

VOLITIONAL VULNERABILITY:  
FROM QUALITATIVE  
TO QUANTITATIVE

By

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This paper is dedicated to the volitionally vulnerable people of the world—those seeking compassion, sensing connection and having the courage to be imperfect. You make life beautifully authentic.

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Title of Study: VOLITIONAL VULNERABILITY: FROM QUALITATIVE TO  
QUANTITATIVE

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Abstract: This paper introduces a newly developed psychometric measure called volitional vulnerability. Results of the present study show how the qualitative theory of vulnerability as set forth by Dr. Brené Brown can be expressed as a quantitative psychometric measure and how that same measure can be utilized as an effective predictor and mediator of other well-established research constructs such as psychological safety and organizational citizenship behaviors. The study of volitional vulnerability contributes to a deeper understanding of the theories of psychological safety and organizational citizenship behaviors. Expressed as a three-factor psychometric measure, volitional vulnerability shows significant and positive associations to these constructs and acts as a partial mediator between them. Courage, compassion and connection appear to play a role in these associations and act in a way to support their articulation. Volitional vulnerability may play a significant role in image management as it relates to psychological safety and is potentially a heuristic to support decision-making in the expression of psychological safety and organizational citizenship behaviors. In review of the hypotheses tested, this study provides empirical evidence that the three factors of vulnerability—courage to be imperfect, connection, and compassion—are essential elements of volitional vulnerability as predicted by Dr. Brown's theory. Second, there is a positive and significant association between psychological safety and volitional vulnerability. Third, volitional vulnerability is a positive and significant contributor to the prediction of organizational citizenship behaviors. Fourth, psychological safety is a positive and significant contributor to the prediction of organizational citizenship behaviors. Fifth, results of this study show that the path between psychological safety and organizational trust is not significant. Sixth, volitional vulnerability is a partial mediator along the decision-making path between psychological safety and organizational citizenship behaviors (Indirect / Total effect = 11.4%) but has no significant mediating effect between organizational trust and workplace performance results. Seventh, the association between organizational trust and volitional vulnerability was not statistically significant. Finally, volitional vulnerability and psychological safety are not significantly related to workplace performance results. Implications of these findings are considered. Contributions to theory and practice are reviewed. Limitations and future research are discussed.

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## CHAPTER I

### INTRODUCTION

This research focuses on the development of a new psychometric measure called volitional vulnerability and its' use in a predictive model.

This study extends the work of Brené Brown, Ph.D., LMSW by introducing a quantitative measure of one of her key concepts, namely vulnerability. Dr. Brown is a highly acclaimed qualitative research professor at the University of Houston's Graduate College of Social Work. She has spent the past decade studying vulnerability, courage, worthiness, and shame. Based on Dr. Brown's extensive qualitative research, this study posits a three-factor structure of vulnerability consisting of courage, compassion and connection. Internal consistencies are evaluated for acceptable reliability. The structure was tested via confirmatory factor analysis. The construct underwent validity analysis and model fit evaluation.

This research also introduces a model that is designed to test both the predictive capacity of volitional vulnerability and its' nomological network. The model consists of constructs expected to be associated with the nomological network including psychological safety, organizational citizenship behavior, and organizational trust. The model is composed of two independent or outcome variables: organizational citizenship behaviors and workplace performance results . There are three independent or predictor variables including

psychological safety, organizational trust and volitional vulnerability. Measures used for this study are specified in Chapter III Methodology.

### **Contribution to Theory and Practice**

From a theoretical perspective, a quantifiable psychometric measure for vulnerability has the potential to expand our perception about well-researched academic constructs such as psychological safety, organizational citizenship behaviors and organizational trust. This study is expected to deepen our understanding of key concepts such as risk-taking, judgment, and decision-making under uncertainty in organizational relationships at the individual and team levels. This study illustrates the value of integrating diverse fields of study such as social work and organizational behavior.

In terms of contribution to practice, this study may facilitate potential improvements in organizational effectiveness, process improvement, change management, learning from failure, team learning, teamwork, cooperation and collaboration.

### **Research Objectives**

The primary objectives of the present research are to:

- (1) Document the development of a new psychometric scale called volitional vulnerability, check its internal consistencies, validate the measure using confirmatory factor and validity analysis, and
- (2) Introduce a predictive model that demonstrates the utility and predictive capability of volitional vulnerability as a psychometric measure.

In a higher sense, these aims will support a clearer understanding of some basic yet critical human interactions, traits and attributes that might enable business enterprises to achieve greater success and in turn contribute to the improved wellbeing and betterment of our society at large.

The research model for this study is illustrated next (see Figure 1).

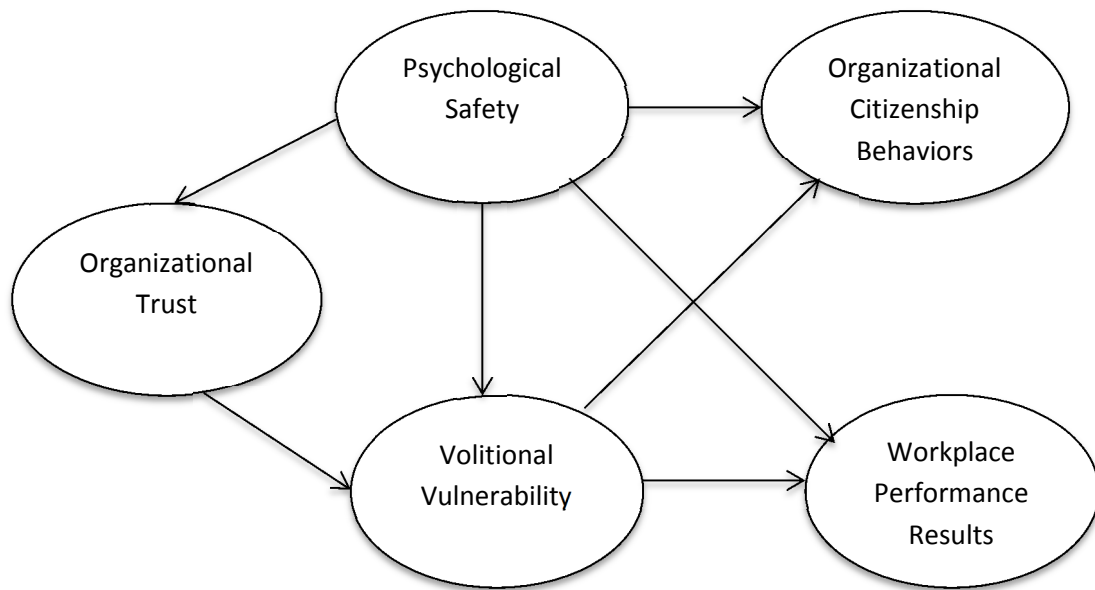


Figure 1. Research model.

**Volitional Vulnerability:** Willingness to expose oneself to threat, damage or attack in pursuit of an organizational goal (Gajda & Slipetz, 2014).

**Psychological Safety:** Perceptions of the consequences of taking interpersonal risks in a particular context such as a workplace (Edmondson, 1999).

**Organizational Trust:** Willingness of a party to be vulnerable to the actions of another party (Mayer, Davis & Schoorman, 1995).

**Organizational Citizenship Behaviors:** Individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in aggregate promotes the effective functioning of the organization (Organ, 1988).

**Workplace Performance Results:** Data obtained from employee performance appraisals including the following categories: job knowledge, work results, adaptability, interpersonal relationships, safety habits, core values and overall score.

## CHAPTER II

### REVIEW OF LITERATURE

#### **Volitional Vulnerability: Conceptualization and Previous Research**

This project builds upon the recent work of Dr. Brené Brown, Ph.D., LMSW by introducing a quantitative measure of one of her key concepts, namely vulnerability. Vulnerability has received a lot of attention in the popular press lately. Thus, it would not be inaccurate to say that vulnerability is a trending media sensation. Vulnerability has become in vogue and ubiquitous. The public's appetite for vulnerability is voracious. Vulnerability is routinely referenced on Facebook, YouTube, Twitter, TedX (Ted Talks), television talk shows, national newspapers, bestsellers' lists and in journal research libraries. Much of the credit and the person at the center of this frenzied media storm is a researcher named Brené Brown. Dr. Brown is a highly acclaimed qualitative research professor from the University of Houston's Graduate College of Social Work and has spent the last decade studying vulnerability, courage, worthiness, and shame. In 2006, her article on "Shame Resilience Theory: A Grounded Theory Study on Women and Shame" was published in *Families in Society*. In 2007, Dr. Brown quietly published her first book, *I Thought It Was Just Me*. A few years later in 2011, Dr. Brown burst on the scene following a sensational and provocative 2010 TEDx Houston Talk presentation on "The Power of Vulnerability" that went viral (Brown, 2010). It is one of the most watched talks on Ted.com with over fifteen million views. Dr. Brown has become a best-selling author with two books to her

credit on the #1 *New York Times* Best Sellers' list (*The Gifts of Imperfection*, 2010; *Daring Greatly: How the Courage to Be Vulnerable Transforms the Way We Live, Love, Parent and Lead*, 2012). She is a highly sought after public speaker and presented the closing talk, *Listening to Shame*, at the 2012 Ted Conference in Long Beach, California.

Dr. Brown is a self-professed and proud qualitative researcher. According to Dr. Brown, "I am a story-teller. I'm a qualitative researcher. I collect stories, that's what I do...and maybe stories are just data with a soul" (Brown, 2011). Her research on vulnerability is premised squarely on thousands of interviews using academically accepted qualitative methods. These qualitative interviews, founded in the medium of social work, provide a means to enter the conversation in the quantitative world of business management. Somewhat ironically and maybe prophetically, one of her dissertation mentors advised Dr. Brown that "If it can't be measured, then it doesn't exist". The purpose of this current research is to provide evidence that in fact vulnerability does exist, and that it is a bona fide measurable psychometric construct with significant utility, practical application and predictive capability.

Dr. Brown's Shame Resilience Theory (SRT), is premised in part on the Merriam-Webster Dictionary's (1997) definition of *vulnerability* as follows: "the word *vulnerable* is derived from the Latin word, *vulnerare*, meaning "to wound". The definition includes "capable of being wounded" and "open to attack or damage" " (Brown, 2006, p. 48). Building on this definition and its association in Social Science, this research defines *vulnerability* in the context of organizational behavior as follows: "the degree to which one willingly exposes oneself to threat, damage or attack in pursuit of an organizational goal". Additionally, the term "volitional" has been added to indicate that the act of being vulnerable comes of one's own free will as differentiated from the idea of being "out-ed" or forced to admit to some personal shortcoming.

From her Ted Talk presentation on "The Power of Vulnerability" given in June, 2010 at TedXHouston, Dr. Brown asserts that *the willingness to be vulnerable* is comprised of three basic factors:

- 1) Courage to be imperfect,
- 2) Compassion, and
- 3) Connection.

Each of these factors is covered in more detail in the next section dealing with factor structure.

### **Volitional Vulnerability: Factor Structure**

In her work, Dr. Brown has not developed a quantitative measure of vulnerability. Dr. Brown posits a formal definition of connection that has been utilized for this proposal.

Definitions of the courage to be perfect and compassion have been developed in order to advance the development of a psychometric scale to measure this theory of vulnerability, and to test its relationship with other existing measures such as psychological safety and organizational trust.

Definitions of the three factors comprising vulnerability are as follows:

- 1) ***The courage to be imperfect*** is defined as the inner strength and confidence necessary to recognize and reveal one's personal flaws. In a broader sense, this subsumes the idea that one needs to be brave enough to admit to shortcomings that act as barriers to the achievement of organizational goals and objectives. This includes acknowledging one's lack of knowledge, experience or skills in the execution of a relevant organizational task. In another sense, this individual learning from imperfections may be thought of as the organization's learning from failure. Both instances depict a form of continuous improvement. At the individual level, it represents a form of personal development and career growth. At the organizational level, it denotes improvement in quality management processes leading to improved performance and output. Such benefits can only be derived when individuals have the courage to speak openly and honestly about their imperfections.
- 2) ***Human compassion*** is sympathetic consciousness of others' distress together with a desire to alleviate it. It is proposed that vulnerability can only exist in the context and in the presence of human compassion. Consider for example a relationship that is

emotionally devoid of any human compassion. Can it be possible for vulnerability to exist in such a hypothetical relationship? A relationship that exhibits vulnerability requires one party who is willing to expose their personal shortcomings and bear the accompanying distress, and another party who empathically recognizes the inherent risk that is undertaken, is sympathetically conscious of the associated distress and is prepared to take action do something about it. Thus, in the absence of human compassion, there is no empathy, sympathy or action towards those who are exposed and vulnerable.

- 3) According to Dr. Brown, *connection* is defined as “the energy that exists between people when they feel seen, heard, and valued; when they can give and receive without judgment; and when they derive sustenance and strength from the relationship” (Brown, 2010, p. 19). NOTE: the descriptor “necessary” has been added to denote the idea that organizational relationships and connections exist by necessity and not as a matter of happenstance or “brutal juxtaposition”. To explain using a metaphor, take the example of a molecule of water. It is known from chemistry that a molecule of water or H<sub>2</sub>O consists of two atoms of hydrogen and one atom of oxygen bonded together. In order for water to be water, hydrogen and oxygen must be present in this structure. This arrangement does not exist randomly or by accident; it exists because it must exist as such in reality. Similarly, we postulate that an organizational relationship (or for that matter a human relationship) does not exist in non-deterministic fashion or as a function of random fate. Relationships exist because they must exist as part of an organizational reality. Philosophically, this is Martin Buber’s adage that “we are all caught in the net of the world”.

