. *Educational and psychological measurement*, *53*(1), 183-189.

McLain, D. L., Kefallonitis, E., & Armani, K. (2015). Ambiguity tolerance in organizations: definitional clarification and perspectives on future research. *Frontiers in psychology*, *6*, 344.

McGee, J. E., & Rubach, M. J. (1997). Responding to increased environmental hostility: A study of the competitive behavior of small retailers. *Journal of Applied Business Research, 13*(1), 83-94. Retrieved from http://search.proquest.com/docview/227575694?accountid=27313

McSweeney, B. (2002). Hofstede's model of national cultural differences and their consequences: A triumph of faith-a failure of analysis. *Human relations*, *55*(1), 89-118.

Meertens, R. M., & Lion, R. (2008). Measuring an individual's tendency to take risks: The risk propensity scale1. *Journal of Applied Social Psychology*, *38*(6), 1506-1520.

Miles, R. E., Snow, C. C., & Pfeffer, J. (1974). Organization-environment: concepts and issues. *Industrial Relations: A Journal of Economy and Society*, *13*(3), 244-264.

Miller, D. (1987). THE STRUCTURAL AND ENVIRONMENTAL CORRELATES OF BUSINESS STRATEGY. *Strategic Management Journal (1986-1998), 8*(1), 55. Retrieved from http://search.proquest.com/docview/231163913?accountid=27313

Mintzberg, H. (1979). The structuring of organizations: A synthesis of the research. *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship*.

Morey, J. C., Simon, R., Jay, G. D., Wears, R. L., Salisbury, M., Dukes, K. A., & Berns, S. D. (2002). Error reduction and performance improvement in the emergency department through formal teamwork training: evaluation results of the MedTeams project. *Health services research*, *37*(6), 1553-1581.

Neuberg, S. L., Judice, T. N., & West, S. G. (1997). What the Need for Closure Scale measures and what it does not: Toward differentiating among related epistemic motives. *Journal of Personality and Social Psychology*, *72*(6), 1396.

Nunnally, J. C. (1967). Psychometric Theory, 1st edition, New York: McGraw-Hill.

Oreg, S. (2003). Resistance to change: developing an individual differences measure. *Journal of applied psychology*, *88*(4), 680.

Oreg, S. (2003). Resistance to Change Scale [Database record]. Retrieved from PsychTESTS. doi: http://dx.doi.org/10.1037/t00513-000

Oreg, S., Bayazit, M., Vakola, M., Arciniega, L., Armenakis, A., Barkauskiene, R., ... & Hřebíčková, M. (2008). Dispositional resistance to change: measurement equivalence and the link to personal values across 17 nations. *Journal of Applied Psychology*, *93*(4), 935.

Payne, J. W., Bettman, J. R., & Johnson, E. J. (1993). *The adaptive decision maker*. Cambridge University Press.

Pelto, P. J. (1968). The differences between "tight" and "loose" societies. *Society*, *5*(5), 37-40.

Performance. (2015). In *Oxforddictionaries.com*. Retrieved February 15, 2015, http://www.oxforddictionaries.com/us/definition/american_english/performance

Pervin, L. A. (1968). Performance and Satisfaction as a Function of Individual-Environment Fit. *Psychological bulletin*, *69*(1), 56.

Peterson, R. A. (1994). A meta-analysis of Cronbach's coefficient alpha. *Journal of consumer research*, *21*(2), 381-391.

Petty, R. E., Cacioppo, J. T., & Kao, C. F. (1984). The efficient assessment of need for cognition. *Journal of Personality Assessment*, *48*(3), 306-307.

Potter, D. V. (1994). Rare Mettle: GOLD AND SILVER STRATEGIES TO SUCCEED IN HOSTILE MARKETS. *California Management Review*, *37*(1).

Ribes, E., Contreras, S., Martínez, C., Doval, E., & Viladrich, C. (2005). INDIVIDUAL CONSISTENCIES ACROSS TIME AND TASKS: A REPLICATION OF INTERACTIVE STYLES. *The Psychological Record, 55*(4), 619-631. Retrieved from http://search.proquest.com/docview/212761594?accountid=27313

Risk. (2015). In *Businessdictionary.com*. Retrieved April 22, 2015, http://www.businessdictionary.com/definition/risk.html

Rochlin, G. I., La Porte, T. R., & Roberts, K. H. (1987). The self-designing high-reliability organization: Aircraft carrier flight operations at sea. *Naval War College Review*, *40*(4), 76-90.

Rohrmann, B. (2005). Risk attitude scales: concepts, questionnaires, utilizations. *Project report. Online access http://www.rohrmannresearch. net/pdfs/rohrmann-ras-report. pdf*, *13*, 2012.

Rokeach, M. (1960). The open and closed mind.

Roth, M. S. (1995). The effects of culture and socioeconomics on the performance of global brand image strategies. *Journal of Marketing Research*, 163-175.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological monographs: General and applied*, *80*(1), 1.

Rotter, J. B. (1966). Rotter's Internal-External Control Scale [Database record]. Retrieved from PsycTESTS. doi: http://dx.doi.org/10.1037/t01671-000

Rowe, W. D. (1977). An Anatomy of Risk. John Wiley & Sons. *New York, NY*.

Saksvik, I. B., & Hetland, H. (2009). Exploring dispositional resistance to change. *Journal of Leadership & Organizational Studies*.

Salas, E., Driskell, J. E., & Hughes, S. (2013). Introduction: The Study of Stress and Human Performance. In Driskell, J. E., & Salas, E. (Eds.). (2013). Stress and human performance (pp. 1-46) . Psychology Press.

Salas, E., Rosen, M. A., & DiazGranados, D. (2009). Expertise-based intuition and decision making in organizations. *Journal of Management*.

Schere, J. L. (1982, August). Tolerance of Ambiguity as a Discriminating Variable Between Entrepreneurs and Managers. In *Academy of management proceedings* (Vol. 1982, No. 1, pp. 404-408). Academy of Management.

Schrader, S., Riggs, W. M., & Smith, R. P. (1993). Choice over uncertainty and ambiguity in technical problem solving. *Journal of Engineering and Technology Management*, *10*(1), 73-99.

Schwab, D. P., & Cummings, L. L. (1976). A theoretical analysis of the impact of task scope on employee performance. *Academy of Management Review*, *1*(2), 23-35.

Scott, S. G., & Bruce, R. A. (1995). Decision-making style: The development and assessment of a new measure. *Educational and psychological measurement*, *55*(5), 818-831.

Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing: II. Perceptual learning, automatic attending and a general theory. *Psychological review*, *84*(2), 127.

Shaffer, L. S., & Zalewski, J. M. (2011). Career advising in a VUCA environment. *NACADA Journal*, *31*(1), 64-74.

Sitkin, S. B., & Pablo, A. L. (1992). Reconceptualizing the determinants of risk behavior. *Academy of management review*, *17*(1), 9-38.

Sitkin, S. B., & Weingart, L. R. (1995). Determinants of risky decision-making behavior: A test of the mediating role of risk perceptions and propensity. *Academy of management Journal*, *38*(6), 1573-1592.

Slater, C. W. (2009). *The measurement of an adult's cognitive curiosity and exploratory behavior.* Regent University.

Slovic, P. (1972). Information processing, situation specificity, and the generality of risk-taking behavior. *Journal of personality and social psychology*, *22*(1), 128.

Slovic, P., Peters, E., Finucane, M. L., & MacGregor, D. G. (2005). Affect, risk, and decision making. *Health Psychology, 24*(4, Suppl), S35-S40. doi:http://dx.doi.org.portal.lib.fit.edu/10.1037/0278-6133.24.4.S35

Solinger, O. N., Van Olffen, W., & Roe, R. A. (2008). Beyond the three-component model of organizational commitment. *Journal of applied psychology*, *93*(1), 70.

Spector, P. E. (1988). Development of the work locus of control scale. *Journal of occupational psychology*, *61*(4), 335-340.

Spector, P. E. (1992). *Summated rating scale construction: An introduction* (No. 82). Sage.

Steelman, L. A. (1998). A comprehensive examination of the feedback environment.

Steenkamp, J. B. E., Hofstede, F. T., & Wedel, M. (1999). A cross-national investigation into the individual and national cultural antecedents of consumer innovativeness. *The Journal of Marketing*, 55-69.

Tabachnick, B. G., & Fidell, L. S. (2007). Multivariate analysis of variance and covariance. *Using multivariate statistics*, *3*, 402-407.

Taber, K. S. (2017). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 1-24.

Tanaka, J. S., Panter, A. T., & Winborne, W. C. (1988). Dimensions of the need for cognition: Subscales and gender differences. *Multivariate Behavioral Research*, *23*(1), 35-50.

Thomas, P. (2015). Hostility Matters: Beyond VUCA (Volatility, Uncertainty, Complexity, and Ambiguity). Unpublished Masters thesis, Industrial/Organizational Psychology Department, Florida Institute of Technology, Melbourne, Florida.

Thompson, B., & Melancon, J. G. (1996). Using Item" Testlets"/" Parcels" in Confirmatory Factor Analysis: An Example Using the PPSDQ-78.

Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological review*, *96*(3), 506.

Tversky, A., & Kahneman, D. (1975). Judgment under uncertainty: Heuristics and biases. In *Utility, probability, and human decision making* (pp. 141-162). Springer Netherlands.

Walinga, J., & Rowe, W. (2013). Transforming stress in complex work environments. *International Journal of Workplace Health Management, 6*(1), 66-88. doi:http://dx.doi.org.portal.lib.fit.edu/10.1108/17538351311312420

Wallerstein, I. (1990). Culture as the ideological battleground of the modern world-system. *Theory, culture and society*, *7*(2-3), 31-55.

Weber, E. U., Blais, A. R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of behavioral decision making*, *15*(4), 263-290.

Webster, D. M., & Kruglanski, A. W. (1994). Individual differences in need for cognitive closure. *Journal of personality and social psychology*, *67*(6), 1049.

WEF (2014). Outlook on the Global Agenda 2015, World Economic Forum.

WEF (2016). The Global Risks Report 2016, Geneva, 11th Edition, 2016.

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit‐formation. *Journal of comparative neurology and psychology*, *18*(5), 459-482.

Zuckerman, M. (1979). *Sensation seeking*. John Wiley & Sons, Inc..

Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. Cambridge university press.

Zuckerman, M. (2014). *Sensation Seeking (Psychology Revivals): Beyond the Optimal Level of Arousal*. Psychology Press.

Zuckerman, M., Kolin, E. A., Price, L., & Zoob, I. (1964). Development of a sensation-seeking scale. *Journal of consulting psychology*, *28*(6), 477.

Appendix A--Tables

Table A1.