One of the primary objectives of this study is to validate a psychometric scale of measurement for vulnerability based on these three factors as defined above, thus the first hypothesis:



*Hypothesis 1: Volitional Vulnerability consists of three factors, namely, courage, compassion, and connection.*

Why is it important to have a psychometric scale for vulnerability? Predictive capability aside, vulnerability may serve to explain the true nature of other highly researched constructs such as psychological safety and organizational trust. A review of the extant literature suggests that vulnerability is closely related to organizational trust and psychological safety, and likely shares the same nomological network.

In their highly cited integrative model of organizational trust, Mayer, Davis, and Schoorman (1995) propose a model of trust whereas “risk taking in relationship” exists as a mediator between “trust” and “outcomes”. What do Mayer et al. have to say about “risk taking in relationship”? To quote: “There is no risk taken in the willingness to be vulnerable (i.e., to trust), but risk is inherent in the behavioral manifestation of the willingness to be vulnerable” (1995, p. 724). These words suggest that the vulnerability and risk taking in relationships are inextricably entangled. One interpretation might simply be that they are one in the same. If so, they must share the same nomological space.

According to Amy Edmondson (1999), “psychological safety describes perceptions of the consequences of taking interpersonal risks in a particular context such as a workplace”. How does one arrive at the perceptions of those consequences, be they good (approachable) or bad (avoid)? By what means does a person judge whether it is safe or unsafe to take interpersonal risks in the workplace? This current study takes the position that such judgments are premised on one’s sense of vulnerability, or one’s willingness to expose oneself to threat or harm in order to achieve an organizational goal. Taking interpersonal risks to achieve psychological safety derives from volitional vulnerability, which is a combination of one’s courage to be imperfect, a sense of connection and the feeling of compassion.

### **Volitional Vulnerability Scale Development**

In the autumn of 2014, John Gajda and the present author, students in Cohort II of Oklahoma State University's PhD program for Executives, designed a psychometric scale of measurement for vulnerability based on the three factors as defined above. Development of the new scale for volitional vulnerability consisted of the following steps: (1) Preparation, review and refinement of item generation list (2) IRB approval process (3) use of MTurk services (4) exploratory factor analysis (5) confirmatory factor analysis, and (6) a review of the nomological network and related constructs. In order to provide some background and context to the present study, a brief summary of each of these steps is now provided. For those who may be interested, a complete copy of the detailed work undertaken by John Gajda and myself is provided in the appendix to this study.

According to researcher Dr. Brené Brown, the underpinnings of vulnerability include courage, compassion and connection. Construct and factor definitions for the terms volitional vulnerability, courage to be imperfect, compassion and connection were developed based on Dr. Brown's theory. These are the same definitions provided earlier in this chapter. These definitions were used to brainstorm and generate an initial list of fifty items. Eight subject content experts supported the sorting of the initial item list. Based on feedback from the eight subject content experts, the item list was refined to twenty-two questions across three factors.

Application for review of human subjects research was submitted to OSU IRB Institutional Review Board on September 6, 2014. Approval of IRB application was granted on September 18, 2014.

MTurk Services was retained to provide responses to surveys consisting of twenty-two questions. Each response was rated on a five-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. The survey was launched on September 24, 2014. Two hundred responses

were collected. Twenty-three responses screened out due to suspected/problematic response patterns. The survey was re-launched on September 26, 2014. An additional twenty-three responses were collected. Four responses were screened out, leaving a total of 196 responses used for data analysis.

*jmp* software was used to assess the reliability of the data received from MTurks. The Cronbach's alpha for the entire set for *Courage to be Imperfect* was 0.8452. The Cronbach's alpha for the entire set for *Human Compassion* was 0.8955. The Cronbach's alpha for the entire set for *Necessary Connection* was 0.8425. The results suggested acceptable reliability for all three factors. Next, exploratory factor analysis (EFA) was conducted to evaluate the dimensionality of the scale. Using *jmp* software, Principal Components was run first in order to do a factor analysis. Default estimation method was set at ML (Maximum Likelihood) and Quartermin for an Oblique Rotation Method. The Factor Loading Plot illustrated a clear break between the factor, *Courage to be Imperfect* and the factors for *Human Compassion* and *Necessary Connection*. The latter two factors were less clearly separated. The initial Rotated Factor Loading plot showed many data below 0.40. These were removed one at a time to obtain a "clean" measure of the constructs. There were four Eigenvalues greater than one suggesting the possibility of four factors. The Scree Plot showed one reasonably sharp elbow and one slight elbow suggesting the possibility of three factors. Finally, four items were removed due to poor fit and in order to obtain a clean measure of the construct.

Confirmatory Factor Analysis (CFA) was conducted using SPSS AMOS software. A preliminary model was configured in SPSS AMOS based on the EFA clean measure of construct three-factor rotated loading chart. In the first run, a number of factor loadings were below 0.70 and a number of model fit indicators suggested unacceptable model fit. (Specific indices are provided in the appendix to this study). Several iterations of the model were run in order to obtain

acceptable model fit and validity. The final iteration formed the basis of the scale used for the present study.

Finally, a literature review was conducted to identify related constructs in the nomological network that included: Psychological Safety (Edmondson, 1999); Organizational Trust, (Mayers, et al., 1995); Organizational Citizenship Behaviors (Organ, 1988).

### **Volitional Vulnerability and Its Nomological Network**

The next section provides a detailed description of the theoretical relationships that volitional vulnerability shares with psychological safety, organizational trust, organizational citizenship behaviors and workplace performance results. The hypothesized research model illustrated in Figure 2 shall guide the introduction of hypotheses 2 through 7.

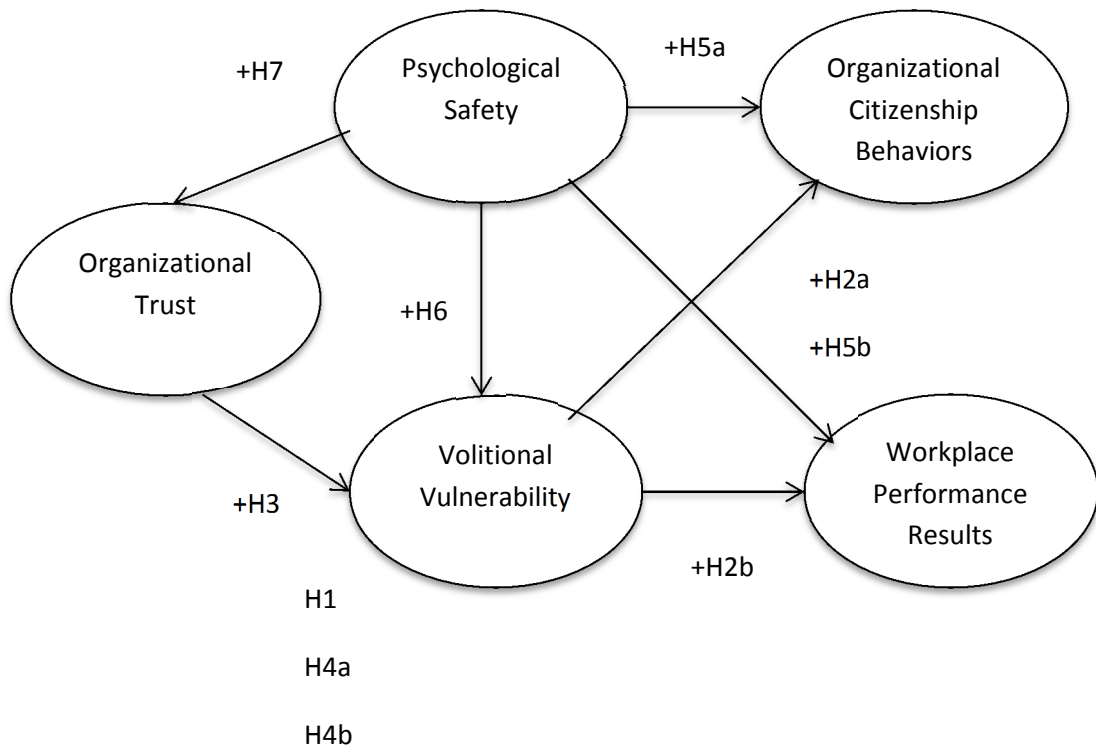


Figure 2. Hypothesized research model.

In general terms, common threads and similarities can be found between vulnerability and the other constructs. At its most fundamental level, vulnerability exists as a form of decision-making and risk-taking between parties. According to Brené Brown (2012), “vulnerability is basically uncertainty, risk and emotional exposure”. In a world of “bounded rationality” (Simon, 1955, 1979), what criteria do individuals use in order to make the decision to be vulnerable in a relationship? How do they make the leap from avoiding vulnerability to embracing it? To draw upon behavioral economics and the work of Daniel Kahneman (2003), vulnerability may exist as a form of intuitive judgment situated somewhere “between the automatic operations of perception and the deliberate operations of reasoning”. In determining how much risk a person is willing to take (i.e., the degree to which one willingly exposes oneself to threat, damage or attack in pursuit of an organizational goal), one might envision the use of a Kahneman-styled “primordial evaluative system” wherein a mental checklist of sorts operates at lightning speed and questions are quickly asked and answered. Do I have the courage to admit my lack of understanding to the person in front of me? Am I dealing with a compassionate person—one who is willing to help me? Do I feel a sense of connection with this individual and can I safely open up in front of this person? As percepts or signals are being assessed for relative goodness (can be approached) or badness (should be avoided), the decision to risk becoming vulnerable is generated. This study takes the position that psychological safety and organizational trust are similar constructs that follow similar pathways and exist as part of the same nomological network.

### **Volitional Vulnerability, Organizational Citizenship Behaviors and Workplace**

#### **Performance Results**

This study builds upon the research of Larry J. Williams and Stella E. Anderson (1991), both of Purdue University, involving predictors of organizational citizenship behaviors (OCB). To specifically measure organizational citizenship behaviors, this research adapts six items from Williams and Anderson’s twenty-item scale. At the same time, this research considers workplace performance results of individuals as a specialized form of organizational citizenship behaviors

and evaluates workplace performance results using criteria established in the sample population's company performance appraisal program. Supervisor's evaluations of employee work performance are based on seven indicators defined in the formal appraisal system. (see Section III Methodology).

Building on Chester Barnard's (1938) "willingness to cooperate" and Daniel Katz's (1964) "innovative and spontaneous behaviors", Dennis Organ (1988) described organizational citizenship behavior as "individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate promotes the effective functioning of the organization". Organ's research subsequently spawned many similar and related concepts including extra-role behavior (cf. Van Dyne, Cummings, & Parks, 1995), prosocial organizational behaviors (cf. George, 1990, 1991; George & Bettenhausen, 1990; O'Reilly & Chatman, 1986), organizational spontaneity (cf. George & Brief, 1992; George & Jones, 1997) and contextual performance (cf. Borman & Motowidlo, 1993, 1997; Borman, White, & Dorsey, 1995; Motowidlo & Van Scotter, 1994).

Walter Borman (2004) described four popular streams of citizenship/contextual performance research. The first stream involved "supervisors' use of task and citizenship performance in making global judgments about subordinates". According to Borman, studies provide empirical evidence that supervisors typically give roughly equal weighting to task and citizenship/contextual performance when making overall judgments about employees' performances (Motowidlo & Van Scotter, 1994; Podsakoff, MacKenzie, Paine, & Bachrach, 2000). For the purposes of the current study, this is an important finding given that we will be utilizing data taken from the sample population's performance appraisal program. The second stream addressed "personality as a predictor of citizenship/contextual performance". One discernible pattern to arise from this stream of research is that the personality measure *conscientiousness* is a consistent predictor of citizenship/ contextual performance (Motowidlo, Borman & Schmit, 1997) while cognitive ability is a stronger predictor of task performance.

Are there other aspects of personality that can predict organizational citizenship behaviors? For example, for the purposes of the present study, one might ask if an individual demonstrates a strong predilection for volitional vulnerability (the willingness to expose oneself to threat, damage or attack in pursuit of an organizational goal): Will there exist a positive association with organizational citizenship behaviors? The third stream of research sought to establish “links between citizenship performance and organizational effectiveness”. (One measure of organizational effectiveness is workplace performance results). In a review of four studies, Podsakoff et al. (2000) determined that there were substantial relationships between citizenship performance and organizational effectiveness. A longitudinally designed study by Koys (2001) suggested a similar connection. The fourth stream of research assessed the relationship between “organizational factors and citizenship performance”. If citizenship performance is a positive behavior, what can organizations do to foster its presence in the workplace? Podsakoff et al. (2000) determined that citizenship performance was enhanced in organizations that “set group goals, demonstrate a high degree of procedural justice, design jobs to be intrinsically satisfying, and have leaders who themselves exhibit citizenship behavior”. It is this author’s view that an organization that fosters an environment of volitional vulnerability, wherein employees are willing to risk exposure to threat, damage or attack in pursuit of an organizational goal, is also an organization that experiences higher levels of citizenship/contextual performance and thus, organizational effectiveness.

In a critical review of the theoretical and empirical literature pertaining to organizational citizenship behaviors, Podsakoff and colleagues (2000) identified seven dimensions of citizenship behavior: (1) Helping Behavior, (2) Sportsmanship, (3) Organizational Loyalty, (4) Organizational Compliance, (5) Individual Initiative, (6) Civic Virtue, and (7) Self Development. For the purposes of the present study and in order to give context to volitional vulnerability, it is proposed that volitional vulnerability is most closely associated with the dimension involving helping behavior. Podsakoff and colleagues also identified four major categories of antecedents to

organizational citizenship behaviors: individual (or employee) characteristics, task characteristics, organizational characteristics, and leadership behaviors. For the purposes of this current study, volitional vulnerability is evaluated as an individual or employee-level antecedent to organizational citizenship behaviors. Regarding employee characteristics, research has focused on two main causes: a general affective “morale” factor and dispositional factors. The affective morale factor includes employee satisfaction, organizational commitment, perceptions of fairness, and perceptions of leader supportiveness. Such variables “have been the most frequently investigated antecedents of organizational citizenship behaviors, and all of them have significant relationships with citizenship behaviors of roughly comparable strength” (Podsakoff et al., 2000, p. 530). Of noteworthy importance, the authors go on to say that “these findings raise the question of whether there are other variables that comprise employee morale (e.g. trust, more specific forms of satisfaction, etc.) whose effects may also be important to examine” (p. 530). One purpose of this current study is to evaluate the case for volitional vulnerability as an antecedent to citizenship behaviors.

Of particular interest to the present research is the work of Williams and Anderson (1991), specifically their published study on *Job Satisfaction and Organizational Commitment as Predictors of Organizational Citizenship and In-Role Behaviors*. It is argued that citizenship behaviors “improve organizational efficiency and effectiveness by contributing to resource transformations, innovativeness, and adaptability” (Organ, 1988). This paper differentiates two broad categories of organizational citizenship behaviors. OCBO-behaviors intend to “benefit the organization in general” and OCBI-behaviors “immediately benefit specific individuals”. Williams and Anderson were able to provide empirical evidence for “two cognition variables (intrinsic and extrinsic) to be differentially related to the two types of OCBs, but affective variables and organizational commitment were not significant predictors” (1991, p. 601). This current study assesses whether volitional vulnerability exists as a predictive variable for OCBI and OCBO.



How do volitional vulnerability and organizational citizenship behaviors relate to one another? Consider again the definition of organizational citizenship behavior as “individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate promotes the effective functioning of the organization” (Organ, 1988,, p. 4) Compare this definition with the current study’s definition of volitional vulnerability: “the degree to which one willingly exposes oneself to threat, damage or attack in pursuit of an organizational goal (p. 5). We might consider that a willingness to be volitionally vulnerable is akin to a behavior that is discretionary. One is not compelled to act either way (i.e., with volitional vulnerability or with discretionary behavior) beyond the common motivation to achieve an organizational goal, which in turn “promotes the effective functioning of the organization”. Given that volitional vulnerability and OCB-related discretionary behaviors are freely and willingly engaged in order to achieve an organizational goal, it follows that there is likely a positive association between the constructs.

Turning our attention now to workplace performance results, this current study considers workplace performance results as a subset or specialized class of organizational citizenship behavior. If organizational citizenship behavior is positively associated with organizational effectiveness, it is prudent to consider workplace performance results as an important measure of organizational effectiveness.

***Hypothesis 2(a):** Volitional vulnerability is positively associated with organizational citizenship behavior.*

***Hypothesis 2(b):** Volitional vulnerability is positively associated with workplace performance results.*

#### **WHY will these hypotheses be the way they are proposed?**

*Helping behavior* is universally regarded as a significant dimension of organizational citizenship behavior research by “virtually everyone who has worked in this area” (Podsakoff et al., 2000). Examples of such research include Borman and Motowidlo, 1993, 1997; George and

Brief, 1992, George and Jones, 1997; Graham, 1989; Organ, 1988, 1990; Smith, Organ, and Near, 1983; Van Scotter and Motowidlo, 1996; Williams and Anderson, 1991.

According to Podsakoff et al. (2000), “conceptually, *helping behavior* involves voluntarily helping others with, or preventing the occurrence of, work-related problems”. Compare this dimensional definition with the volitional vulnerability factor definition of *human compassion*: sympathetic consciousness of others’ distress together with a desire to alleviate it. What action best represents a desire to alleviate distress except *helping behavior*? The logical inference of this relationship must be that organizational citizenship behavior and volitional vulnerability are positively related. Similar logic applies when considering workplace performance results. If *helping behavior* is indeed a cornerstone of organizational citizenship behavior, then its’ definition which includes “preventing the occurrence of work-related problems” must include the proactive improvement of organizational effectiveness. Thus, organizational citizenship behavior and workplace performance results are also most likely positively related.

### **Volitional Vulnerability and Organizational Trust**

This current study builds upon the research in organizational trust conducted by Roger C. Mayer and James H. Davis (both from the University of Notre Dame) and F. David Schoorman (of Purdue University). Per their paper titled “Integrative model of organizational trust”, they define trust as “the willingness of a party to be vulnerable to the actions of another party” (Mayer, Davis, & Schoorman, 1995). The present paper proposes that a trusting party must first pass through volitional vulnerability on the path to demonstrating positive organizational citizenship behaviors and workplace performance results.

The concept of trust in an organizational setting has proved challenging for researchers to measure given the lack of consensus on its definition. In 2011, Bill McEvily (Rotman School of Management, University of Toronto, Canada) and Marco Tortoriello (IESE Business School, Madrid, Spain) published research in which they analyzed 171 empirical papers involving

organizational trust published over a 48-year time frame from 1962 to 2010. Amongst these papers, a total of 129 unique/different measures of trust were identified. To further exacerbate the situation, McEvily and Tortoriello (2011) reported that “in only 24 instances were we able to verify that a previously developed and validated measure of trust had been replicated verbatim, and 11 of these replications were by the same authors who originated the measure. In addition to the limited degree of replication, the measurement of trust in the organizational literature is characterized by weak evidence in support of construct validity and limited consensus on operational dimensions” (p. 23). Fortunately, the authors also provide focus on measures that have been strongly validated. The instrument developed by Schoorman, Mayer and Davis (1996) was an instrument that was shown to possess strong measurement properties based on replication, construct validity and dimensionality. McEvily and Tortoriello (2011) labeled this construct as a “noteworthy measure of trust”.

Although there appears to be a lack of consensus on the definition of organizational trust, according to Dr. Max Evans of McGill University in Montreal, Canada, there is general agreement among social psychologists on two important factors: (1) that trust is based on an expectation that within a given context, the other person or trustee will behave in a way that is important to or aligned with the trustor’s requirements, and (2) there exists a willingness to take a risk or to be vulnerable (Evans, 1991). Thus, expectation and vulnerability are common characteristics that appear to be central to trusting relationships.

According to Mayer, Davis, and Schoorman, authors of *An Integrated Model of Organizational Trust*, “The definition of trust proposed in this research is the willingness of a party to be **vulnerable** (my emphasis) to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party” (Mayer et al., 1995, p. 712). It is noteworthy that the authors immediately go on to say that “This definition parallels that of Gambetta (1988), with the critical addition of **vulnerability** (my emphasis)” (p. 712). However, Mayer et al. do not provide a

definition of either vulnerable or vulnerability. It follows that if vulnerability can be defined and measured as suggested by the present study, then vulnerability and organizational trust are most likely related concepts that bear a positive association with each other. Further, if the empirical evidence confirms such a relationship, volitional vulnerability may also act as a mediator between organizational trust and workplace performance results. Thus, the following hypotheses are posited:

***Hypothesis 3:** Organizational trust is positively associated with volitional vulnerability.*

***Hypothesis 4(b):** Volitional vulnerability mediates the link between organizational trust and workplace performance results.*

#### **WHY will these hypotheses be the way they are proposed?**

A review of the extant literature and empirical research involving trust suggests that there is a significant and positive relationship between trust and volitional vulnerability. The following studies and citations support the idea of a positive association.

Currall and Judge (1995) posit four dimensions of boundary role person trust. The first dimension is *Open and honest communication with the counterpart boundary role person* defined thusly: “Boundary role persons manifest trust by disclosing important yet potentially self-damaging information, being accurate when communicating and not filtering or distorting information”. The first part of the definition sounds remarkably like the definition of volitional vulnerability i.e., “the degree to which one willingly exposes oneself to threat, damage or attack in pursuit of an organizational goal”. Support for the boundary role person trust construct validity came from individual level confirmatory factor analysis. This may suggest a similar result for volitional vulnerability as well as a positive relationship with trust.

Mayer, David, and Schoorman’s (1995) integrative model of organizational trust defined trust as the willingness of a trustor to be vulnerable to the actions of a trustee based on the expectation that the trustee will perform a particular action. By this definition, vulnerability is

observed to be inextricably entwined and a critical element of trust.

“A widely held definition of trust is as follows: ‘Trust is a psychological state comprising the intention to accept vulnerability based on positive expectations of the intentions or behaviors of another’” (Rousseau, Burt, Sitkin, & Camerer, 1998). According to this definition, vulnerability is embedded in the fabric of trust and is one of its integral components.

Colquitt, Scott, and LePine (2007) reported that “In addition to exploring trust antecedents, our study examined the specific behaviors that trust can be used to predict. Most important, we tested Mayer et al.’s (1995) fundamental assumption that trust fosters risk taking—that an intention to accept vulnerability actually results in a decision to become vulnerable. Our results revealed moderately strong relationships between trust and risk taking”. There exists some empirical evidence that trust and vulnerability have a moderately strong relationship.

In a study of the relationship between trust and cooperation, researchers confirmed that it does “take two to tango”: the development of mutual trust and cooperation involves an intricate dance that spirals over time and is fundamentally affected by partners’ initial moves” (Ferrin, Bligh, & Kohles, 2008). While not strictly related to the present hypothesis, this author suspects that trust and vulnerability likely exhibit the same type of “spiraling” relationship rather than the linear relationship depicted in the present hypothesized model. In their research, Ferrin et al. (2008) also acknowledge some challenges associated with the two-part definition of trust proposed by Rousseau et al. (1998) such as the acceptance of vulnerability based on positive expectations.

In their meta-analysis of trust involving 171 papers over 48 years, McEvily and Tortoriello (2011) identify challenges to advancing “the state-of-the-art in trust measurement”. The first challenge is to expand our coverage and understanding of the two core elements of trust, namely “the willingness to be vulnerable and the expectation of favorable treatment by another party”. This current study takes direct aim at broadening our understanding of “the willingness to be vulnerable”.

Gillespie (2003) also emphasize the willingness to be vulnerable as expressed in *Measuring Trust in Work Relationships: The Behavioral Trust Inventory*.

Mayer and Davis (1999) emphasize a tri-partite definition of trustworthiness consisting of ability, benevolence and integrity. They comment that, “There is evidence that ***conceptualizing trust as a willingness to be vulnerable has merit*** (my emphasis)”. Whereas vulnerability has not been clearly established as a bona fide and legitimate psychometric measure, this current study aims to fill that void.

### **Volitional Vulnerability and Psychological Safety**

This research builds upon the work of Amy C. Edmondson, the Novartis Professor of Leadership and Management at the Harvard Business School. Dr. Edmondson is a renowned authority on organizational learning, teaming, learning from failures and psychological safety. This research study positions psychological safety as an independent or predictor variable that positively influences volitional vulnerability, organizational trust, organizational citizenship behaviors and workplace performance results.

Much of what is accomplished in today’s business environment is dependent upon mutual collaborative efforts between employees. Psychological safety has been identified as an important factor in determining the outcome of collaborative activities. Edmondson (1999) has described psychological safety as the “perceptions of the consequences of taking interpersonal risks in a particular context such as a workplace.”

In a review of the research on psychological safety, Edmondson and Lei (2014) found that the concept explains why employees share information and knowledge, speak up with suggestions for improvement, take initiative to develop new products and services, enables teams and organizations to learn, and improves performance. Edmondson and Lei conclude that one of the greatest challenges that organizations face is managing the interpersonal threats that employees are exposed to when they admit being uncertain, voice opinions or respond differently than other employees. Interpersonal risk “is a powerful force that makes effective collaboration

less likely to occur, particularly when the work is characterized by uncertainty and complexity” (Edmondson, 2014). Such interpersonal risks create a vulnerability that suppresses employees’ input. Edmondson and Lei maintain that “a rapidly growing body of conceptual and empirical research has focused on understanding the nature of psychological safety, identifying factors that contribute to this interpersonal construct” (p. 24). This present research proposes that volitional vulnerability is one such contributor to the construct. Volitional vulnerability may help to achieve a clearer understanding of psychological safety and interpersonal risk-taking among team members in a workplace setting. Further, one of Edmondson and Lei’s (2014) recommendations is increased use of hybrid methods that mix qualitative and quantitative data and field research to illuminate the phenomena. Thus, volitional vulnerability may be the hybrid solution needed to deepen our understanding of psychological safety.