Demographic Data for Pilot Studies 1 and 2

Demographic	Frequency	%	Frequency	%	Frequency	%
	Pilot 1		Pilot 2		Pilots 1 & 2 Combined	
Gender						
Male	58	58	47	47	105	52.50
Female	42	42	53	53	95	47.50
Ethnicity						
White	72	72	83	83	155	77.50
Black / African American	9	9	7	7	16	8
American Indian / Alaska Native	3	3	1	1	4	2
Native Hawaiian / Pacific Islander	-	-	1	1	1	.50
Asian	11	11	5	5	16	8
Other	5	5	3	3	8	4
Tenure Range						
<1 year	17	17	19	19	36	18
1-3 years	40	40	34	34	74	37
4-6 years	26	26	26	26	52	26
7-9 years	9	9	5	5	14	7
>10 years	8	8	16	16	24	12
Employment Status						
Full Time	69	69	66	66	135	67.50
Part Time	16	16	19	19	35	17.50
Unemployed	14	14	13	13	27	13.50
Retired	1	1	2	2	3	1.50
Age Range						
18-24	18	18	12	12	30	15
25-34	43	43	38	38	81	40.50

Demographic	Frequency	%	Frequency	%	Frequency	%
	Pilot 1		Pilot 2		Pilots 1 & 2 Combined	
35-44	21	21	27	27	48	24
45-54	14	14	17	17	31	15.50
55-64	4	4	5	5	9	4.50
65-74	-	-	1	1	1	.50

Note: Pilot 1, n=100; Pilot 2, n=100; Pilots 1 & 2 combined, n=200.

Table A2.

50-Items, Subscale, and Scale Descriptives—Pilot Study 1

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
5 Hostility	.47	4.72	1.57	-.55	-.76
6 Hostility	.57	4.13	1.61	-.19	-1.03
8 Hostility	.40	3.78	1.57	.20	-.89
10 Hostility	.46	5.09	1.33	-.54	-.20
33 Hostility	.56	4.57	1.48	-.35	-.66
59 Hostility	.41	5.14	1.26	-.88	1.35
63 Hostility	.54	4.20	1.74	.03	-.91
75 Hostility	.55	3.48	1.64	.46	-.54
85 Hostility	.57	3.43	1.80	.42	-.99
97 Hostility	.50	4.01	1.58	-.11	-.80
Hostility Subscale	α=.82, Mean r=.31	42.55 (4.26)	9.67 (.97)	-.37	-.33
7 Ambiguity	.60	4.00	1.45	-.33	-.78
20 Ambiguity	.48	3.97	1.46	-.01	-.87
26 Ambiguity	.64	4.49	1.31	-.28	-.34
32 Ambiguity	.74	3.76	1.39	.12	-.82
34 Ambiguity	.47	4.63	1.57	-.42	-.43
37 Ambiguity	.53	4.25	1.47	-.10	-.74
50 Ambiguity	.71	4.62	1.29	-.31	-.26
56 Ambiguity	.53	4.90	1.58	-.57	-.55
60 Ambiguity	.52	4.92	1.27	-.57	.28
64 Ambiguity	.47	3.16	1.38	.35	-.08

Demographic	Frequency	%	Frequency	%	Frequency	%
	Pilot 1		Pilot 2		Pilots 1 & 2 Combined	
Ambiguity Subscale	α=.86, Mean r=.38	42.70 (4.27)	9.39 (.94)	-.30	-.27	
1 Volatility	.73	4.57	1.61	-.62	-.75	
2 Volatility	.69	4.70	1.51	-.52	-.55	
29 Volatility	.67	4.47	1.50	-.26	-.89	
31 Volatility	.73	3.61	1.73	.17	-1.01	
44 Volatility	.71	3.75	1.62	.08	-.99	
49 Volatility	.60	4.30	1.53	-.47	-.52	
58 Volatility	.65	4.70	1.51	-.54	-.49	
73 Volatility	.72	4.42	1.39	-.14	-.74	
92 Volatility	.54	3.59	1.64	-.04	-.95	
96 Volatility	.39	5.21	1.25	-.73	.26	
Volatility Subscale	α=.90, Mean r=.46	43.32 (4.33)	11.04 (1.10)	-.28	-.24	
3 Uncertainty	.34	2.52	1.40	.91	.10	
16 Uncertainty	.48	3.74	1.56	-.06	-.85	
17 Uncertainty	.66	3.97	1.58	-.22	-1.18	
18 Uncertainty	.53	2.97	1.26	.37	-.13	
25 Uncertainty	.37	3.80	1.66	.16	-1.03	
27 Uncertainty	.54	4.26	1.46	-.23	-.86	
36 Uncertainty	.47	4.41	1.74	-.24	-1.04	
47 Uncertainty	.54	3.83	1.68	.04	-1.03	
76 Uncertainty	.53	3.83	1.52	.03	-1.02	
88 Uncertainty	.67	3.93	1.64	.04	-.96	
Uncertainty Subscale	α=.82, Mean r=.32	37.26 (3.73)	9.68 (.97)	-.19	-.66	
4 Complexity	.33	5.76	1.22	-1.25	2.04	
11 Complexity	.42	4.91	1.49	-.60	.08	
22 Complexity	.50	4.03	1.57	-.02	-1.08	
23 Complexity	.46	5.79	1.21	-.99	.73	
35 Complexity	.70	5.09	1.38	-.52	-.46	
43 Complexity	.50	4.51	1.45	-.48	-.53	
66 Complexity	.65	4.59	1.44	-.36	-.82	
68 Complexity	.76	5.11	1.34	-.87	.47	
71 Complexity	.77	4.89	1.50	-.62	-.43	

Demographic	Frequency	%	Frequency	%	Frequency	%
	Pilot 1		Pilot 2		Pilots 1 & 2 Combined	
78 Complexity	.76	5.09	1.45	-.79	.01	
Complexity Subscale	α=.87, Mean r=.39	49.77 (4.98)	9.50 (.95)	-.33	-.62	
Summated HEFS	α=.95, Mean r=.26	215.60 (4.31)	39.16 (.78)	-.55	.27	

Note: n = 100; SD = standard deviation; α = Cronbach's alpha; Mean r = Mean inter-item correlations for each subscale or summated HEFS as applicable; Means for the subscales and summated HEFS are reported to reflect the summation of all items for that particular scale, thus were not divided by the number of items in a particular subscale/scale; the numbers in parentheses reflect means and SD when subscales/scale was divided the number of items in the respective subscale/scale.

Table A3.

50-items, HEFS and Subscale Correlation Matrix—Pilot Study 1

Scale / Subscale	1	2	3	4	5	6
1 HEFS (Full Scale)	1.00					
2 Hostility Subscale	.70**	1.00				
3 Ambiguity Subscale	.85**	.50**	1.00			
4 Volatility Subscale	.89**	.52**	.68**	1.00		
5 Uncertainty Subscale	.78**	.30**	.67**	.74**	1.00	
6 Complexity Subscale	.73**	.48**	.54**	.54**	.38**	1.00

Note: n=100; **p<.01 (2-tailed)

Table A4.

50-Items, Subscale, and Scale Descriptives—Pilot Study 2

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
5 Hostility	.65	4.69	1.61	-.75	-.39
6 Hostility	.65	4.23	1.73	-.22	-1.08

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
8 Hostility	.59	3.55	1.64	.28	-1.10
10 Hostility	.53	4.97	1.26	-.59	-.18
33 Hostility	.69	4.47	1.49	-.36	-.47
59 Hostility	.34	5.02	1.39	-.82	.24
63 Hostility	.66	4.15	1.65	-.11	-.93
75 Hostility	.63	3.35	1.60	.45	-.79
85 Hostility	.65	3.53	1.74	.08	-1.13
97 Hostility	.52	3.92	1.57	-.15	-1.26
Hostility Subscale	α=.87, Mean r=.40	41.88 (4.19)	10.72 (1.07)	-.09	-.50
7 Ambiguity	.71	3.91	1.68	.02	-1.00
20 Ambiguity	.75	3.50	1.59	.25	-.87
26 Ambiguity	.71	4.52	1.30	-.60	-.24
32 Ambiguity	.81	3.64	1.51	.28	-.70
34 Ambiguity	.44	4.90	1.28	-.50	.33
37 Ambiguity	.68	4.20	1.51	-.22	-.61
50 Ambiguity	.76	4.43	1.45	-.34	-.42
56 Ambiguity	.50	5.15	1.56	-.61	-.64
60 Ambiguity	.60	4.78	1.38	-.67	-.31
64 Ambiguity	.45	2.92	1.21	.40	.17
Ambiguity Subscale	α=.90, Mean r=.46	41.95 (4.19)	10.44 (1.04)	-.06	-.19
1 Volatility	.66	4.57	1.44	-.60	-.67
2 Volatility	.64	4.84	1.48	-.78	-.22
29 Volatility	.73	4.33	1.58	-.27	-.87
31 Volatility	.55	3.42	1.58	.38	-.98
44 Volatility	.71	3.55	1.53	.28	-.67
49 Volatility	.68	3.91	1.59	.03	-1.11
58 Volatility	.78	4.73	1.52	-.58	-.28
73 Volatility	.78	4.40	1.55	-.23	-.62
92 Volatility	.58	3.22	1.48	.56	-.30
96 Volatility	.52	5.06	1.21	-.65	.27
Volatility Subscale	α=.91, Mean r=.49	42.03 (4.20)	11.05 (1.11)	-.17	-.29
3 Uncertainty	.51	2.46	1.19	.86	.50

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
16 Uncertainty	.53	3.54	1.49	.22	-.91
17 Uncertainty	.76	3.62	1.65	.18	-1.20
18 Uncertainty	.65	3.03	1.43	.70	-.35
25 Uncertainty	.10	3.72	1.69	.31	-.84
27 Uncertainty	.53	4.38	1.49	-.27	-.94
36 Uncertainty	.47	4.39	1.54	-.29	-.70
47 Uncertainty	.71	3.66	1.45	.35	-.80
76 Uncertainty	.76	3.48	1.51	.44	-.90
88 Uncertainty	.78	3.58	1.57	.23	-.97
Uncertainty Subscale	α=.86, Mean r=.39	35.86 (3.59)	10.03 (1.00)	.27	-.31
4 Complexity	-.05	5.82	1.10	-1.10	1.04
11 Complexity	.72	4.93	1.60	-.99	.32
22 Complexity	.58	3.88	1.60	-.06	-.96
23 Complexity	.45	5.60	1.25	-1.05	1.35
35 Complexity	.81	4.61	1.55	-.75	.11
43 Complexity	.54	4.09	1.49	.09	-1.04
66 Complexity	.77	4.48	1.56	-.37	-.73
68 Complexity	.80	4.99	1.43	-1.10	.65
71 Complexity	.87	4.96	1.70	-.88	-.02
78 Complexity	.89	4.88	1.66	-.74	-.12
Complexity Subscale	α=.90, Mean r=.44	48.24 (4.82)	10.89 (1.09)	-.72	.47
Summated HEFS	α=.96, Mean r=.34	209.96 (4.20)	45.23 (.90)	-.13	-.05

Note: n = 100; SD = standard deviation; α = Cronbach's alpha; Mean r = Mean inter-item correlations for each subscale or summated HEFS as applicable; Means for the subscales and summated HEFS are reported to reflect the summation of all items for that particular scale, thus were not divided by the number of items in a particular subscale/scale; the numbers in parentheses reflect means and SD when subscales/scale was divided the number of items in the respective subscale/scale.

Table A5.

50-items, HEFS and Subscale Correlation Matrix—Pilot Study 2

Scale / Subscale	1	2	3	4	5	6
1 HEFS (Full Scale)	1.00					
2 Hostility Subscale	$.78^{**}$	1.00				
3 Ambiguity Subscale	$.91^{**}$	$.60^{**}$	1.00			
4 Volatility Subscale	$.90^{**}$	$.62^{**}$	$.81^{**}$	1.00		
5 Uncertainty Subscale	$.83^{**}$	$.41^{**}$	$.76^{**}$	$.77^{**}$	1.00	
6 Complexity Subscale	$.85^{**}$	$.66^{**}$	$.70^{**}$	$.64^{**}$	$.59^{**}$	1.00

Note: n=100; $^{**}p<.01$ (2-tailed)

Table A6.