It is interesting to observe how frequently researchers will make use of terms such as vulnerability or vulnerable without defining the terms or necessarily realizing the implications of such use i.e., that there may be hidden constructs within the very constructs that they are studying. For example, in their study of *High-quality relationships, psychological safety, and learning from failures in work organizations*, Carmeli and Gittel (2009) state that “Both trust and psychological safety involve perceptions of **vulnerability** (my emphasis) and making choices to minimize negative consequences in a relationship.” They further state, “When members feel safe to make themselves **vulnerable** (my emphasis) in what and how they say and act (Edmondson, 2004; Kahn, 2007; Schein, 1999), they are likely to be engaged in learning from failures” (Carmeli & Gittel, 2009). Notwithstanding that the terms vulnerability and vulnerable are undefined and simply left to the interpretation of the reader, Carmeli & Gittel’s statements may provide insight into a potential relationship between trust, psychological safety and volitional vulnerability. It is this author’s view that an individual’s perception of psychological safety (or their state of assuredness) is positively associated with their sense of volitional vulnerability or “the degree to which one willingly exposes oneself to threat, damage or attack in pursuit of an

organizational goal” (p.5). Compare this definition of volitional vulnerability with the definition of psychological safety set forth by Dr. Edmondson: “perceptions of the consequences of taking interpersonal risks in a particular context such as a workplace” (Edmondson, 1999).

Psychological safety speaks of perceived risk while volitional vulnerability describes willing exposure to risk. It is the subtle difference between perception and execution that is important in these definitions. Therefore, it is the position of this author that psychological safety will positively influence volitional vulnerability. Given the proximate nature of other variables in the model, it is further anticipated that organizational trust, organizational citizenship behaviors, and workplace performance results will also reveal a positive association with psychological safety. Further, the model structure assesses the possibility that volitional vulnerability mediates the link between psychological safety and organizational citizenship behaviors. Thus, the following hypotheses are put forth:

***Hypothesis 4(a):** Volitional vulnerability mediates the link between psychological safety and organizational citizenship behaviors.*

***Hypothesis 5(a):** Psychological safety is positively associated with organizational citizenship behaviors.*

***Hypothesis 5(b):** Psychological safety is positively associated with workplace performance results.*

***Hypothesis 6:** Psychological safety is positively associated with volitional vulnerability.*

***Hypothesis 7:** Psychological safety is positively associated with organizational trust.*

**WHY will these hypotheses be the way they are proposed?**

A review of the extant literature and empirical research involving psychological safety suggests that there may be significant and positive relationships between psychological safety and volitional vulnerability, organizational trust and organizational citizenship behaviors. The



following quotes and references provide support for these hypotheses.

The early roots of psychological safety are founded in the study of change management set forth by MIT professors Edgar Schein and Warren Bennis (1965). In reflecting upon his 50-year academic career involving organizational studies and change dynamics, Edgar Schein said: “Motivation to change does not arise until the change target feels secure enough to accept the disconfirming data because the new things to be learned begin to be feasible. The change target feels *‘psychologically safe’* (my emphasis) if he or she can accept a new attitude or value without complete loss of self. Once the individual feels *psychologically safe* (my emphasis), he or she can accept new information either through *identification* with others or *scanning* the environment for new solutions” (Schein, 2006).

Renewal of interest in psychological safety in the early 1990s foreshadowed a connection between psychological safety and trust. In 1990, William Kahn’s qualitative studies of summer camp counselors and members of an architecture firm gave evidence of how psychological safety enables personal engagement at work. As reported by Edmondson and Lei (2014), “Kahn argued that people are more likely to believe they will be given the benefit of the doubt—a defining characteristic of psychological safety—when relationships within a given group are characterized by *trust* and respect” (p. 25). Thus, the rejuvenation of research in psychological safety is premised on its relationship with trust.

In a 2012 study of a Taiwanese retail chain, Gong, Cheung, Wang, and Huang assessed relationships among psychological safety, individual creativity, employee proactivity, and information exchange. They proposed that proactive employees seek information in exchanges with others; information exchange, in turn, fosters trusting relationships that provide psychological safety for employee creative endeavors. Data from 190 matched employee–manager pairs in a retail chain, collected in three time-lagged waves, supported the argument that proactive employees engage in more information exchange and that the relationship between information exchange and creativity is fully mediated by trust (Gong et al., 2012). In this

author's view, proactive is synonymous with extra-role or pro-social organizational citizenship behaviors and thus, establishes a positive link between organizational citizenship behaviors, trust and psychological safety.

Contemplating future directions for research in psychological safety, Edmondson and Lei (2014) indicates that:

Much of the literature on psychological safety provides relatively little insight regarding how psychological safety unfolds and builds, or lessens, or even is destroyed. It seems reasonable to assert the likelihood of an asymmetry, in which *psychological safety takes time to build, through familiarity and positive responses to displays of vulnerability* (my emphasis) and other inter- personally risky actions, but can be destroyed in an instant through a negative response to an act of *vulnerability*. Researchers may wish to examine the dynamic nature of and influences on psychological safety in future work (p. 38).

## CHAPTER III

### METHODOLOGY

#### **Pilot Work**

The present study extends and refines the pilot work on scale development undertaken in the autumn of 2014 by John Gajda and Walter Slipetz, both students of Oklahoma State University's PhD Program for Executives. A copy of the results of that initial work is provided in Appendix A.

Development of the new scale for volitional vulnerability consist of the following steps:

- Preparation, Review and Refinement of Item Generation List
- IRB Approval Process
- Use of MTurk Services
- Exploratory Factor Analysis
- Confirmatory Factor Analysis

Each of these steps is discussed in detail in Appendix A.

#### **Research Design**

This study is uniquely designed to draw upon both qualitative and quantitative methods.

Although primarily quantitative in nature, the work is premised on extensive qualitative

research conducted by Dr. Brené Brown over a ten year period. Dr. Brown's research was formulated based on the grounded theory approach, meaning that the research centered on what mattered to the research participants. Grounded theory, developed by Barney Glaser and Anselm Strauss (1967), and outlined in their book *The Discovery of Grounded Theory*, has its roots in qualitative research and stands in sharp contrast to social science research conducted in the positivist tradition. Positivism is reliant on verified data or empirical evidence, effectively rejecting introspection and intuitive knowledge. In one sense, the present study represents a cross-over from one approach (grounded theory/qualitative) to another (quantitative).

### **Data Source**

The data used for this research originates from a consulting study involving a medium-sized chemical manufacturing plant located in the U.S. There are approximately 700 workers employed at this location. The study was conducted during the winter-spring of 2016. At the request of management, employees responded to online surveys pertaining to the psychometric measures used for this research including psychological safety, organizational trust, organizational citizenship behaviors and volitional vulnerability. Responses were matched and compared with the results of employee performance appraisals (referred to as workplace performance results for the purposes of this study). Workplace performance results, as measured by employee performance appraisals, consisted of the following categories: job knowledge, work results, adaptability, interpersonal relationships, safety habits, core values and overall score. Participants responded to twenty-six questions. Seven questions involve psychological safety, four pertain to organizational trust, nine relate to volitional vulnerability, and six focus on organization citizenship behaviors. All questions are rated on a 5-point Likert scale.

### **Data Analysis**

Data were reviewed and prepared for analysis using SPSS statistical software and AMOS Graphics.

Step one involved a repeat of the Confirmatory Factor Analysis conducted in the original

pilot study. Confirmatory Factor Analysis (CFA) for volitional vulnerability was conducted using SPSS AMOS. The CFA began with the creation of a preliminary model comprised of three factors (courage to be imperfect, compassion, and connection) and 22 items based on prior Subject Matter Expert (SME) agreement of 80%. The preliminary model was run to analyze output and determine internal consistencies, factor loadings, model fit, modification indices and co-variances. The new model was re-evaluated for model fit. Validity analysis including composite reliability, discriminant validity, MSV and ASV was conducted and evaluated.

Step two involved evaluation of the relationships illustrated in the hypothesized research model shown in Figure 2. The model is composed of two independent or outcome variables: organizational citizenship behaviors and workplace performance results. There are three independent or predictor variables including psychological safety, organizational trust, and volitional vulnerability. Using SPSS Amos graphics, this study developed a measurement model to understand how the constructs relate to their measures and a path model to determine how the constructs relate to each other. The model fit was evaluated to determine goodness of fit and hypotheses are interpreted based upon output. Model adjustments were made in accordance with best research practices.

## **Measures**

This section outlines the five specific measures utilized for this study.

### ***Volitional Vulnerability***

This research introduces a new nine-item scale initially developed by John Gajda and Walter Slipetz from Oklahoma State University, PhD program for Executives (2014) to measure volitional vulnerability and its three factors: (1) courage to be imperfect, (2) human compassion, and (3) necessary connection. The nine items are as follows:

1. I am not afraid to risk revealing my flaws if it means achieving an important organizational goal.
2. I am comfortable discussing my shortcomings if it helps achieve an organizational goal.
3. It's okay to open up and reveal one's imperfections to others when pursuing a goal.
4. I feel authentic when I am compassionate towards others.
5. I am grateful for moments of human compassion.
6. Practicing human compassion makes us kinder and gentler.
7. I function best when I practice human compassion.
8. I feel a sense of rejection when I am not connected to someone.
9. I feel like a failure when I am not connected with other people

All items were assessed on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree

### ***Organizational Citizenship Behaviors***

To specifically measure organizational citizenship behaviors, this research adapted six items from Williams and Anderson's (1991) twenty-item IRB-OCBI-OCBO scale. The survey items for employees responding to surveys for volitional vulnerability, organizational trust, and psychological safety are as follows:

1. How often do you help co-workers who have been absent?
2. How often do you help others who have heavy workloads?
3. How often do you assist your supervisor with his/her work, even when not asked to?
4. How often do you take time to listen to co-worker's problems and worries?
5. How often do you go out of your way to help new employees?
6. How often do you voluntarily pass along information to co-workers?

All items were assessed on a five-point scale ranging from 1 = rarely to 5 = very often.

### ***Workplace Performance Results***

To specifically measure workplace performance results, this research utilized data contained in the organization's formal employee performance appraisal program. Supervisors are charged with the responsibility to assess employee behavior as part of the formal performance appraisal process. The seven WPR indicators for this study include:

1. Job Knowledge
2. Work Results
3. Adaptability
4. Interpersonal Relationships
5. Safety Habits
6. Core Values
7. Overall Score

All items were assessed on a five-point scale ranging from 1 = poor to 5 = excellent.

### ***Organizational Trust***

To specifically measure organizational trust, this research utilized a four-item instrument developed by Mayer and Davis (1999). Whereas Mayer and Davis were measuring trust between work force and top management, each item was modified for this research to reflect intra-team trust. Accordingly, the term "top management" was replaced with "a member of my team" or

simply “my team” as appropriate.

1. If I had my way, I wouldn't let a member of my team have any influence over issues that are important to me. \*
2. I would be willing to let a member of my team have complete control over my future in this company.
3. I really wish I had a good way to keep an eye on my team. \*
4. I would be comfortable giving a member of my team a task or problem which was critical to me, even if I could not monitor their actions.

\*- Reversed-scored item.

All items were assessed on a five-point scale ranging from 1 = strongly disagree to 5 = strongly agree.

### ***Psychological Safety***

To specifically measure psychological safety, this research adapted Edmondson's (1999) seven-item team psychological safety scale. In order to be consistent with the scale utilized by Carmeli & Gittell (2009) wherein psychological safety was assessed at the organization level, the word “team”, as originally used by Edmondson, was replaced with the “organization”. Items include:

1. If you make a mistake in this organization, it is often held against you (reverse-scored).
2. Members of this organization are able to bring up problems and tough issues.
3. People in this organization sometimes reject others for being different.
4. It is safe to take a risk in this organization.
5. It is difficult to ask other members of this organization for help.
6. No one in this organization would deliberately act in a way that undermines my efforts.
7. Working with members of this organization, my unique skills and talents are valued and utilized.



All items were assessed on a five-point scale ranging from 1 = strongly disagree to 5 = strongly agree.

## CHAPTER IV

### RESULTS

This chapter describes the progression of different stages of data analysis for this research and provides the results for each step. It includes information regarding the data set used, data preparation, internal consistency of the volitional vulnerability measure, confirmatory factor analysis for volitional vulnerability, measurement model analysis, and path model analysis. The path model is examined relative to hypothesis testing and model fit.

#### **Data Set**

The data set used for this research originated from a consulting study involving a medium-sized U.S.-based chemical manufacturing plant. At the request of management, employees responded to online surveys pertaining to the psychometric measures used for this research including psychological safety, organizational trust, organizational citizenship behaviors and volitional vulnerability. Responses were matched and compared with the results of employee performance appraisals (referred to as workplace performance results for the purposes of this study). Workplace performance results, as measured by employee performance appraisals, consisted of the following categories: job knowledge, work results, adaptability, interpersonal relationships, safety habits, core values and overall score. Sample size consisted of 151 total respondents who responded to twenty-six questions. Seven questions involved psychological

safety, four pertained to organizational trust, nine related to volitional vulnerability and six focused on organizational citizenship behaviors. Questions were rated on a five-point Likert scale.

### **Data Preparation**

Data was reviewed and prepared for analysis. Using SPSS statistical software, frequencies were run to check for missing values. A total of 27 missing values involving four constructs (PS, OT, VV and OCB) and 14 items were identified. Missing values were replaced with the appropriate series mean value. Reverse coded items were re-coded. In total, three reverse coded items were re-coded, including two items (#81 and #83 from the data set) for organizational trust and one item (#85) for psychological safety. Despite considerable attention to re-coding, this research did encounter problems with negative inter-item correlations. This issue is discussed in greater detail later in this chapter. In order to confirm the first hypothesis, that volitional vulnerability consists of three factors, the analysis next considered the internal consistencies of the new measure followed by a confirmatory factor analysis.