50-Items, Subscale, and Scale Descriptives—Combined Pilot Studies

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
5 Hostility	.56	4.71	1.58	-.65	-.58
6 Hostility	.61	4.18	1.67	-.20	-1.05
8 Hostility	.50	3.67	1.61	.23	-1.01
10 Hostility	.50	5.03	1.29	-.55	-.21
33 Hostility	.63	4.52	1.48	-.35	-.57
59 Hostility	.37	5.08	1.33	-.85	.69
63 Hostility	.60	4.18	1.69	-.03	-.92
75 Hostility	.59	3.41	1.62	.46	-.66
85 Hostility	.61	3.48	1.77	.26	-1.08
97 Hostility	.51	3.97	1.57	-.13	-1.03
Hostility Subscale	α=.85, Mean r=.36	42.22 (4.22)	10.19 (1.02)	-.22	-.44
7 Ambiguity	.66	3.95	1.57	-.13	-.89
20 Ambiguity	.62	3.74	1.54	.09	-.91
26 Ambiguity	.67	4.50	1.30	-.43	-.32
32 Ambiguity	.78	3.70	1.45	.19	-.76
34 Ambiguity	.44	4.77	1.43	-.50	-.06

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
37 Ambiguity	.61	4.22	1.49	-.16	-.68
50 Ambiguity	.74	4.52	1.37	-.35	-.32
56 Ambiguity	.51	5.02	1.57	-.58	-.60
60 Ambiguity	.56	4.85	1.33	-.64	-.05
64 Ambiguity	.46	3.04	1.30	.40	.04
Ambiguity Subscale	α=.88, Mean r=.42	42.32 (4.23)	9.91 (.99)	-.17	-.24
1 Volatility	.70	4.57	1.53	-.61	-.70
2 Volatility	.66	4.77	1.49	-.64	-.43
29 Volatility	.70	4.40	1.54	-.27	-.87
31 Volatility	.64	3.52	1.66	.28	-.99
44 Volatility	.71	3.65	1.58	.18	-.86
49 Volatility	.64	4.11	1.57	-.22	-.94
58 Volatility	.71	4.72	1.51	-.56	-.41
73 Volatility	.75	4.41	1.47	-.20	-.65
92 Volatility	.56	3.41	1.57	.24	-.78
96 Volatility	.46	5.13	1.23	-.67	.21
Volatility Subscale	α=.90, Mean r=.48	42.68 (4.27)	11.04 (1.10)	-.22	-.30
3 Uncertainty	.42	2.49	1.30	.90	.31
16 Uncertainty	.51	3.64	1.53	.08	-.91
17 Uncertainty	.71	3.79	1.62	-.02	-1.24
18 Uncertainty	.59	3.00	1.34	.57	-.23
25 Uncertainty	.23	3.76	1.68	.24	-.95
27 Uncertainty	.53	4.32	1.47	-.24	-.91
36 Uncertainty	.47	4.40	1.64	-.26	-.89
47 Uncertainty	.62	3.75	1.57	.19	-.93
76 Uncertainty	.65	3.65	1.52	.23	-1.03
88 Uncertainty	.73	3.75	1.61	.14	-.99
Uncertainty Subscale	α=.84, Mean r=.35	36.56 (3.66)	9.86 (.99)	.05	-.55
4 Complexity	.13	5.79	1.16	-1.19	1.63
11 Complexity	.58	4.92	1.54	-.81	.19
22 Complexity	.54	3.96	1.58	-.04	-1.01
23 Complexity	.46	5.70	1.23	-1.01	1.02

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
35 Complexity	.76	4.85	1.48	-.68	.05
43 Complexity	.52	4.30	1.48	-.19	-.93
66 Complexity	.72	4.54	1.50	-.37	-.76
68 Complexity	.78	5.05	1.38	-.99	.57
71 Complexity	.82	4.92	1.60	-.77	-.18
78 Complexity	.83	4.99	1.56	-.78	-.01
Complexity Subscale	α=.89, Mean r=.42	49.00 (4.90)	10.22 (1.02)	-.59	.18
Summated HEFS	α=.96, Mean r=.30	212.78 (4.25)	42.29 (.90)	-.34	.08

Note: n = 200; SD = standard deviation; α = Cronbach's alpha; Mean r = Mean inter-item correlations for each subscale or summated HEFS as applicable; Means for the subscales and summated HEFS are reported to reflect the summation of all items for that particular scale, thus were not divided by the number of items in a particular subscale/scale; the numbers in parentheses reflect means and SD when subscales/scale was divided the number of items in the respective subscale/scale.

Table A7.

50-items, HEFS and Subscale Correlation Matrix—Combined Pilot Studies

Scale / Subscale	1	2	3	4	5	6
1 HEFS (Full Scale)	1.00					
2 Hostility Subscale	.78**	1.00				
3 Ambiguity Subscale	.85**	.55**	1.00			
4 Volatility Subscale	.88**	.57**	.75**	1.00		
5 Uncertainty Subscale	.77**	.36**	.72**	.76**	1.00	
6 Complexity Subscale	.79**	.58**	.63**	.59**	.50**	1.00

Note: n=200; **p<.01 (2-tailed)

Table A8.

50-items, Initial PCA Eigenvalues and Variance—Combined Pilot Studies

	Initial Eigenvalues		
Component	λ	% Variance	Cumulative %
1	17.24	34.47	34.47
2	4.24	8.48	42.95
3	3.08	6.15	49.10
4	1.98	3.95	53.05
5	1.77	3.54	56.60
6	1.48	2.97	59.56
7	1.30	2.60	62.16
8	1.16	2.32	64.47
9	1.14	2.28	66.75
10	1.04	2.09	68.84
11	.96	1.92	70.76
12	.83	1.67	72.43
13	.82	1.64	74.07

Note: n=200; λ=eigenvalue; Principal Component Analysis with Varimax rotation; only components with eigenvalues above .80 are reported

Table A9.

Initial 50-Item EFA Factor Loadings—Combined Pilot Studies

Item / Subscale	Factor 1	2	3	4	5
Hostility Subscale; α=.85					
5. I am most comfortable making decisions under pressure.	.60			-.33	
6. I perform best under pressure.			.34		
8. I enjoy the challenge of doing a job with limited resources.			.41		
10. I prefer to take a chance when I see an opportunity.	.31				

Item / Subscale	Factor 1	2	3	4	5
33. I can succeed in any situation even when resources are scarce.	.32				
59. I feel that risks are an unavoidable part of any job.					.47
63. I like situations that involve competition.			.55		
75. Environments that involve threating situations help me perform better.			.74		
85. I like to figure out ways to turn any situation into a competition.			.84		
97. Internal competition is necessary for the workplace.			.75		
Ambiguity Subscale; α=.88					
7. Ambiguous situations can make work more enjoyable.			.41	.47	
20. I thrive in ambiguous situations.	.33		.33		
26. I feel ambiguous situations offer opportunities.					.35
32. I enjoy ambiguous situations.			.34	.47	
34. Ambiguity in a situation is ALWAYS bad.*				.53	.38
37. I enjoy situations that can be interpreted in multiple ways.		.35		.34	
50. Ambiguity provides an opportunity to excel.			.33	.39	.42
56. No one likes ambiguity.*				.61	.39
60. Ambiguous situations are just part of the job.					.54
64. I generally prefer situations that are easy to interpret.*				.47	
Volatility Subscale; α=.90					
1. I am comfortable changing plans.	.78				
2. I find it easy to change my mind if the situation changes.	.61				.40
29. I am comfortable working in rapidly changing situations.	.73				
31. I get upset when my routine is disturbed.*	.79				
44. I get frustrated when the situation constantly	.81				

Item / Subscale	Factor 1	2	3	4	5
changes.*					
49. I am comfortable in situations where information is changing constantly.	.52				
58. I embrace change because it presents new opportunities.	.47				.43
73. I generally view change in a situation as a positive thing.	.53				
92. I don't like being surprised by change.*	.64				
96. Unexpected changes to the situation is part of doing business.					.50
Uncertainty Subscale; α=.84					
3. I prefer doing jobs that have clear procedures.*				.53	
16. I am comfortable making decisions with little available information.	.50				
17. I am comfortable working in uncertain environments.	.50				
18. I get frustrated when I lack information about a situation.*	.62				
25. Planning can remove all uncertainty.*			-.43	.52	
27. I am comfortable taking action even if I am uncertain about the outcomes.	.61				
36. Uncertainty in a situation is ALWAYS a problem.*			-.36	.61	
47. I have a hard time taking action without all the information about the future.*	.74				
76. I have trouble forming a plan when I'm missing information.*	.71				
88. I actively avoid uncertain situations.*	.59			.39	
Complexity Subscale; α=.89					
4. No one person has all the answers in complex situations.			-.33		.36
11. I enjoy trying to explain complex problems in simple terms.		.60			
22. I am comfortable making decisions about complex problems that have no clear answer.		.36			

Item / Subscale	Factor 1	2	3	4	5
23. I prefer to understand how something works rather than take someone's word for it.	-.33	.59			
35. I enjoy tasks that require a lot of mental effort.		.78			
43. I get frustrated with problems containing lots of factors.*	.54	.42	-.33		
66. I can solve complex problems regardless of the situation.		.61			
68. I am comfortable thinking through novel and complex problems.		.80			
71. I like the challenge of solving complex problems.		.90			
78. I enjoy coming up with new solutions to complex problems.		.86			

Note: n = 200; Principal Axis Factoring with Promax rotation; Kaiser-Meyer-Olkin (KMO) = .91; Bartlett's Test of Sphericity was significant (χ^2 (1225)=6903.42, p<.001); α = Cronbach's alpha; loadings <.30 were suppressed for easier interpretation; *=reverse coded.

Table A10.

30-Item EFA Factor Loadings—Combined Pilot Studies

Item / Subscale	Factor 1	2	3	4	5
Hostility Subscale; α=.81					
6. I perform best under pressure.			.38		
8. I enjoy the challenge of doing a job with limited resources.			.37		
63. I like situations that involve competition.			.64		
75. Environments that involve threating situations help me perform better.			.66		
85. I like to figure out ways to turn any situation into a competition.			.81		

Item / Subscale	Factor 1	2	3	4	5
97. Internal competition is necessary for the workplace.			.79		
Ambiguity Subscale; α=.82					
26. I feel ambiguous situations offer opportunities.				.49	
34. Ambiguity in a situation is ALWAYS bad.*				.69	
37. I enjoy situations that can be interpreted in multiple ways.				.32	
50. Ambiguity provides an opportunity to excel.				.74	
56. No one likes ambiguity.*				.86	
60. Ambiguous situations are just part of the job.				.51	
Volatility Subscale; α=.88					
1. I am comfortable changing plans.					.90
2. I find it easy to change my mind if the situation changes.					.83
29. I am comfortable working in rapidly changing situations.	.38				.39
31. I get upset when my routine is disturbed.*	.43				.43
58. I embrace change because it presents new opportunities.					.54
73. I generally view change in a situation as a positive thing.					.44
Uncertainty Subscale; α=.86					
16. I am comfortable making decisions with little available information.	.72				
17. I am comfortable working in uncertain environments.	.63				
18. I get frustrated when I lack information about a situation.*	.86				
47. I have a hard time taking action without all the information about the future.*	.68				
76. I have trouble forming a plan when I'm missing information.*	.81				
88. I actively avoid uncertain situations.*	.61				
Complexity Subscale; α=.88					
11. I enjoy trying to explain complex problems in		.65			

Item / Subscale	Factor 1	2	3	4	5
simple terms.					
35. I enjoy tasks that require a lot of mental effort.		.84			
43. I get frustrated with problems containing lots of factors.*	.40	.46			
66. I can solve complex problems regardless of the situation.		.69			
68. I am comfortable thinking through novel and complex problems.		.87			
78. I enjoy coming up with new solutions to complex problems.		.94			

Note: n = 200; Principal Axis Factoring with Promax rotation; Kaiser-Meyer-Olkin (KMO) = .90; Bartlett's Test of Sphericity was significant (χ^2 (435)=3510.61, p<.001); α = Cronbach's alpha; loadings <.30 were suppressed for easier interpretation; *=reverse coded.