### **Internal Consistencies for Volitional Vulnerability Measure**

Data analysis began by evaluating the internal consistencies associated with the three individual factors (*courage to be imperfect, compassion, and connection*) making up the new psychometric measure, *volitional vulnerability*. Reliability analysis was conducted using various options in SPSS. Reliability is important since, in the absence of reliability, it is impossible to have any validity associated with the scores of the scale. The convention for measuring internal consistency is Cronbach's alpha, which evaluates how closely related a set of items are as a group. Cronbach's alpha is an estimate associated with the scores that can be derived from each of the factors that make up volitional vulnerability. For this step, Cronbach's alpha was calculated in SPSS. The items that comprised each of the factors making up volitional vulnerability were loaded and analyzed using the scale and reliability options available in SPSS. The sample size consisted of 151 personnel. The criterion for determining an acceptable level of reliability has not

been fully resolved. However, there are several recommendations in the literature and the most frequently cited is 0.70. Most social science research is premised on a reliability coefficient of 0.70 or higher being acceptable. Therefore, 0.70 is the level used for acceptable reliability in this analysis. Results were as follows. Reliability for the factor *Courage to be Imperfect*, comprised of three items, had a Cronbach's alpha of 0.719; reliability for the factor *Compassion*, comprised of four items, showed a Cronbach's alpha of 0.866, and; reliability for *Connection*, comprised of two items, had a Cronbach's alpha of 0.650. See Table 1: Internal Consistency Data for Individual VV Factors.

Table 1

*Internal Consistency Data for Individual VV Factors*

**Reliability Statistics**

Scale	Cronbach's Alpha	CA Standardized	N of Items
Courage	.719	.729	3
Compassion	.866	.870	4
Connection	.650	.650	2

**Item Statistics**

Scale	Item	Mean	Std. Dev.	N
Courage	VV 6	3.59	.888	151
Courage	VV 2	3.79	.751	151
Courage	VV 3	3.57	.904	151
Compassion	VV 1	3.71	.769	151
Compassion	VV 5	3.90	.661	151

Compassion	VV 9	3.90	.640	151
Compassion	VV 8	3.63	.699	151
Connection	VV 4	2.69	.824	151
Connection	VV 7	2.28	.828	151

### **Confirmatory Factor Analysis for Volitional Vulnerability**

A confirmatory factor analysis (CFA) was conducted for the scale *volitional vulnerability* to confirm the factor structure of a set of observed variables, and to effectively test the hypothesis that a relationship exists between observed variables (i.e., courage, compassion, and connection) and their underlying latent structure (i.e., volitional vulnerability). A three-factor nine-item model, based on and consistent with the qualitative research conducted by Dr. Brené Brown, was configured in SPSS AMOS. The structure of the model included three items for the factor *Courage to be Imperfect*, four items for *Compassion* and two items for *Connection*. (Note: The model was derived from a pilot study conducted in 2014 by John Gajda and Walter Slipetz, third year Cohort II participants of the OSU PhD for Executives Program. The 2014 study provided some encouraging results that motivated the present research involving further investigation of the scale for volitional vulnerability). The model was run in SPSS AMOS and the output is shown in Figure 3. There were three factor loadings below 0.70. For *Courage to be Imperfect*, items vv6 and vv3 loaded at 0.59 and 0.58, respectively. For *Connection*, vv4 loaded at 0.64.

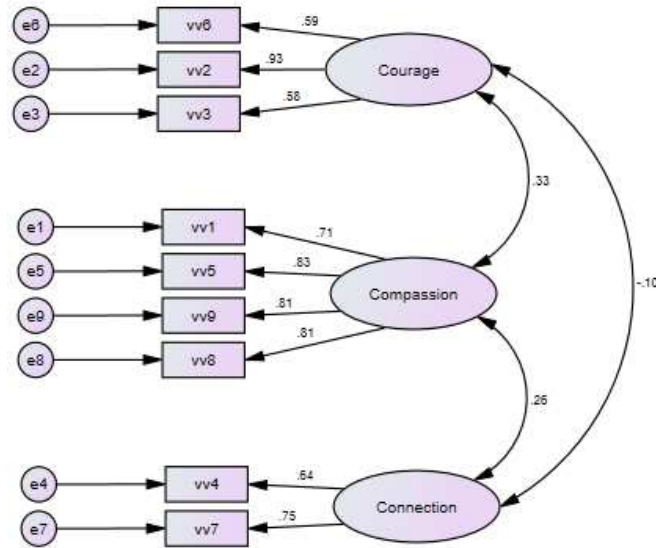


Figure 3. CFA model with factor loadings.

### CFA Model Fit

The model had reasonable but not perfect fit to the data (CMIN/DF(N =151) = 1.595,  $p < .05$ ; GFI = .949; NFI = .983; CFI = .969; RMSEA = .063; PCLOSE > .05 ). According to Hu and Bentler (1999), CMIN/DF values should be below 5 and preferably below 3 and above 1. The CMIN/DF value for this model was 1.595. The p-value (.032) was significant (less than .05) and therefore not acceptable. The GFI value was .949 which is greater than .9 suggesting a good model fit. The Normed Fit Index (NFI) value was .983 which is greater than .95 indicating a good model fit. According to Bentler and Bonett (1980), a NFI value greater than .95 suggests a good model fit. The CFI value was .969. Hu and Bentler (1999) have proposed that acceptable model fit is indicated by a CFI value of 0.90 or greater. The RMSEA value was .063 which borders on an acceptable model fit. Hu and Bentler (1999) recommend that a RMSEA value of 0.06 or less denotes an acceptable model fit. PCLOSE was 0.262, above the 0.05 threshold and acceptable. Overall, there were several indicators which supported a position of acceptable model fit.

### CFA Covariance Analysis

Covariances between errors were examined; no large values were observed and no attempt was made to covary errors in the model. Standardized residual covariances were examined and found to be acceptable with none exceeding an absolute value of 2.58 (Jöreskog & Sörbom, 1993).

### Validity Analysis

Validity analysis presented two concerns (See Table 2). Reliability for the *Connection* factor was less than 0.70 at 0.655. Average Variance Explained (AVE) was less than 0.50 (0.488) suggesting potential problems with convergent validity. Although, strictly speaking, CR and AVE for *Connection* do not meet required thresholds for validity, a decision was made to proceed with further study of the volitional vulnerability scale given the relative closeness of the validity values to their acceptable threshold limits.

Table 2

#### *Validity Analysis*

	CR	AVE	MSV	ASV	Courage	Compassion	Connection
Courage	0.751	0.514	0.111	0.060	0.717		
Compassion	0.872	0.630	0.111	0.088	0.333	0.794	
Connection	0.655	0.488	0.066	0.037	-0.096	0.256	0.699

### Interpretation of *Hypothesis 1* Based on Internal Consistencies and Confirmatory Factor Analysis

*Hypothesis 1*: As predicted, volitional vulnerability consisted of three factors, namely, courage to be imperfect, compassion, and connection. Given that the CFA produced a reasonable model fit with minor concerns about validity, the H1 hypothesis is accepted. (Note:

Factor reliability for *connection* is a concern but will form the subject of additional scrutiny in future research).

### **Measurement Model**

In order to understand how the constructs related to their measures, a measurement model was configured in SPSS AMOS. The developed measurement model is a Principal Factor or Reflective Model, wherein the direction of causality is from the construct to the measure. As such, measures are expected to be correlated and therefore it is critically important that the measures possess internal consistency reliability. The model consisted of two dependent or outcome variables: organizational citizenship behaviors (OCB), comprised of six items and workplace performance results (WPR), consisting of eight items: job knowledge, work results, adaptability, interpersonal relationships, safety habits, core values, overall score and total performance score. There are three independent or predictor variables including psychological safety (PS) comprised of seven items, organizational trust (OT) made up of four items and volitional vulnerability (VV) consisting of nine items. The measurement model was run in SPSS AMOS (See Figure 4). Fit indices were evaluated for acceptable model fit.

### **Measurement Model Fit**

A review of fit indices indicated that the measurement model had unacceptable fit to the data (CMIN/DF(N=151) = 1.629;  $p < .05$ ; RMR = .058; GFI = .757; AGFI = .721; CFI = .823; PCFI = .761; RMSEA = .065; PCLOSE = .002). The CMIN/DF value of 1.629 is  $< 3$  (Hu & Bentler, 1999). The p-value of .000 was  $< .05$  and not acceptable. RMR of 0.058 was below 0.1 and acceptable. GFI of 0.757 is  $< 0.95$  and not acceptable (Baumgartner & Homburg, 1996). AGFI of 0.721 is  $< 0.80$  and not acceptable. CFI of 0.823 is less than 0.90 and not acceptable (Hu & Bentler, 1999). PCFI of 0.761 is below 0.8 and not acceptable. RMSEA of 0.065 is not less than .06 and not acceptable (Hu & Bentler, 1999). PCLOSE of .002 is below 0.05 and not acceptable. Based on these indicators, overall model fit was considered to be poor.



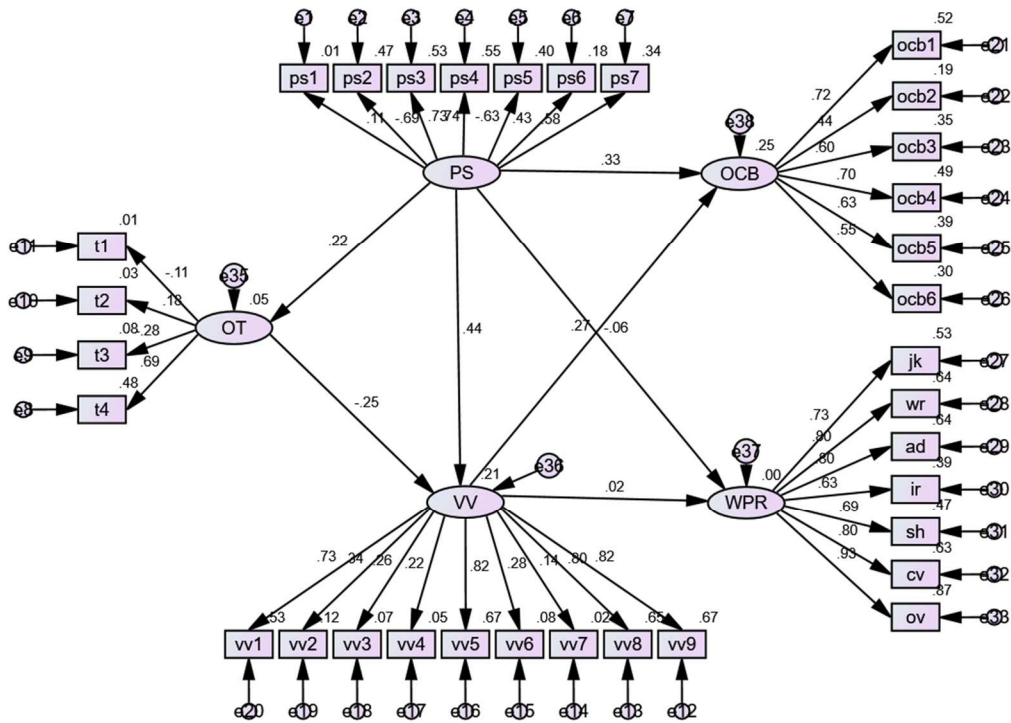


Figure 4. Measurement model with standardized estimates.

Additionally, there were problems with negative inter-item correlation values for three of the scales including psychological safety (one negative inter-item correlation among seven items), organizational trust (one negative inter-item correlation among four items) and volitional vulnerability (three negative inter-item correlations among nine items). The scales for organizational citizenship behaviors and workplace performance results contained no negative inter-item correlation values.

The standardized estimate between organizational trust and volitional vulnerability was -0.25 and statistically significant with a p-value of 0.230. Such a relationship is logically inconsistent given that one might reasonably expect that as organizational trust increases so does one's willingness to expose oneself to threat, damage or attack in pursuit of an organizational goal such as volitional vulnerability. A possible explanation for this finding might be that the inter-item reliability for the organizational trust scale was very low with a Cronbach's alpha of

only 0.252 (discussed in the next section on Path Analysis). Other explanations might include the relatively small sample size (N = 151) and participants' lack of engagement.

## Path Model Analysis

### Descriptive Statistics and Reliabilities

Results of the sample means, standard deviations, correlations and reliabilities are reported in Table 3. Internal reliabilities are acceptable for all variables with the exception of organizational trust. Psychological safety is significantly correlated with volitional vulnerability and organizational citizenship behaviors but not organizational trust and workplace performance results. Volitional vulnerability is significantly correlated with psychological safety, organizational trust and organizational citizenship behaviors but not workplace performance results. Organizational citizenship behaviors are significantly correlated with psychological safety and volitional vulnerability. Workplace performance results are not significantly correlated with any of the other variables.

Table 3

#### *Descriptive Statistics, Reliabilities, and Correlations*

Variable	M	SD	1	2	3	4	5
1. PS	3.34	.54	<b>.74</b>				
2. OT	2.99	.46	.150	<b>.25</b>			
3. VV	3.46	.45	.223**	-.112	<b>.77</b>		
4. WPR	3.44	.48	.024	-.007	-.006	<b>.90</b>	
5. OCB	3.84	.53	.336**	.038	.252**	-.072	<b>.75</b>

*Note:* N = 151; Cronbach's alphas are in boldface on the diagonal; \*\* p < .01; \* p < .05

### Path Model Development

Unlike measurement model analysis, which evaluates how constructs relate to their measures, path analysis relates the constructs to each other. Based on imputed values obtained from the measurement model, a path diagram was configured and run in SPSS AMOS. A path model was constructed based on the original hypothesized model presented earlier.