Table A11.

30-Items, Subscale, and Scale Descriptives—Combined Pilot Studies

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
6 Hostility	.49	4.18	1.67	-.20	-1.05
8 Hostility	.45	3.67	1.61	.23	-1.01
63 Hostility	.64	4.18	1.69	-.03	-.92
75 Hostility	.59	3.41	1.62	.46	-.66
85 Hostility	.69	3.48	1.77	.26	-1.08
97 Hostility	.56	3.97	1.57	-.13	-1.03
Hostility Subscale	α=.81, Mean r=.41	22.88 (3.81)	7.09 (1.18)	-.02	-.77
26 Ambiguity	.64	4.50	1.30	-.43	-.32
34 Ambiguity	.49	4.77	1.43	-.50	-.06
37 Ambiguity	.51	4.22	1.49	-.16	-.68
50 Ambiguity	.74	4.52	1.37	-.35	-.32
56 Ambiguity	.57	5.02	1.57	-.58	-.60

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
60 Ambiguity	.56	4.85	1.33	-.64	-.05
Ambiguity Subscale	α=.82, Mean r=.43	27.90 (4.65)	6.15 (1.03)	-.33	-.26
1 Volatility	.72	4.57	1.53	-.61	-.70
2 Volatility	.68	4.77	1.49	-.64	-.43
29 Volatility	.67	4.40	1.54	-.27	-.87
31 Volatility	.59	3.52	1.66	.28	-.99
58 Volatility	.70	4.72	1.51	-.56	-.41
73 Volatility	.73	4.41	1.47	-.20	-.65
Volatility Subscale	α=.88, Mean r=.54	26.38 (4.40)	7.21 (1.20)	-.36	-.34
16 Uncertainty	.61	3.64	1.53	.08	-.91
17 Uncertainty	.70	3.79	1.62	-.02	-1.24
18 Uncertainty	.59	3.00	1.34	.57	-.23
47 Uncertainty	.60	3.75	1.57	.19	-.93
76 Uncertainty	.69	3.65	1.52	.23	-1.03
88 Uncertainty	.67	3.75	1.61	.14	-.99
Uncertainty Subscale	α=.86, Mean r=.50	21.59 (3.60)	7.01 (1.17)	-.02	-.78
11 Complexity	.58	4.92	1.54	-.81	.19
35 Complexity	.76	4.85	1.48	-.68	.05
43 Complexity	.53	4.30	1.48	-.19	-.93
66 Complexity	.71	4.54	1.50	-.37	-.76
68 Complexity	.74	5.05	1.38	-.99	.57
78 Complexity	.82	4.99	1.56	-.78	-.01
Complexity Subscale	α=.88, Mean r=.55	28.64 (4.77)	7.06 (1.18)	-.70	.38
Summated HEFS	α=.94, Mean r=.33	127.38 (4.25)	27.11 (.90)	-.34	.08

Note: n = 200; SD = standard deviation; α = Cronbach's alpha; Mean r = Mean inter-item correlations for each subscale or summated HEFS as applicable; Means for the subscales and summated HEFS are reported to reflect the summation of all items for that particular scale, thus were not divided by the number of items in a particular subscale/scale; the numbers in parentheses reflect means and SD when subscales/scale was divided by the number of items in the respective subscale/ scale.

Table A12.

30-item HEFS and Subscale Correlation Matrix—Combined Pilot Studies

Scale / Subscale	1	2	3	4	5	6
1 HEFS (Full Scale)	1.00					
2 Hostility Subscale	.68**	1.00				
3 Ambiguity Subscale	.79**	.39**	1.00			
4 Volatility Subscale	.85**	.41**	.64**	1.00		
5 Uncertainty Subscale	.80**	.38**	.53**	.70**	1.00	
6 Complexity Subscale	.81**	.46**	.61**	.57**	.53**	1.00

Note: n=200; **p<.01 (2-tailed)

Table A13.

Demographic Data for Focal Study 1—Samples 1 & 2

Demographic	Frequency Focal Study1 Sample 1*	%	Frequency Focal Study 1 Sample 2	%	Frequency Samples 1 & 2 Combined	%
Gender						
Male	197	97	220	97	417	97
Female	7	3	7	3	14	3
Ethnicity						
White	163	80	177	78	340	79
Black / African American	8	4	8	3.5	16	4
Hispanic	14	7	27	12	41	9
Asian	9	4	7	3	16	4
Other	10	5	8	3.5	18	4
Tenure Range (Time in Service)						
<1 year	16	8	-	-	16	4
1-3 years	59	29	83	36.5	142	33
4-6 years	79	39	102	45	181	42
7-9 years	30	15	27	12	57	13
>10 years	20	9	15	6.5	35	8
Employment Status—Component and Officer/Enlisted						

Demographic	Frequency Focal Study1 Sample 1[*]	%	Frequency Focal Study 1 Sample 2	%	Frequency Samples 1 & 2 Combined	%
Active Duty	188	92	217	96	405	94
National Guard	16	8	10	4	26	6
Officer	43	21	98	43	141	33
Enlisted	161	79	129	57	290	67
Age Range						
18-22	19	9	9	4	28	6
23-27	96	47	126	56	222	52
28-32	71	35	76	33	147	34
33-37	16	8	14	6	30	7
38-42	2	1	2	1	4	1
>42	-	-	-	-	-	-

Note: [*]Retest was provided to Sample 1 with n=82 usable cases. Sample 1, n=204; Sample 2, n=227; Pilots 1 & 2 combined, n=431.

Table A14.

30-Items, Subscale, and Scale Descriptives—Focal Study 1

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
1 Hostility	.42	5.60	1.06	-1.24	2.27
6 Hostility	.41	5.40	1.17	-.65	.13
11 Hostility	.64	6.07	.97	-1.02	.64
16 Hostility	.42	5.36	1.11	-.40	-.48
21 Hostility	.54	4.70	1.38	-.30	-.42
26 Hostility	.56	5.37	1.19	-.77	.78
Hostility Subscale	α=.75 Test-Retest r=.73[**] Mean r=.34	32.50 (5.42)	4.62 (.77)	-.32	.06
2 Ambiguity	.48	5.67	1.03	-.97	1.19
7 Ambiguity	.45	5.34	1.28	-.69	-.04
12 Ambiguity	.38	5.64	1.04	-.86	.82
17 Ambiguity	.58	5.55	1.03	-.52	.02
22 Ambiguity	.41	5.48	1.28	-.68	-.15

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
27 Ambiguity	.46	5.83	1.02	-.72	.00
Ambiguity Subscale	α=.72 Test-Retest r=.68** Mean r=.31	33.51 (5.58)	4.34 (.72)	-.22	-.46
3 Volatility	.49	5.81	.92	-1.16	2.23
8 Volatility	.29	5.63	1.08	-1.39	3.07
13 Volatility	.52	5.76	.90	-.83	1.10
18 Volatility	.25	4.45	1.38	-.19	-.68
23 Volatility	.47	5.70	.89	-.56	.28
28 Volatility	.45	5.10	.98	.17	-.95
Volatility Subscale	α=.66 Test-Retest r=.53** Mean r=.27	32.44 (5.41)	3.79 (.63)	-.14	.41
4 Uncertainty	.46	5.35	1.18	-1.03	.91
9 Uncertainty	.48	5.80	.92	-.99	1.94
14 Uncertainty	.43	4.00	1.41	.20	-.78
19 Uncertainty	.58	5.15	1.27	-.57	-.58
24 Uncertainty	.63	4.93	1.29	-.50	-.68
29 Uncertainty	.54	5.17	1.25	-.49	-.47
Uncertainty Subscale	α=.77 Test-Retest r=.76** Mean r=.37	30.41 (5.07)	5.03 (.84)	-.07	-.23
5 Complexity	.41	5.86	1.11	-1.26	1.99
10 Complexity	.65	5.89	.89	-.76	.75
15 Complexity	.44	5.23	1.15	-.64	-.18
20 Complexity	.51	5.63	.87	-.50	.48
25 Complexity	.60	5.77	.89	-1.08	2.41
30 Complexity	.52	6.04	.78	-1.08	2.98
Complexity Subscale	α=.77 Test-Retest r=.67** Mean r=.37	34.41 (5.74)	3.90 (.65)	-.42	.09
Summated HEFS	α=.91 Test-Retest r=.80** Mean r=.26	163.29 (5.44)	17.24 (.57)	.13	-.01

Note: ** p<.01 (2-tailed), test-retest n=82; n = 429; SD = standard deviation; α = Cronbach's alpha; Mean r = Mean inter-item correlations for each subscale or summated HEFS as applicable; Means for the subscales and summated HEFS are

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis

reported to reflect the summation of all items for that particular scale, thus were not divided by the number of items in a particular subscale/scale; the numbers in parentheses reflect means and SD when subscales/scale was divided by the number of items in the respective subscale/ scale.

Table A15.

30-item HEFS and Subscale Correlation Matrix—Focal Study 1

Scale / Subscale	1	2	3	4	5	6
1 HEFS (Full Scale)	1.00					
2 Hostility Subscale	$.77^{**}$	1.00				
3 Ambiguity Subscale	$.77^{**}$	$.49^{**}$	1.00			
4 Volatility Subscale	$.80^{**}$	$.52^{**}$	$.50^{**}$	1.00		
5 Uncertainty Subscale	$.84^{**}$	$.50^{**}$	$.55^{**}$	$.63^{**}$	1.00	
6 Complexity Subscale	$.80^{**}$	$.52^{**}$	$.53^{**}$	$.58^{**}$	$.59^{**}$	1.00

Note: n=429; $^{**}p<.01$ (2-tailed)

Table A16.

30-items, PCA Eigenvalues and Variance—Focal Study 1

	Initial Eigenvalues		
Component	λ	% Variance	Cumulative %
1	8.79	29.31	29.31
2	2.11	7.02	36.34
3	1.57	5.23	41.56
4	1.48	4.94	46.50
5	1.30	4.33	50.83
6	1.12	3.72	54.55
7	1.06	3.52	58.07
8	.91	3.02	61.10
9	.87	2.90	63.99
10	.83	2.76	66.74

Note: n=429; λ=eigenvalue; Principal Component Analysis with Varimax rotation; only components with eigenvalues above .80 are reported

Table A17.