The path analysis causal model consists of three independent variables (psychological safety, organizational trust, and volitional vulnerability) and two dependent variables (organizational citizenship behaviors and workplace performance results). There are five measured variables in the path analysis diagram including one exogenous variable (psychological safety) and four endogenous variables (organizational trust, volitional vulnerability, organizational citizenship behaviors, and workplace performance results). Since exogenous variables are not given error terms, none are illustrated in the model that follows. The formula for determining model identification is based on the number of observations (or number of distinct sample moments) less the number of distinct parameters to be estimated. For this model, the number of observations was 15 less the number of parameters 12 which equates to 3 degrees of freedom (3 df) indicating that the model is over-identified. (If  $df = 0$ , the model would be just identified; if  $df < 0$ , the model would be under-identified and this model could not be worked).

The path model and the resulting standardized path coefficients are illustrated in Figure 5. Results are based on sample data with missing data added using mean values, items reverse coded where required and variable values imputed from the measurement model.

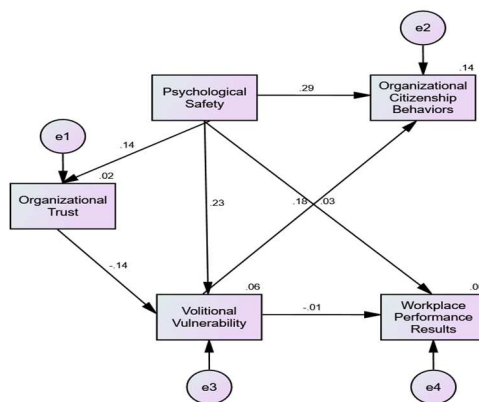


Figure 5. Path model with standardized estimates and squared multiple correlations.

### **Path Model Fit**

The predictive model was tested using observed variable paths. The model had acceptable fit to the data (CMIN/DF(N = 151) = .367,  $p > .05$ ; RMR = .005; GFI = .997; AGFI = .985; NFI = .969; CFI = 1.000; PCFI = .300; RMSEA = .000). The CMIN/DF value of .367 was less than 1.0 suggesting a poor model fit. The p-value (.777) was not significant indicating that the null hypothesis should not be rejected. (Another interpretation is that there is no significant difference between the proposed model and a perfect model). RMR of .005 is below .1 and acceptable. The GFI value was .997 which is greater than .9 suggesting a good model fit (Baumgartner & Homburg, 1996). The AGFI value of 0.985 was  $> 0.80$  and therefore acceptable. The NFI value is .969 which is greater than .95 indicating a good model fit. According to Bentler and Bonett (1980), a Normed Fit Index (NFI) value greater than .95 suggests a good model fit. The CFI value was 1.000. Hu and Bentler (1999) have proposed that acceptable model fit is indicated by a CFI value of 0.90 or greater. PCFI of 0.300 was below 0.8 and not acceptable. The RMSEA value was .000 and is less than .06 indicating a good model fit. Hu and Bentler (1999) recommend that a RMSEA value of 0.06 or less denotes an acceptable model fit. Alternatively, MacCallum, Browne and Sugawara (1996) have suggested that an RMSEA value of .01 indicates an excellent fit. Thus, based on the MacCallum et al. criteria, the present model has an excellent fit. PCLOSE of 0.857 was above 0.05 and acceptable. In summary, with two exceptions (CMIN/DF and PCFI), model fit was considered acceptable.

### **Interpretation of Hypotheses Based on Path Model**

*Hypothesis 2(a):* As predicted, the path between volitional vulnerability and organizational citizenship behaviors was positive and significant ( $\beta = .18$ ,  $p < .05$ ).

*Hypothesis 2(b):* Contrary to the hypothesis, the path between volitional vulnerability and workplace performance results was not significant ( $\beta = -.01$ , *ns*).

*Hypothesis 3:* Contrary to the hypothesis, the path between organizational trust and

volitional vulnerability was not significant ( $\beta = -.14, ns$ ).

*Hypothesis 4(a):* As hypothesized, volitional vulnerability mediated the link between psychological safety and organizational citizenship behaviors. (The percentage mediated, calculated as a proportion of the total effect that was mediated (indirect /total effect), was 11.4%).

*Hypothesis 4(b):* Contrary to the hypothesis, volitional vulnerability did not mediate the link between organizational trust and workplace performance results.

*Hypothesis 5(a):* As predicted, the path between psychological safety and organizational citizenship behaviors was positive and significant ( $\beta = .29, p < .01$ )

*Hypothesis 5(b):* Contrary to the hypothesis, the path between psychological safety and workplace performance results was not significant ( $\beta = .03, ns$ ).

*Hypothesis 6:* As predicted, the path between psychological safety and volitional vulnerability was positive and significant ( $\beta = .23, p < .01$ ).

*Hypothesis 7:* Contrary to the hypothesis, the path between psychological safety and organizational trust was not significant ( $\beta = .14, ns$ ).

## CHAPTER V

### DISCUSSION

This section presents interpretations and opinions regarding the results of this study, implications of its findings, limitations, and suggestions for future research.

#### **Summary of Results**

Results of the present study show how the qualitative theory of vulnerability as set forth by Dr. Brené Brown can be expressed as a quantitative psychometric measure, and how that same measure can be utilized as an effective predictor and mediator of other well-established research constructs such as psychological safety and organizational citizenship behaviors. In review of the hypotheses tested, this study provides empirical evidence that the three factors of vulnerability—courage to be imperfect, connection, and compassion—are essential elements of volitional vulnerability as predicted by Dr. Brown's theory (*Hypothesis 1*). Second, there is a positive and significant association between psychological safety and volitional vulnerability (*Hypothesis 6*,  $\beta = .23$ ,  $p < .01$ ). Third, volitional vulnerability is a positive and significant contributor to the prediction of organizational citizenship behaviors (*Hypothesis 2(a)*,  $\beta = .18$ ,  $p < .05$ ). Fourth, psychological safety is a positive and significant contributor to the prediction of organizational citizenship behaviors (*Hypothesis 5(a)*,  $\beta = .29$ ,  $p < .01$ ). Fifth, the path between psychological safety and organizational trust is not significant (*Hypothesis 7*,  $\beta = .14$ , *ns*). Sixth, volitional vulnerability is a partial

mediator along the decision-making path between psychological safety and organizational citizenship behaviors (*Hypothesis 4(a)*, Indirect / Total effect = 11.4%) but has no significant mediating effect between organizational trust and workplace performance results (*Hypothesis 4(b)*). Seventh, organizational trust and volitional vulnerability are not significantly related (*Hypothesis 3*,  $\beta = -.14$ , *ns*). Finally, volitional vulnerability and psychological safety are not significantly related to workplace performance results (*Hypothesis 2(b)*,  $\beta = -.01$ , *ns*; *Hypothesis 5(b)*,  $\beta = .03$ , *ns*). Implications of these findings are discussed next.

### **Implications of Findings**

This study confirms that volitional vulnerability, a theory based on qualitative research, can be effectively expressed as a quantitative psychometric measure. The results further confirm that the structural nature of volitional vulnerability is consistent with Dr. Brown's hypothesis that the construct is comprised of three factors—the courage to be imperfect, compassion, and connection (*Hypothesis 1*). Although factor reliability for connection showed borderline acceptability at 0.655 and similarly, average variance explained (AVE) bordered acceptability at 0.488, the confirmatory factor analysis provided evidence of reasonable model fit, thereby confirming that a relationship exists between the three observed variables and their underlying latent structure. The results of this study are in general agreement with the espoused theory of vulnerability and align with expected outcomes. Therefore, it is the position of this researcher that the scale for volitional vulnerability is a viable research tool and meaningful psychometric measure. Introduction of this new measure helps to increase our understanding of psychological safety and organizational citizenship behaviors. Results of this study provide insights on how volitional vulnerability relates to and possibly explains some of the decision-making mechanisms underlying psychological safety and organizational citizenship behaviors.

An important finding of this study was the identification of a positive and significant association between psychological safety and volitional vulnerability (*Hypothesis 6*,  $\beta = .23$ ,  $p <$

.01). Edmondson (1999) has defined psychological safety as “an individual’s perceptions about the consequences of interpersonal risks in their work environment”. How does one arrive at the perceptions of those consequences, be they good (approachable) or bad (avoid)? By what means does a person judge whether it is safe or unsafe to take interpersonal risks in the workplace?

Based on the positive association that exists between psychological safety and volitional vulnerability, it can be argued that such judgments are premised, at least in part, on one’s sense of vulnerability or one’s willingness to expose oneself to threat or harm in order to achieve an organizational goal. Taking interpersonal risk to achieve psychological safety derives from volitional vulnerability, itself a combination of one’s courage to be imperfect, a sense of connection and the feeling of compassion. Edmondson (1999) further described psychological safety as a cognitive group-level concept in which “individuals engage in a kind of tacit calculus at micro-behavioral decision points, in which they assess the interpersonal risk associated with a given behavior”. Thus, the following questions may be asked: What is this calculus? and what are these micro-behavioral decision points? I contend that they are, at least in part, the very factors that make up volitional vulnerability.

According to Dr. Brown (2010), courage, compassion and connection are “the tools for developing worthiness”. An individual will willingly expose themselves to risk when they feel a sense of connection with another person, when that other person is viewed as being compassionate, and when the exposing individual musters up the courage to be imperfect in the presence of that other person. It is my view that a person consciously or unconsciously activates a vulnerability checklist of sorts, consisting of courage, compassion and connection in order to mitigate what Dr. Brown (2012) describes as a state of “uncertainty, risk and emotional exposure”. In the absence of feeling courage, compassion and connection, an individual might perceive only negative consequences in assuming any “interpersonal risk in their work environment” (Edmondson, 1999).



The positive association between psychological safety and volitional vulnerability can also be explained in the context of image management. Amy Edmondson has said that “people are (both conscious and unconscious) impression managers—reluctant to engage in behaviors that could threaten the image others hold of them” (2002, p. 2). According to Dr. Edmondson (2002), there are “four specific risks to image that people face at work: being seen as ignorant, incompetent, negative or disruptive” (p. 3). In similar tones, Brené Brown (2008) talks about making the journey from “What will people think?” to “I am enough”. To quote Dr. Brown further, “we spend so much of our time and energy into making sure that we meet everyone’s expectations and into caring what other people think of us” (2007, p. xvi). This is simply another way of describing image management and according to Dr. Brown the motivator is this thing called shame or the feeling of inadequacy that “I am not enough”. The feeling of not being enough is only marginally different from Dr. Edmondson’s (2002) notion of “being seen as ignorant, incompetent, negative or disruptive”. In its most fundamental sense, image management is a form of personal self-protection or what I would call “vulnerability-avoidance”. In the context of achieving organizational goals and ultimately organizational excellence, a state of psychological safety and volitional vulnerability among team members is an imperative. “Our willingness to own and engage with our vulnerability determines the depth of our courage and the clarity of our purpose; the level to which we protect ourselves from being vulnerable is a measure of our fear and disconnection” (Brown, 2012, p. 2). In other words, we need vulnerability to achieve our organizational goals; thus, vulnerability-avoidance is an expression of a dysfunctional organization.

Another key finding of this study was that volitional vulnerability is a positive and statistically significant contributor to the prediction of organizational citizenship behaviors (*Hypothesis 2(a)*,  $\beta = .18$ ,  $p < .05$ ). Building upon Chester Barnard’s (1938) “willingness to cooperate” and Daniel Katz’s (1964) “innovative and spontaneous behaviors”, Dennis Organ (1988) described organizational citizenship behavior as “individual behavior that is discretionary,

not directly or explicitly recognized by the formal reward system, and that in the aggregate promotes the effective functioning of the organization”. Compare this definition with the definition of volitional vulnerability: “the degree to which one willingly exposes oneself to threat, damage or attack in pursuit of an organizational goal” (p. 5). We might consider that a willingness to be volitionally vulnerable is akin to a behavior that is discretionary. One is not compelled to act either way (i.e., with volitional vulnerability or with discretionary behavior) beyond the common motivation to achieve an organizational goal, which in turn “promotes the effective functioning of the organization” (Organ, 1988). Given that volitional vulnerability and OCB-related discretionary behaviors are freely and willingly engaged in order to achieve an organizational goal, it makes sense that there is a positive association between the constructs.

Further, like organizational citizenship behaviors, volitional vulnerability is not directly or explicitly recognized by the formal reward system yet in some way, it appears to be a positive predictor of organizational citizenship behaviors. By inference, one may conclude that volitional vulnerability is also a contributor to the effective functioning of an organization. Moreover, as indicated earlier, *helping behavior* is universally regarded as a significant dimension of OCB research by “virtually everyone who has worked in this area” (Podsakoff, 2000). According to Podsakoff (2000), “conceptually, *helping behavior* involves voluntarily helping others with, or preventing the occurrence of, work-related problems”. Compare this dimensional definition with the volitional vulnerability factor definition of *human compassion*: sympathetic consciousness of others’ distress together with a desire to alleviate it. What action best represents a desire to alleviate distress except *helping behavior*? The logical inference of this relationship must be that organizational citizenship behavior and volitional vulnerability are positively related.