30-Item EFA Factor Loadings—Focal Study 1

Item / Subscale	Factor 1	2	3	4	5
Hostility Subscale; α=.75					
1. I perform best under pressure.		.34			
6. I enjoy the challenge of doing a job with limited resources.		.36			
11. I like situations that involve competition.				.73	
16. Environments that involve threating situations help me perform better.	.33				
21. I like to figure out ways to turn any situation into a competition.				.81	
26. Internal competition is necessary for the workplace.				.77	
Ambiguity Subscale; α=.72					
2. I feel ambiguous situations offer opportunities.		.45			
7. Ambiguity in a situation is ALWAYS bad.*					.68
12. I enjoy situations that can be interpreted in multiple ways.		.30			
17. Ambiguity provides an opportunity to excel.					.38
22. No one likes ambiguity.*					.61
27. Ambiguous situations are just part of the job.	.38				.36
Volatility Subscale; α=.66					
3. I am comfortable changing plans.		.85			
8. I find it easy to change my mind if the situation changes.		.44			
13. I am comfortable working in rapidly changing situations.	.43	.32			
18. I get upset when my routine is disturbed.*			.64		
23. I embrace change because it presents new opportunities.	.32				.54
28. I generally view change in a situation as a positive thing.		.25[1]			
Uncertainty Subscale; α=.77					

Item / Subscale	Factor 1	2	3	4	5
4. I am comfortable making decisions with little available information.		.85			
9. I am comfortable working in uncertain environments.		.51			
14. I get frustrated when I lack information about a situation.*			.69		
19. I have a hard time taking action without all the information about the future.*			.58		
24. I have trouble forming a plan when I'm missing information.*			.63		
29. I actively avoid uncertain situations.*			.40		
Complexity Subscale; α=.77					
5. I enjoy trying to explain complex problems in simple terms.	.30	.40			
10. I enjoy tasks that require a lot of mental effort.	.77				
15. I get frustrated with problems containing lots of factors.*			.56		
20. I can solve complex problems regardless of the situation.	.62				
25. I am comfortable thinking through novel and complex problems.	.82				
30. I enjoy coming up with new solutions to complex problems.	.69				

Note: n = 429; *=reverse coded item; α = Cronbach's alpha; [1] loadings <.30 were suppressed for easier interpretation, except in the case of Volatility #28 where .25 was the highest loading; Principal Axis Factoring with Promax rotation; Kaiser-Meyer-Olkin (KMO) = .91; Bartlett's Test of Sphericity was significant (χ^2 (435)=4611.52, p<.001)

Table A18.

Demographic Data for Focal Study 2—Criterion Study

Demographic	Frequency	%
	Focal Study 2 Criterion Study	

Demographic	Frequency	%
	Focal Study 2 Criterion Study	
Gender		
Male	357	100
Female	-	-
Ethnicity		
White	277	77.6
Black / African American	18	5
Hispanic	42	11.8
Asian	9	2.5
Other	11	3.1
Tenure Range (Time in Service)		
<1 year	95	26.6
1-3 years	138	38.7
4-6 years	84	23.5
7-9 years	32	9
>10 years	8	2.2
Employment Status—Component and Officer/Enlisted		
Active Duty	319	89.4
National Guard/Reserve	38	10.6
Officer	50	14
Enlisted	307	86
Age Range		
18-22	68	19
23-27	201	56.3
28-32	77	21.6
33-37	11	3.1
38-42	-	-
>42	-	-

Table A19.

30-Items, Subscale, and Scale Descriptives—Focal Study 2

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
1 Hostility	.44	5.80	.86	-.77	.99
6 Hostility	.32	5.99	.89	-1.07	2.10
11 Hostility	.51	6.53	.63	-1.23	1.34
16 Hostility	.40	5.69	1.04	-.66	-.13
21 Hostility	.43	4.96	1.43	-.66	.06
26 Hostility	.51	5.77	1.12	-1.05	1.26
Hostility Subscale	α=.69 Mean r=.29	34.75 (5.79)	3.83 (.64)	-.33	-.16
2 Ambiguity	.48	5.76	.92	-.90	1.87
7 Ambiguity	.59	5.28	1.19	-.43	-.49
12 Ambiguity	.36	5.93	.93	-1.18	1.89
17 Ambiguity	.69	5.63	.91	-.37	-.64
22 Ambiguity	.61	5.39	1.22	-.28	-.91
27 Ambiguity	.50	5.80	.96	-.74	.39
Ambiguity Subscale	α=.79 Mean r=.38	33.79 (5.63)	4.29 (.72)	-.21	-.65
3 Volatility	.50	6.05	.80	-1.10	2.80
8 Volatility	.33	5.69	1.06	-1.33	2.80
13 Volatility	.55	6.18	.67	-.35	-.29
18 Volatility	.33	5.13	1.29	-.50	-.57
23 Volatility	.48	6.07	.77	-.73	.90
28 Volatility	.44	5.57	.97	-.38	-.43
Volatility Subscale	α=.68 Mean r=.30	34.70 (5.78)	3.54 (.59)	-.15	.37
4 Uncertainty	.48	5.71	1.03	-1.07	1.62
9 Uncertainty	.43	6.16	.75	-1.29	4.19
14 Uncertainty	.55	4.79	1.37	-.17	-1.04
19 Uncertainty	.66	5.73	1.08	-1.00	.67
24 Uncertainty	.72	5.48	1.22	-.83	.06
29 Uncertainty	.49	5.49	1.19	-.75	-.19
Uncertainty Subscale	α=.79 Mean r=.40	33.36 (5.56)	4.73 (.79)	-.35	-.32

Item / Subscale / Scale	Corrected Item-Total Correlation	Mean	SD	Skewness	Kurtosis
5 Complexity	.46	5.97	.98	-1.23	1.99
10 Complexity	.64	6.26	.68	-.64	.46
15 Complexity	.54	5.83	1.01	-1.10	1.20
20 Complexity	.62	5.90	.77	-.52	.34
25 Complexity	.66	6.06	.84	-1.59	5.98
30 Complexity	.59	6.30	.71	-.89	1.14
Complexity Subscale	α=.81 Mean r=.43	36.32 (6.05)	3.61 (.65)	-.38	-.17
Summated HEFS	α=.91 Mean r=.27	172.93 (5.76)	15.56 (.52)	-.04	-.31

Note: ** $p<.01$ (2-tailed); n = 348; SD = standard deviation; α = Cronbach's alpha; Mean r = Mean inter-item correlations for each subscale or summated HEFS as applicable; Means for the subscales and summated HEFS are reported to reflect the summation of all items for that particular scale, thus were not divided by the number of items in a particular subscale/scale; the numbers in parentheses reflect means and SD when subscales/scale was divided by the number of items in the respective subscale/ scale.

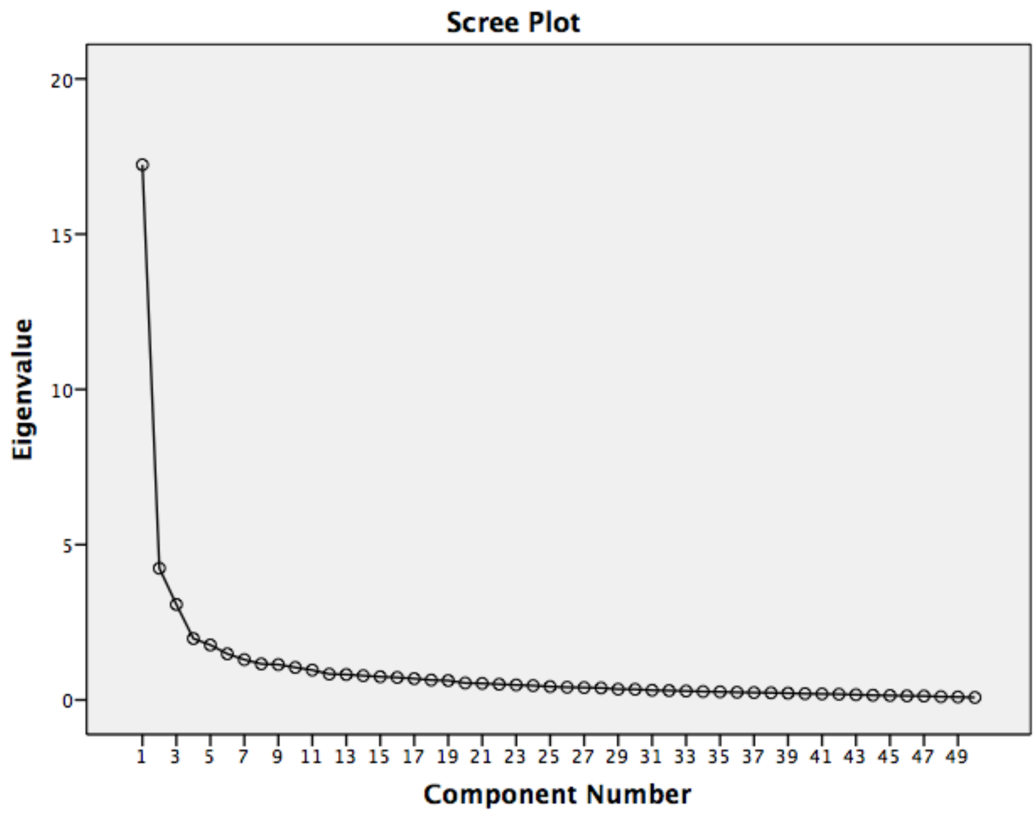
Table A20.

30-item HEFS and Subscale Correlation Matrix—Focal Study 2

Scale / Subscale	1	2	3	4	5	6
1 HEFS (Full Scale)	1.00					
2 Hostility Subscale	.66**	1.00				
3 Ambiguity Subscale	.76**	.38**	1.00			
4 Volatility Subscale	.80**	.43**	.47**	1.00		
5 Uncertainty Subscale	.81**	.32**	.49**	.62**	1.00	
6 Complexity Subscale	.86**	.47**	.58**	.64**	.67**	1.00

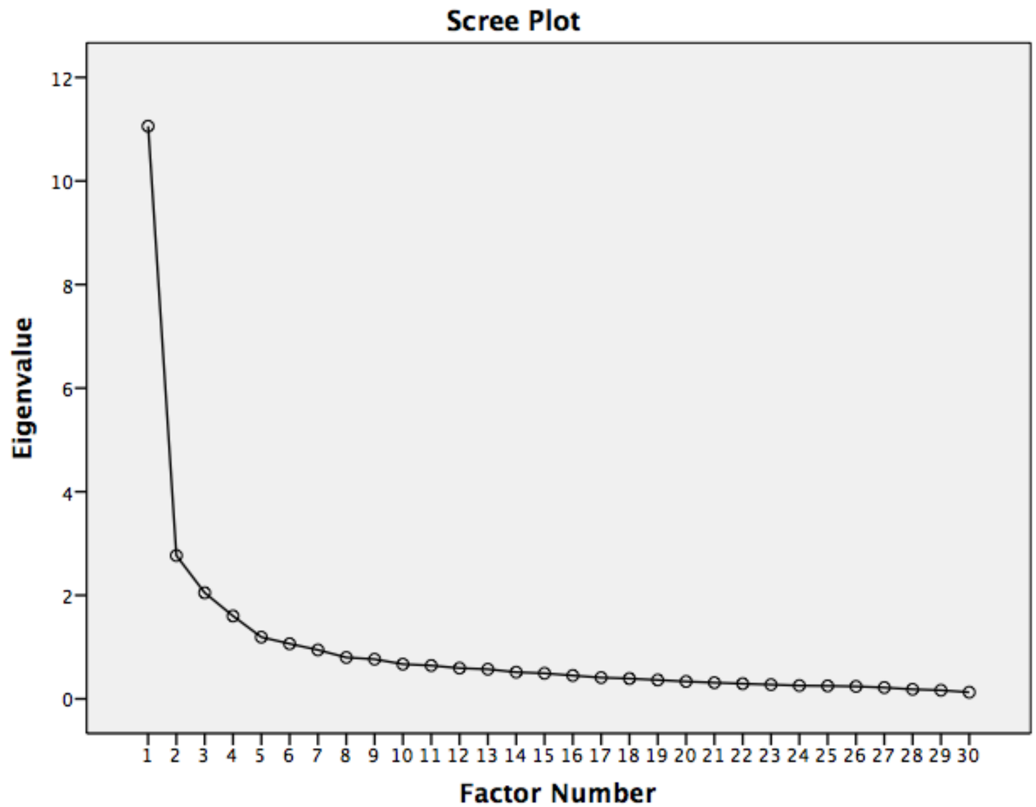
Note: n=348; ** $p<.01$ (2-tailed)