The results of this study confirm the role of psychological safety as a statistically significant and positive contributor to the prediction of organizational citizenship behaviors (*Hypothesis 5(a)*,  $\beta = .29$ ,  $p < .01$ ). Not surprisingly, psychological safety and organizational citizenship behaviors have a significant and positive association. As discussed earlier,

psychological safety is premised on the concept of people behaving as impression managers in order to convey or at least maintain the semblance of someone who appears to be knowledgeable, competent, positive and cooperative. It just makes sense that such a person would be the embodiment of a good organizational citizen and a positive ambassador for the company.

The results of this study indicate that the relationship between psychological safety and organizational trust is not statistically significant. (*Hypothesis 7*,  $\beta = .14$ , *ns*). This finding is inconsistent with expectations and with other research. For example, this finding contradicts Edmondson's (2002) view that "the concepts of psychological safety and trust have much in common; they both describe intra-psychic states involving perceptions of *risk or vulnerability* [my emphasis], as well as making choices to minimize negative consequences and both have potential positive consequences for work groups and organizations". In another example, studies conducted by May, Gilson, and Harter (1999) and Kahn (1990) have provided earlier empirical evidence of a positive relationship between psychological safety and trust in the workplace.

Another encouraging finding of this study was the role of volitional vulnerability as a partial mediator along the decision-making path between psychological safety and organizational citizenship behaviors (*Hypothesis 4(a)*, percentage mediated, calculated as a proportion of the total effect that was mediated, Indirect / Total effect = 11.4%). How can this be explained? At its most fundamental level, vulnerability exists as a form of decision-making and risk-taking between parties. In a world of "bounded rationality" (Simon, 1955, 1979), what criteria do individuals use in order to make the decision to be vulnerable in a relationship? How do they make the leap from avoiding vulnerability to embracing it? To draw from behavioral economics and the work of Daniel Kahneman, I suspect that vulnerability may exist as a form of intuitive judgment situated somewhere "between the automatic operations of perception and the deliberate operations of reasoning" (Kahneman, 2003). In other words, volitional vulnerability may exist as a kind of judgment heuristic or "a simple procedure that helps find adequate, though often imperfect, answers to difficult questions" (Kahneman, 2011). In determining how much risk a

person is willing to take (i.e., the degree to which one willingly exposes oneself to threat, damage or attack in pursuit of an organizational goal), one might envision the use of a Kahneman-configured “primordial evaluative system” wherein a mental checklist of sorts operates at lightning speed and questions are quickly asked and answered. Do I have the courage to admit my lack of understanding to the person in front of me? Am I dealing with a compassionate person – one who is willing to help me? Do I feel a sense of connection with this person and can I safely open up in front of him without a loss of face? As percepts or signals are being assessed for relative goodness (can be approached) or badness (should be avoided), the decision to risk being vulnerable is generated. In this context, volitional vulnerability is simply a judgment heuristic for assessing interpersonal risk in a social or workplace setting. And as it turns out, it is also a mechanism for mediating the relationship between psychological safety and organizational citizenship behaviors.

Volitional vulnerability had no significant mediating effect between organizational trust and workplace performance results (*Hypothesis 4(b)*) given that (1) the path between organizational trust and volitional vulnerability was not significant ( $\beta = -.14, ns$ ) and (2) the path between volitional vulnerability and workplace performance results was not significant ( $\beta = -.01, ns$ ). A possible explanation for this finding might be found in the poor quality of the performance appraisal tool used to reflect workplace performance results in this study as well as the low reliability for the organizational trust scale.

Results of this study showed that the relationship between organizational trust and volitional vulnerability was not significant (*Hypothesis 3*,  $\beta = -.14, ns$ ). This was an unexpected finding. Trust, by definition, incorporates the term vulnerable, as follows: Trust is the expectation that others’ future actions will be favorable to one’s interests, making one willing to be *vulnerable* [my emphasis] to those actions (Mayer et al., 1995; Robinson, 1996). What is surprising is the fact that this study indicated that the association between trust and vulnerability

was not statistically significant. This finding is both counter-intuitive and logically inconsistent. In fact, it is incongruous with Dr. Brown's understanding of the "chicken-and-egg" relationship that exists between the two constructs: "We need to feel trust to be vulnerable and we need to be vulnerable in order to trust" (Brown, 2012). Possible explanations may include poor internal reliability for the trust scale and lack of employee engagement. In respect of this specific point, Brené Brown has said "trust is a product of vulnerability that grows over time and requires work, attention and full engagement" (Brown, 2012).

Finally, volitional vulnerability and psychological safety were not significantly related to workplace performance results (*Hypothesis 2(b)*,  $\beta = -.01$ , *ns*; *Hypothesis 5(b)*,  $\beta = .03$ , *ns*). Although speculative, this may largely be due to the poor quality of the performance appraisal tool utilized by the tested organization to evaluate workplace performance results.

### **Limitations**

Some caution should be exercised in the interpretation of this study's results based on the following limitations. Volitional vulnerability is a new scale with relatively limited testing. To the knowledge of this researcher, only two quantitative studies of the volitional vulnerability scale have been conducted. The first study, conducted in the fall of 2014 by John Gajda and myself, was considered a pilot study. It consisted of a limited sample of 196 usable responses that were collected on a publicly available internet-based resource center. Although data was provided using paid "human intelligence" providers, the overall quality of respondents may be suspect. Like the pilot study, the present study used a modest sampling of 151 employees working in a mid-sized chemical manufacturing plant located in the southern part of the U.S. The present study was not exclusively focused on the scales associated with this study; many other scales were used to investigate other areas of interest relevant to the client's needs. Given the volume of questions, employee engagement may have been less than optimal. Going forward, future studies should focus on exclusive use of the volitional vulnerability measure and avoid the use of too many others. Further, interpretation of the scale for volitional vulnerability is the interpretation of this

researcher and not that of Dr. Brown. Some creative license was taken in creation of the scale line items based on this researcher's understanding of the writings and qualitative research originally developed by Dr. Brown. While every effort was made to ensure alignment with the originator's theory and its content, I cannot say with certainty that Dr. Brown would give carte blanche approval to all survey questions that were developed for this current study. However, it is worth mentioning that this author did make an attempt to contact Dr. Brown on her website to seek her participation but no response to the query was received.

Finally, potential endogeneity issues should be mentioned. Endogeneity occurs when an explanatory variable is correlated with an error term. This can occur for different reasons, but for this model it may have resulted from simultaneous causality. For example, given that volitional vulnerability and psychological safety are closely related nomological constructs, it is difficult to know for certain if psychological safety was a predictor of volitional vulnerability or vice-versa.

### **Contributions to Theory and Practice**

First, how does this study contribute to the theoretical work of Dr. Brené Brown? For starters, in a highly viewed Ted Talks video on the subject of vulnerability, Dr. Brown had referenced a comment from one of her former professors who had stated "if it can't be measured, it doesn't exist". It is not known if this was meant to imply that vulnerability simply did not exist, or that it did not exist because there was no known measure of it. Either way, this study gives evidence that vulnerability, as construed by Dr. Brown's qualitative research, can be measured quantitatively. In fact, it has been demonstrated with a reasonable level of assurance that the latent variable called "vulnerability" does indeed consist of the three factors described in Dr. Brown's research, namely, the courage to be imperfect, compassion, and connection. Effectively, this research quantitatively supports the qualitative theory of vulnerability, thereby adding another dimension to her work.

Dr. Brown's research was formulated based on the grounded theory approach, meaning that the research centered on what mattered to the research participants. Grounded theory,

developed by Galser and Strauss (1967), has its roots in qualitative research and stands in sharp contrast to social science research conducted in the positivist tradition. Positivism is reliant on verified data or empirical evidence, effectively rejecting introspection and intuitive knowledge. Consider now that Dr. Brown's grounded theory research was comprised of some of the following qualitative activities (this is not an exhaustive list): 1,280 participant interviews, analysis of field notes, conversations with content experts, coding in excess of 3,500 pieces of secondary data and manual coding of 11,000 incidents using line-by-line analysis of phrases and sentences found in original sentences. Dr. Brown stated that, "My data doesn't come from questionnaires or surveys; I interview people and collect stories using field notes. I'm basically a story catcher. Over the past ten years, I've collected more than ten thousand stories" (Brown, 2010). Such large numbers and ten years of study illustrate not only the depth of Brown's commitment to academic curiosity and excellence in research but also the level of rigor that may be required of qualitative research to yield the sort of statistically significant strong quantitative outcomes such as those found in the present study. The evidence found in this present study may also serve to buttress or reinforce the positive and synergistic relationship that exists between qualitative and quantitative research wherein both approaches, if properly conducted, might lead to analogous outcomes. Like the wings of insects and birds, qualitative and quantitative methodologies may perform similar functions despite having different evolutionary origins. The results of the present study not only serve as a validation of the grounded theory methodology but in a larger sense, confirm that there is a shared association between the qualitative and quantitative approaches to research. On this note, it is important to point out the benefit that accrues from crossing knowledge disciplines. Dr. Brown's research on vulnerability originates from the field of social work. Theories such as psychological safety and organizational citizenship behaviors are rooted in the domains of organizational behavior and industrial psychology. The present study illustrates the value of cross-fertilization across different fields of study.

If we accept the premise that this study provides reasonable evidence of the existence of something called volitional vulnerability, we should consider the reason for its existence. Why does volitional vulnerability bother to exist at all? What purpose does it serve? As discussed previously, it does not exist simply to show that qualitative measures can be expressed quantitatively. Nor does it occupy space simply to demonstrate the benefits of cross-study across knowledge domains, although this seems to be a nice thing. Why then does volitional vulnerability bother to exist at all? Why does it play a meaningful role in human relationships? Why does an individual take a risk to expose oneself to harm in order to achieve a goal? To what benefit? Let us speculate. Intelligently. Human beings are organisms. They are complex organisms and highly adaptive ones at that. These highly adaptive complex organisms, comprised of dynamic networks of interactions, have evolved over time, against improbable odds, in order to adapt to the changing demands of the world environment, itself a complex adaptive system (Gell-Man, 1994). To adapt is to change. To change is to self-organize in response to an event in order to increase the odds of survivability. Events that challenge survival belong themselves to some form of complex adaptive system. Examples of complex adaptive systems include human beings, mammalian brains, biological, economic, political, social, military and ecosystems. Within each system, there may be a plethora of agents working in parallel. So there are a lot of moving parts swirling around us as we struggle to make sense of it all. So how do we interpret our existence? Let's figure it out.

Human beings experience existence. Existence in our terms is called life. Our experience of life can be thought of as a set of data. Our senses receive data in the form of sensory input. We process that sensory data cognitively developing thoughts or what neuroscientists refer to as "mental representations". To make things easy on ourselves, we try to find patterns. Patterns that are irrelevant to survival are discarded into some random unconscious wasteland. Patterns that support survival are somehow epistemologically condensed using sense-making processes into schema in order to produce a kind of model or plan for decision-making. Sensemaking is the



process by which people give meaning to experience (Weick, 1995). “The basic idea of sensemaking is that reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs” (Weick, 1993, p. 635). Using sensemaking processes, human beings, engaged in human relationships develop schema to help make sense of this endless surge of data coming their way via their senses. We can think of this schema as a heuristic (Kahneman, 2011), a cognitive tool to support data analysis. It is a sort of fast acting cognitive or genetic algorithm designed to support survival in the face of approach or avoidance decision-making. How might this operate in terms of volitional vulnerability?

Organizations have goals. Employees support those goals. Sometimes employees may be uncertain about how to properly achieve those goals. They may turn to their managers, team leaders, or their co-workers for clarification regarding some aspect of the goal. They may have inhibitions about reaching out. As Dr. Edmondson (2002) has pointed out, they may fear looking ignorant, incompetent, negative or disruptive. Or, as Dr. Brown (2008) has observed, they may fear the kind of shame that says “I am not enough”, that feeling of being inadequate in the eyes of another. I am postulating that volitional vulnerability is a sort of schema or heuristic for evaluating whether employees should take a leap of faith and expose themselves to the risk of appearing insufficient in order to achieve an organizational goal. What sort of data is the individual sorting through when evaluating whether to approach or avoid another workplace party? Do I feel a genuine sense of connection with this person? Yes. Okay then proceed. Is this person compassionate? Will s/he sympathize with my situation? Yes. Okay, then take another step. Do I have the courage to reveal my imperfections to this person? Based on my positive assessment of this sense of connection and compassion in our relationship, am I brave enough to alter my image and possibly look ignorant or incompetent for the sake of pursuing an organizational goal? If the answer is yes, then this person has acted in a volitionally vulnerable way. How does this improve the odds of survivability? At the individual level, the employee who has clarity of thinking around the team’s objectives provides greater utility to the team, thereby

adding value and ensuring continuity on the team. By extension, aligned teams are more productive and achieve greater results in terms of earned value. Volitional vulnerability increases the valued assets of the company by enhancing the prospects for survival for the individual and the team.

The study of volitional vulnerability contributes to a deeper understanding of the theories of psychological safety and organizational citizenship behaviors. Expressed as a three-factor psychometric measure, volitional vulnerability shows significant and positive associations to these constructs and acts as a partial mediator between them. Courage, compassion, and connection appear to play a role in these associations and act in a way to support their articulation. Volitional vulnerability may play a significant role in image management as it relates to psychological safety, and is potentially a heuristic to support decision-making in the expression of psychological safety and organizational citizenship behaviors. As most of these theoretical relationships and contributions have been thoroughly discussed in the preceding sections, what follows are some additional thoughts regarding contributions of volitional vulnerability to existing theory.