Appendix B--Figures



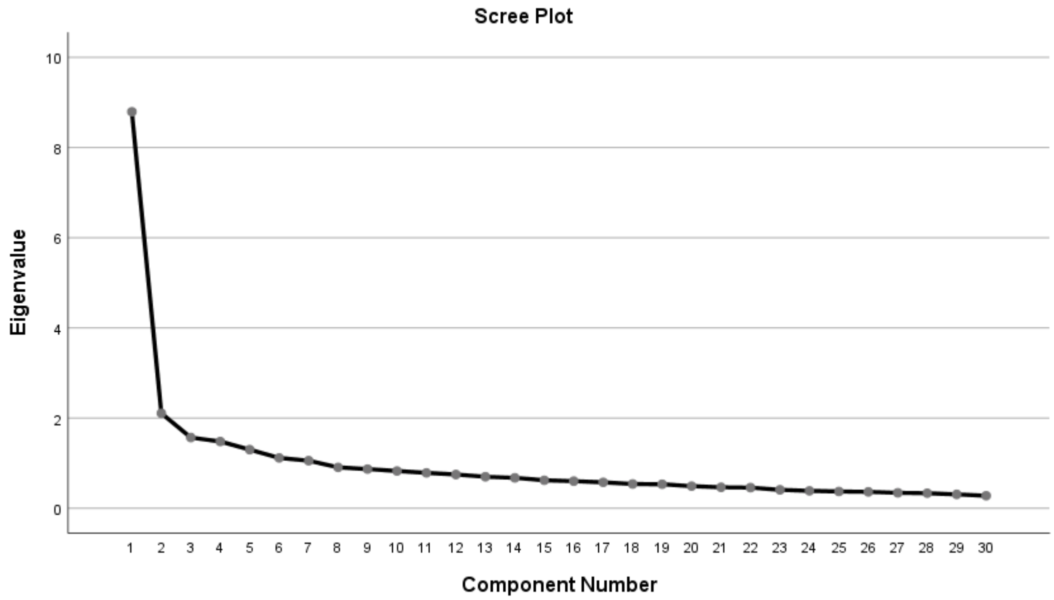
Note: n=200; 10 factors with Eigen values >1.0; Principal Component Analysis with Varimax rotation.

Figure B1. Initial PCA Scree Plot for the 50-items: Combined Pilot Studies.



Note: n=200; 6 factors with Eigen values >1.0; Principal Axis Factoring with Promax rotation.

Figure B2. EFA Scree Plot for the 30-items: Combined Pilot Studies.



Note: n=429; 7 factors with Eigen values >1.0; Same scree plot for the PCA and EFA, as neither the data nor items were altered.

Figure B3. Scree Plot for the 30-items: Focal Study 1.

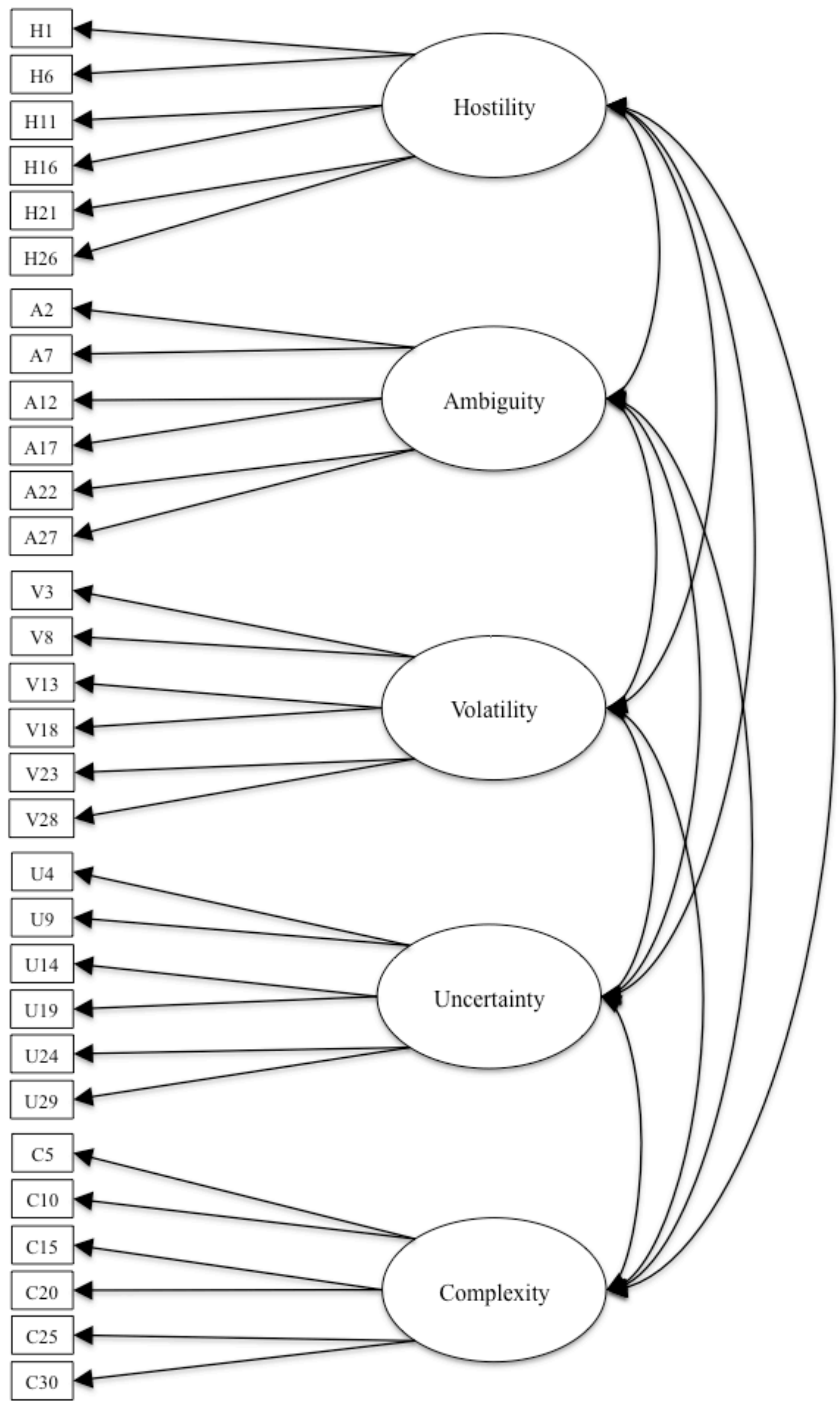


Figure B4. 5 factor model.

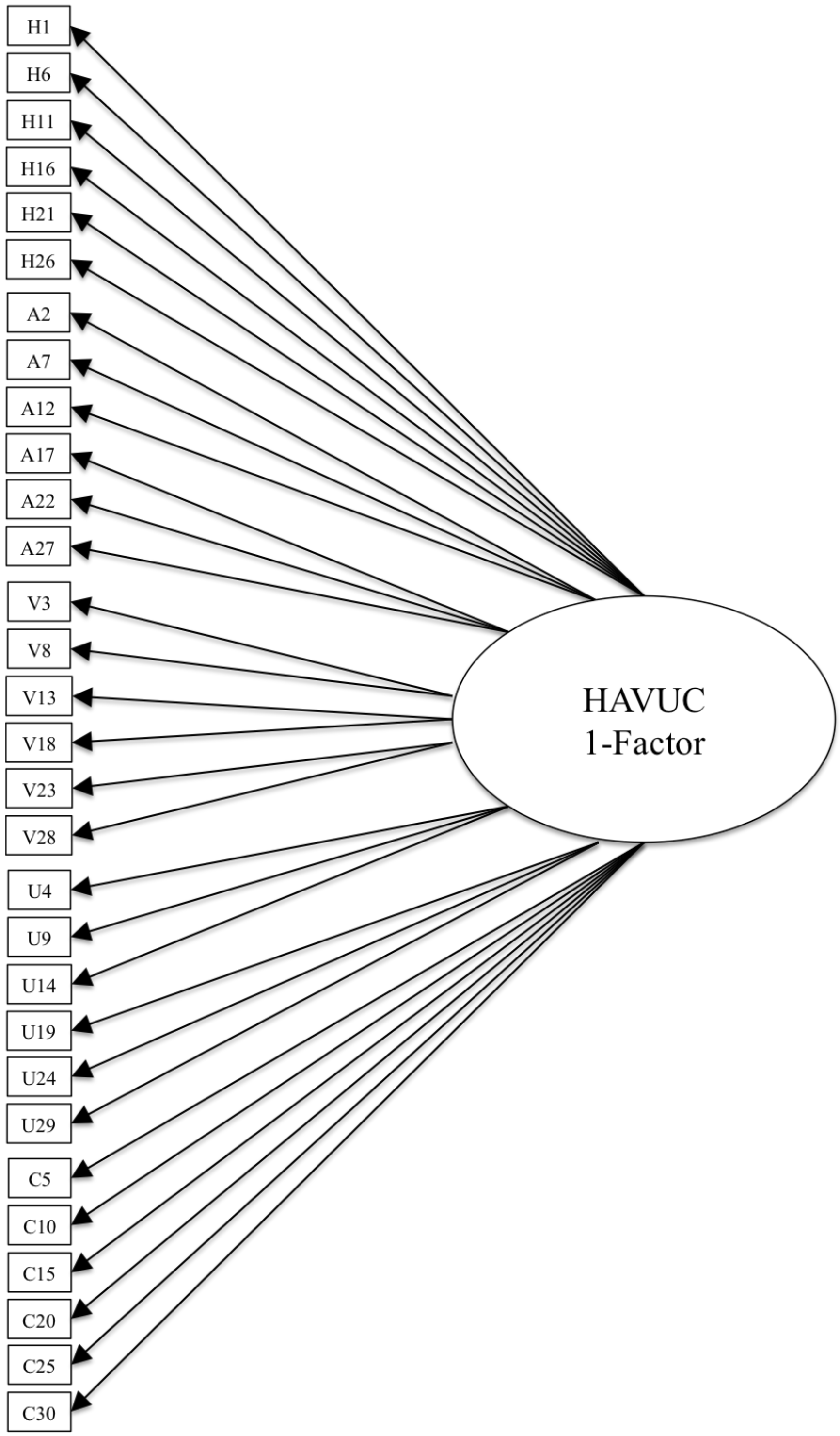


Figure B5. 1-Factor Model.

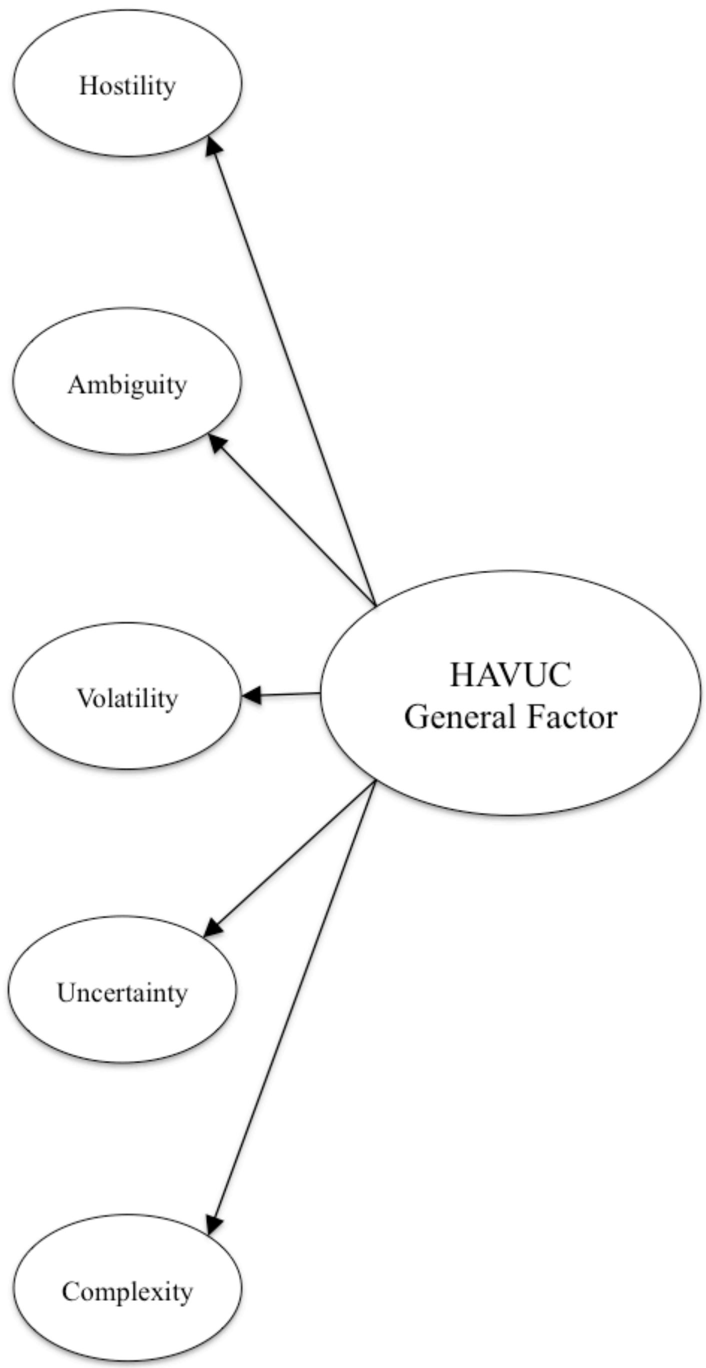
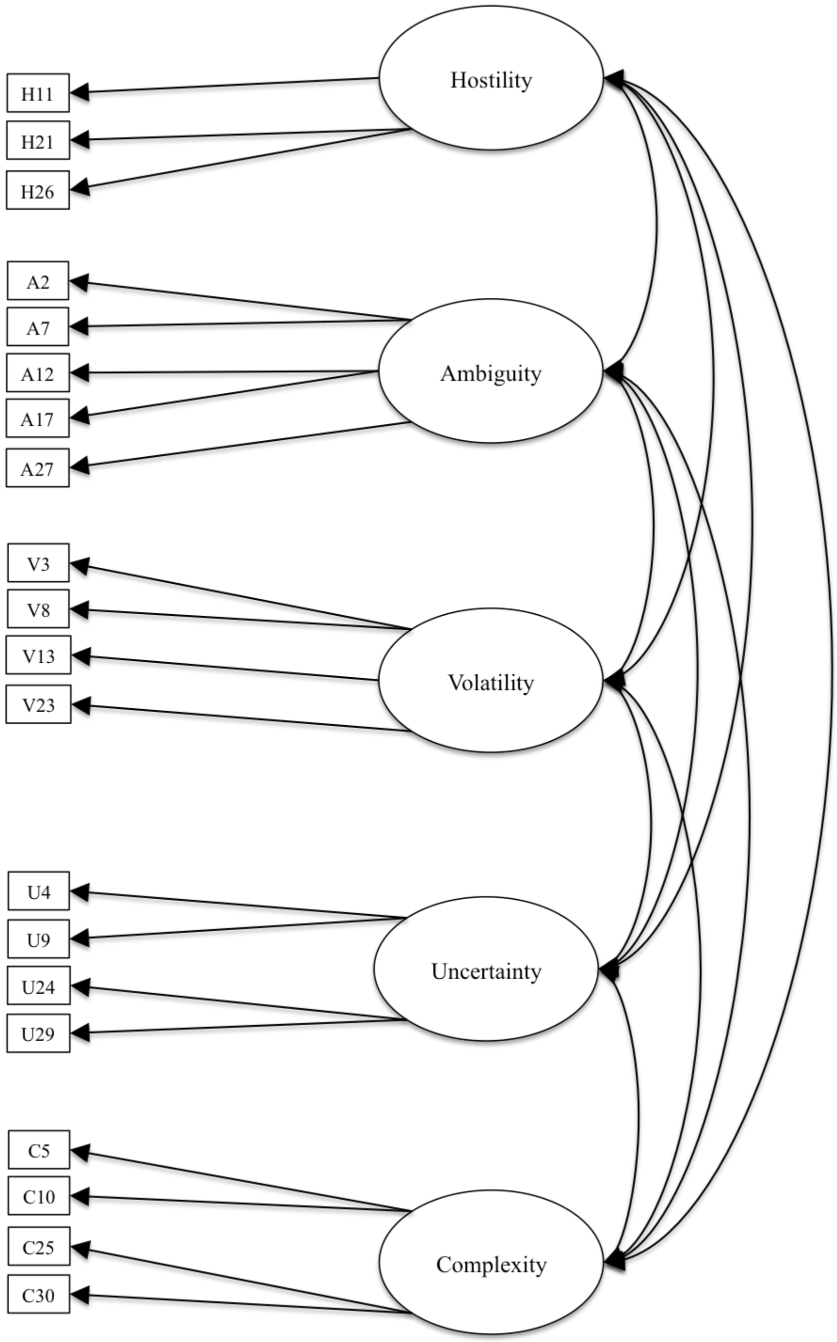
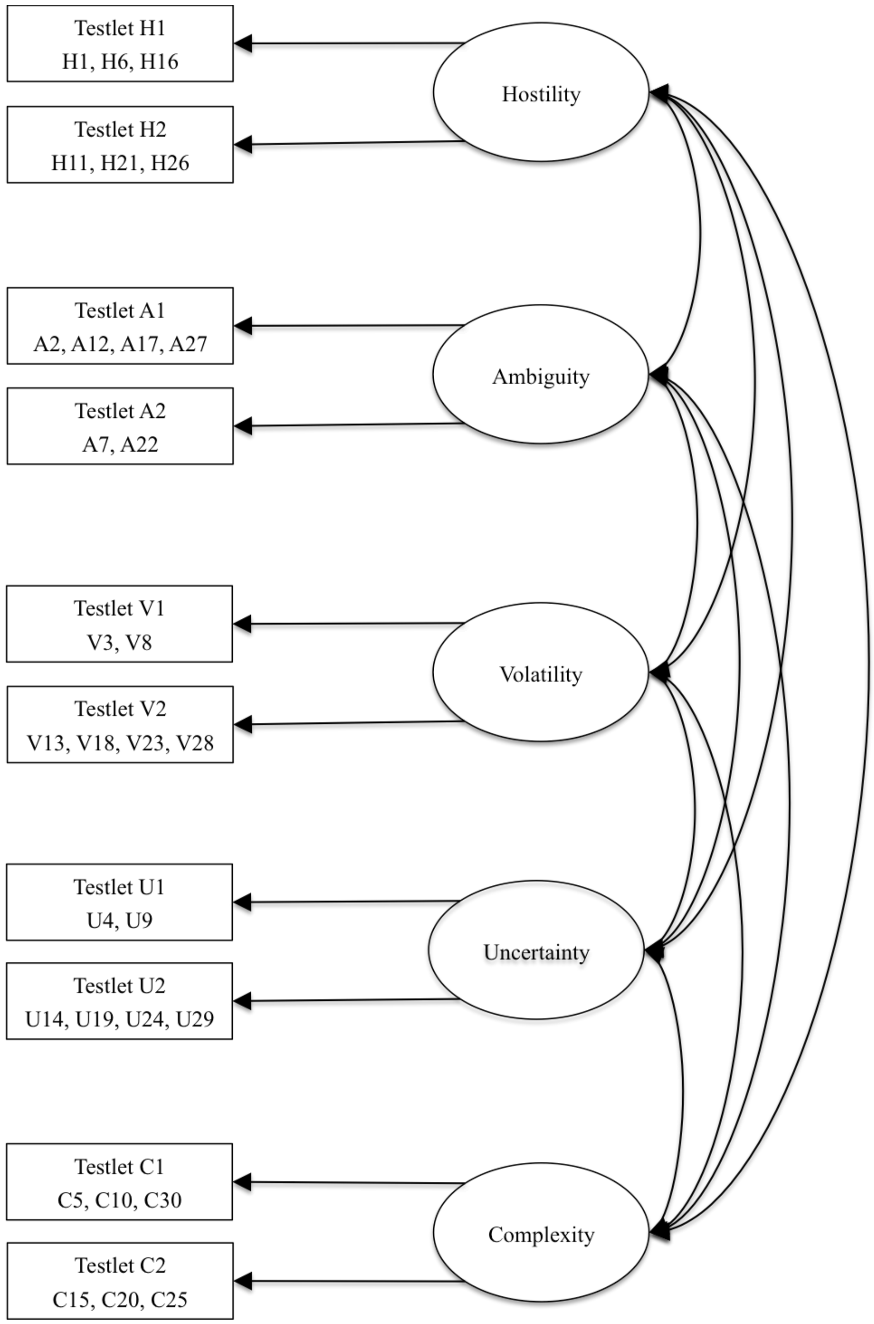


Figure B6. Higher order General Factor.



Note: Ten items were removed for exploratory purposes: H1, H6, H16, A22, V18, V28, U14, U19, C15, & C20. Model fit improved, but has deficiencies in regards to construct coverage.

Figure B7. Modified 5-Factor—Reduced to 20-items.



Note: Testlets were comprised of 2 to 4 items each, based on PCA fixing to two factors and attempts to balance factor loadings.

Figure B8. 5-Factor with Testlets.

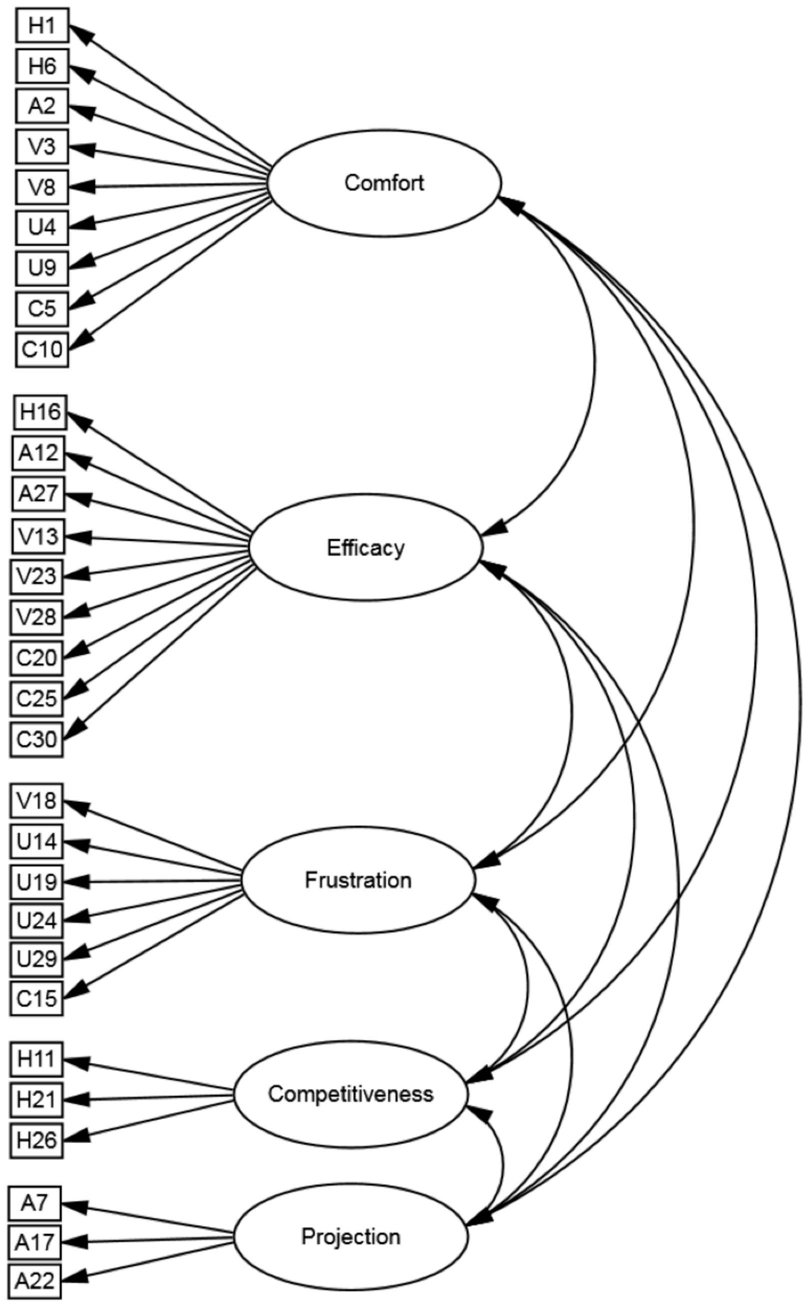


Figure B9. Exploratory 5-Factor—Different Constructs.

Appendix C—Initial HEFS Items

HAVUC Environment Fitness Scale (HEFS)—Initial 100/50-items

Below are the initial 100-items developed, noting that only 99-items of the items were used for pilot study 1. Item #100 located in the ambiguity subscale was dropped from the scale due to a technical issue with the online platform; however, after comparing the item to the other items the loss did not result in any deficiency in construct coverage (item is included but lined-out below). The items are presented in subscale order, i.e., HAVUC. The **bolded items** represent the retained items (i.e., 50-items, 10-items per subscale) utilized for pilot study 2 and the combined pilot 1 and 2 data set. Items were randomized as reflected by item number to the left of each item; the same item numbers were used for the 50-item set. Reverse coded items are annotated by an asterisk (*).

Hostility Subscale (20)

5 I am most comfortable making decisions under pressure.
6 I perform best under pressure.
8 I enjoy the challenge of doing a job with limited resources.
10 I prefer to take a chance when I see an opportunity.
14 I get stressed out when I'm tasked with something but not given the appropriate resources.*
15 I generally avoid situations where I may fail.*
33 I can succeed in any situation even when resources are scarce.
41 I feel avoiding a threatening situation is a sign of weakness.*
46 No decision is better than making a quick decision.*
59 I feel that risks are an unavoidable part of any job.
61 I feel you should pick a decision-making style and stick with it.*
63 I like situations that involve competition.
67 I feel opportunities can be found in any situation.
75 Environments that involve threating situations help me perform better.
84 I get anxious when I cannot control all the risks in a situation.*
85 I like to figure out ways to turn any situation into a competition.
87 I get frustrated when regulations make a situation more difficult.*
91 I get frustrated making decisions under time constraints.*
97 Internal competition is necessary for the workplace.
99 I feel most rules can be broken without any harm.*

Ambiguity Subscale (20)

7 Ambiguous situations can make work more enjoyable.
20 I thrive in ambiguous situations.
21 Ambiguous situations make me uncomfortable.*
26 I feel ambiguous situations offer opportunities.
32 I enjoy ambiguous situations.
34 Ambiguity in a situation is ALWAYS bad.*
37 I enjoy situations that can be interpreted in multiple ways.
40 I am comfortable with situations where it's difficult to determine what information is needed to help solve the problem.
45 People can be trained to deal with ambiguity.
48 I avoid ambiguous situations.*
50 Ambiguity provides an opportunity to excel.
51 I am comfortable making decisions in situations that have multiple interpretations.
56 No one likes ambiguity.*
60 Ambiguous situations are just part of the job.
62 I get frustrated with ambiguous guidance.*
64 I generally prefer situations that are easy to interpret.*
94 Ambiguity causes me concern.*
95 I get tense when I'm faced with an ambiguous situation.*
98 I avoid ambiguity by going with the first solution that comes to mind.*
~~100 Working in ambiguous environments stresses me out.~~

Volatility Subscale (20)

1 I am comfortable changing plans.
2 I find it easy to change my mind if the situation changes.
24 Changes in the situation stress me out.*
28 One thing is certain, things always change.
29 I am comfortable working in rapidly changing situations.
31 I get upset when my routine is disturbed.*
38 If someone else changes the plan, it stresses me out.*
44 I get frustrated when the situation constantly changes.*
49 I am comfortable in situations where information is changing constantly.
52 I get stressed out when the plan changes.*
53 There is no need to plan because the situation will change anyways.*
55 I stick to the plan even when situations change.*
58 I embrace change because it presents new opportunities.
73 I generally view change in a situation as a positive thing.

77 When things change, I alter my plans.
82 I prefer to stick to the plan even when the situation changes.*
83 I prefer the status quo over change.*
89 I generally am not surprised by change, I realize it's part of life.
92 I don't like being surprised by change.*
96 Unexpected changes to the situation is part of doing business.

Uncertainty Subscale (20)

3 I prefer doing jobs that have clear procedures.*
9 More information is ALWAYS better than less information.*
12 I look for the positive in uncertain situations.
16 I am comfortable making decisions with little available information.
17 I am comfortable working in uncertain environments.
18 I get frustrated when I lack information about a situation.*
19 I feel threatened by uncertain situations.*
25 Planning can remove all uncertainty.*
27 I am comfortable taking action even if I am uncertain about the outcomes.
36 Uncertainty in a situation is ALWAYS a problem.*
42 Sometimes you have to take action to gather more information.
47 I have a hard time taking action without all the information about the future.*
54 I prefer being told how to do something, rather than deciding on my own.*
57 Not knowing what the future holds stresses me out.*
65 I am comfortable knowing that uncertainty is part of life.
69 You can usually gather all required information prior to making decisions.*
76 I have trouble forming a plan when I'm missing information.*
80 I am comfortable not knowing what the future holds.
88 I actively avoid uncertain situations.*
90 I generally cannot relax when I don't know what tomorrow holds.*

Complexity Subscale (20)

4 No one person has all the answers in complex situations.
11 I enjoy trying to explain complex problems in simple terms.
13 I get frustrated if I have to ask for help solving complex problems.*
22 I am comfortable making decisions about complex problems that have no clear answer.
23 I prefer to understand how something works rather than take someone's word for it.

30 I often try to determine better ways of doing things.
35 I enjoy tasks that require a lot of mental effort.
39 People from different disciplines can offer good insights to complex situations.
43 I get frustrated with problems containing lots of factors.*
66 I can solve complex problems regardless of the situation.
68 I am comfortable thinking through novel and complex problems.
70 I prefer complex problems over simple problems.
71 I like the challenge of solving complex problems.
72 I get overwhelmed in complex situations.*
74 I like the challenge of novel problems that others have found difficult.
78 I enjoy coming up with new solutions to complex problems.
79 I enjoy thinking about how culture adds to the complexity of problems.
81 Complex situations are out of my control.*
86 I prefer letting things happen rather than expend energy thinking about problems.*
93 I prefer to quickly identify a solution and move on.*

Appendix D—Final 30-item HEFS

HAVUC Environment Fitness Scale (HEFS)—Focal Study Items (30)

Below are the 30-items retained for use in the focal studies; 6 items per subscale. The items are presented in subscale order, i.e., HAVUC. The 30-items were renumbered for use in the focal studies, with the original randomized item numbers in parentheses for reference. The items were renumbered using a revolving pattern, 1, 2, 3, 4, 5 assigned to the first item of each respective subscale, followed by 6, 7, 8, 9, 10 to the second item of each subscale, and so on. Reverse coded items are annotated by an asterisk (*).

Hostility Subscale (6)

1 (6) I perform best under pressure.
6 (8) I enjoy the challenge of doing a job with limited resources.
11 (63) I like situations that involve competition.
16 (75) Environments that involve threating situations help me perform better.
21 (85) I like to figure out ways to turn any situation into a competition.
26 (97) Internal competition is necessary for the workplace.

Ambiguity Subscale (6)

2 (26) I feel ambiguous situations offer opportunities.
7 (34) Ambiguity in a situation is ALWAYS bad.*
12 (37) I enjoy situations that can be interpreted in multiple ways.
17 (50) Ambiguity provides an opportunity to excel.
22 (56) No one likes ambiguity.*
27 (60) Ambiguous situations are just part of the job.

Volatility Subscale (6)

3 (1) I am comfortable changing plans.
8 (2) I find it easy to change my mind if the situation changes.
13 (29) I am comfortable working in rapidly changing situations.
18 (31) I get upset when my routine is disturbed.*
23 (58) I embrace change because it presents new opportunities.
28 (73) I generally view change in a situation as a positive thing.

Uncertainty Subscale (6)

4 (16) I am comfortable making decisions with little available information.
9 (17) I am comfortable working in uncertain environments.
14 (18) I get frustrated when I lack information about a situation.*
19 (47) I have a hard time taking action without all the information about the future.*
24 (76) I have trouble forming a plan when I'm missing information.*
29 (88) I actively avoid uncertain situations.*

Complexity (6)

5 (11) I enjoy trying to explain complex problems in simple terms.
10 (35) I enjoy tasks that require a lot of mental effort.
15 (43) I get frustrated with problems containing lots of factors.*
20 (66) I can solve complex problems regardless of the situation.
25 (68) I am comfortable thinking through novel and complex problems.
30 (78) I enjoy coming up with new solutions to complex problems.