Dr. Edmondson's theory of psychological safety is very closely aligned with her thoughts involving learning from failure. In my view, learning from failure is the flip side of psychological safety. Psychological safety describes an organizational environment where employees feel comfortable discussing their mistakes, errors or failures. In an organization where employees feel psychologically safe, there is an opportunity to learn from failure. The benefit is that the organization can take corrective actions, preventive measures and going forward, hopefully learn from their failure so as not to see a repeat of the same error, thereby improving the functionality of the corporation. Dr. Edmondson published an insightful article titled *Strategies for Learning from Failure* (2011). Edmondson also describes these strategies in a Harvard Business School interview of the same title (Edmondson, 2011). For my part, I believe that her recommended strategies can be equally applied to the implementation of corporate programs and practices that

support the introduction of volitional vulnerability and organizational citizenship behaviors. Dr. Edmondson identifies potential obstacles to learning from failure. From the perspective of the employee, a significant obstacle is the notion of blame, what Edmondson calls the blame game. From a very early age, it seems that blame becomes deeply rooted in our psychology. Small children are aware that blame is emotionally unpleasant and therefore learn to avoid it. As adults (and employees), we carry these feelings forward and find it difficult to take actions that may expose our shortcomings or less-than-perfect performance. This may be especially acute when considering workplace issues such as promotions, bonuses or pay raises. From the perspective of the manager, the obstacle to learning from failure takes a different form. Most managers will very likely readily subscribe to the importance of learning from failure as a mechanism of quality improvement for their organization. However, in so doing, managers might fear the appearance of condoning substandard behavior and perhaps a loss of control among their direct reports.

While it may appear axiomatic that organizations should learn from their mistakes, it does not necessarily follow that companies consistently do. A well-publicized example is NASA's Columbia space shuttle accident on February 1, 2003 that killed all seven members of the mission. This replicated the Challenger accident that occurred 17 years earlier on January 28, 1986, again killing all seven members of the crew. In both cases, the normalization of risk was identified as a causal factor. Shuttle parts that malfunctioned partially, but not totally, were considered a normal risk factor. Another tragic example is described in Andrew Hopkins's (2009) book, *Failure to Learn*, which details the events leading up to the BP Texas City Refinery disaster on March 23, 2005. The explosion killed 15 workers and injured more than 170 others. While many factors contributed to this tragic event, it is clear that the owner, British Petroleum, had ample opportunities to learn from previous failures but did not. For example, Europe's largest petrochemical plant in Grangemouth, Scotland, experienced three major incidents over a two-week period in the year 2000. The Grangemouth plant was owned by British Petroleum. The failures and lessons from Grangemouth were directly available to Texas City. Similarly, details of

the ESSO gas plant explosion near Melbourne, Australia in 1998 were widely known to Texas City. How can organizations do a better job of learning from failure(s)? Dr. Edmondson offers several management strategies to support learning from failure. Some of these recommended strategies are now reviewed in detail. It is my belief that these strategies apply equally to the implementation of programs that support volitional vulnerability and organizational citizenship behaviors.

*Framing Strategy:* Team leaders need to accurately “frame the work” to be done, explaining both the kind of work executed and how failures fit within the context. Framing the work means making psychological safety and volitional vulnerability the norm for the workplace. High reliability organizations (HROs) do this very well. By definition, HROs are obsessed or pre-occupied with failure. An HRO is an organization where failure to consider failures can have catastrophic and unforgiving results. Examples include nuclear power plants, petrochemical units, air traffic controllers or military organizations. These sorts of workplaces are characterized with complexity and risk factors where normal accidents are a constant possibility. The key differentiator with HROs is that they “organize themselves in such a way that they are better able to notice the unexpected in the making and halt its development” (Weick & Sutcliffe, 2001). HRO employees feel not only psychologically safe in their organizations, they feel a personal obligation to respond to the unexpected even in the earliest stages, when only weak signals of trouble may be present. According to Weick & Sutcliffe (2001), “mindfulness preserves the capability to see significant meaning of weak signals and to give strong responses to weak signals”. Different work environments will require different approaches.

Let us consider the Texas City Refinery disaster as a practical example. In order to fully develop Dr. Edmondson’s “framing strategy”, it is necessary to understand some of the details of the Texas City disaster. The accident resulted when plant operators overfilled a 170-foot distillation column. This led to a geyser-like discharge from a tall vent located a few hundred feet

from the column. It is estimated that about one road-tanker-load of gasoline was released from the vent into the environment in a little under two minutes. Under ideal circumstances, vents will have a small burning flame mechanically installed at its top so that an unexpected discharge will simply ignite and burn off. As the vent in question did not contain a flare, a vapor cloud formed at or near ground level. An idling vehicle left in the area caused the vapor cloud to ignite leading to an explosion that killed and injured the occupants of a number of mobile offices located next to the plant. Effective “framing” of this work environment might include team leaders consistently stressing the high-risk nature of work life in a petrochemical plant, the severe consequences associated with poor decisions, and the need for full compliance with safe work procedures. This apparently was not done. The accident sequence for the Texas City Refinery disaster began with operator error that existed in a culture of “casual compliance” (Hopkins, 2009). It was known by BP managers that employees often failed to adhere strictly with company safe operating procedures. The accident sequence ended when the ensuing vapor cloud was ignited by an idling vehicle. This specific event stood in sharp contrast to another highly publicized incident that was most certainly very well known to all those involved at Texas City. Charlie Morecraft, a refinery worker, was severely burned in a New Jersey Exxon refinery fire in 1980. In violation of company policy, he left his vehicle idling while he went to investigate a gas leak and suffered horrific burns after being drenched in a flammable liquid. The fact that Texas City knew of this incident and continued to tolerate the idling of vehicles in the plant caused Andrew Hopkins to state that Texas City “suffered from a learning disability” (Hopkins, 2009). “Framing the work” may be a viable strategy for addressing this sort of learning disability and for helping employees to be mindful to even the weakest signals of trouble that may appear in their workplace. In my view, a workplace that promotes volitional vulnerability is one that enables effective learning.

*Embracement Strategy:* “Embrace the messenger, don’t shoot them”. Edmondson advocates for a kind of leadership role modeling by encouraging team leaders to resist the impulse to get annoyed with employees who openly and honestly communicate moments of

failure. They are to be celebrated and thanked for having the courage to come forward. Along the same lines of thinking, messengers should not be ignored. Where potential failures are identified, it is incumbent on good team leaders to take appropriate action. For example, in the years leading up to the Texas City disaster, numerous major reviews identified serious safety problems in the plant. A major external review conducted in 2002 identified “serious concerns about the potential for a major site incident due mainly to the very large number of hydrocarbon escapes [over 80 in the 2000-2001 period]”. A 2003 audit conducted by BP personnel external to Texas City found that the leadership team’s response to process safety risks was insufficient. A few months before the explosion in 2005, a workforce survey revealed “an exceptional degree of fear of catastrophic incidents at Texas City”. Despite these repeated findings from reputable and reliable sources, management at Texas City ignored the warnings. The ensuing catastrophe underlines the criticality of Edmondson’s recommendation to embrace the messenger whenever potential failures are identified. Appropriate action must follow if organizations are to be viewed as industry leaders in learning from failure.

One of the most effective ways to embrace the messenger is to establish formal systems and processes where failure can be learned from effectively. If an organization is seeking to introduce or increase a specific behavior in their culture, it is important to “embed” that behavior in all of its processes. Many high performing quality-oriented organizations (HROs) have established formal structures and processes designed to report, discuss and document lessons learned (knowledge management), breaches of corporate ethics, respect in the workplace, issues of risk, environmental violations and safety concerns. HROs are distinctive in their ability to organize, increase and enhance employee workplace awareness. Weick and Sutcliffe refer to this as collective mindfulness or mindful organizing in their book, *Managing the Unexpected* (2001, 2007). The same approach can be used to improve conditions of psychological safety, volitional vulnerability, and organizational citizenship behaviors. If it is good to have an organization built on psychological safety and learning from failure, it is equally good to have an organization that

is imbued with volitional vulnerability and organizational citizenship behaviors.

Team leaders who openly foster an environment of volitional vulnerability among their employees might experience associated positive improvements in conditions involving psychological safety and organizational citizenship behaviors. Improvements in these areas might lead to greater innovation and performance (Edmondson, 1999; West & Anderson, 1996), improvements in safety performance (Carroll, 1998; Weick & Roberts, 1993), team learning and collective reflection (Edmondson, 2002), and reductions in learning anxiety (Schein, 1985).

### **Future Research**

Two areas for future research are recommended: (1) enhancing the volitional vulnerability measure, and (2) exploring the relationship between volitional vulnerability and safety performance.

First, there is a need to strengthen the measure for volitional vulnerability. In particular, there is a need to focus on improving the item questions for the connection factor. In both the pilot study and this present study, the Cronbach's alpha coefficient for the connection factor bordered on acceptability. Presently, the connection factor is comprised of the following two items: (1) I feel a sense of rejection when I am not connected to someone, and (2) I feel like a failure when I am not connected with other people. For my part, I would be far more comfortable if the factor were comprised of a minimum of three items. The following four items are consistent with the philosophy of connection and are recommended for further consideration and study: (1) It bothers me to feel disconnected from other human beings. (2) Being connected to others gives me a sense of belonging. (3) When I am connected with other people, I feel a personal sense of worthiness. (4) It helps me be a better employee if I feel connected to people in my organization. Strengthening the factor quality for connection may help improve the validity issues (i.e., composite reliability, average variance explained, and convergent validity) as cited earlier. While not necessarily an item for future research, I remain somewhat puzzled by the similarity between the two factors, connection and compassion. It is very difficult to envision a human relationship

in which one exists without the other. If a person feels connected to another person, there is in all likelihood a simultaneous feeling of compassion. If a person feels compassion with or towards another person, it is hard to imagine a lack of connection. These two factors may well be two sides of the same coin.

Second, in future research, I propose to explore the relationship between volitional vulnerability and safety performance, and anticipate that there will be a positive association between these measures. In their meta-analysis of workplace safety, Christian, Bradley, Wallace, and Burke (2009) have construed “a parsimonious description of the person- and situation-related antecedents of workplace safety”. For the purposes of future research, the focus will entail the person-related antecedents and in particular the measures set out by Burke et al. (2002). Burke, Sarpy, Tesluk, and Smith-Crowe (2002) developed a metric for safety related behaviors that consist of four factors: (1) using personal protective equipment, (2) engaging in work practice to reduce risk, (3) communicating hazards and accidents, and (d) exercising employee rights and responsibilities. In the same way that OCB has been subdivided into in-role and extra-role behaviors, Burke et al’s four factors can be divided into task and contextual performance. Using personal protective equipment and engaging in work practice to reduce risk (i.e., following the organization’s safe work procedures) are task requirements (i.e., mandatory in-role behaviors that match with technical job requirements). On the other hand, communicating hazards and accidents and exercising employee rights and responsibilities are consistent with extra-role or discretionary behaviors. Using these measures, I hypothesize that volitional vulnerability will be positively associated with workplace safety behavior.



## REFERENCES

- Barnard, C. J. (1938). *The functions of the executive*. Cambridge, MA: Harvard University Press.
- Baumgartner, H., & Homburg, C. (1996). Applications of structural equation modeling in marketing and consumer research: A review. *International Journal of Research in Marketing, 13*(2), 139-161.
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*(3), 588-606.
- Borman, W. C. (2004). The concept of organizational citizenship. *Current Directions in Psychological Science, 13*, 238-241.
- Borman, W. C., & Motowidlo, S. J. (1993). Expanding the criterion domain to include elements of contextual performance. In N. Schmitt, W.C. Borman & Associates (Eds.), *Personnel selection in organizations* (pp. 71-98). San Francisco, CA: Jossey-Bass.
- Borman, W. C., & Motowidlo, S. J. (1997). Task performance and contextual performance: The meaning for personnel selection research. *Human Performance, 10*, 99-109.
- Borman, W. C., White, L. A., & Dorsey, D. W. (1995). Effects of ratee task performance and interpersonal factors on supervisor and peer performance ratings. *Journal of Applied Psychology, 80*, 168-177.
- Brown, B. (1999). Searching for a theory: The journey from explanation to revolution. *Families in Society, 80*(4), 359-366.
- Brown, B. (2002). *Acompañar: A grounded theory of developing, maintaining and assessing relevance in professional helping* (Doctoral dissertation). University of Houston, TX. Dissertation Abstracts International, 63(02). (UMI No. 3041999).
- Brown, B. (2006). Shame resilience theory: A grounded theory study on women and shame. *Families in Society, 87*(1), 43-52.
- Brown, B. (2007). *I thought it was just me (but it isn't)*. New York: Gotham Books.

- Brown, B. (2010, June 10). The power of vulnerability. *TedTalks YouTube Video Presentation*, at TedXHouston. Retrieved from [https://www.ted.com/talks/brene\\_brown\\_on\\_vulnerability](https://www.ted.com/talks/brene_brown_on_vulnerability)
- Brown, B. (2010). *The gifts of imperfection: Let go of who you think you're supposed to be and embrace who you are*. Center City, MN: Hazelden Publishing.
- Brown, B. (2012). *Daring greatly*. New York: Gotham Books.
- Buber, M. (1923). *I and thou*. David Rehak, Publisher. ISBN-10: 8087830342.
- Burke, M. J., Sarpy, S. A., Tesluk, P. E., & Smith-Crowe, K. (2002) General safety performance: A test of a grounded theoretical model. *Personnel Psychology*, 55, 429-457.
- Carmeli, A., & Gittel, J. H. (2009). High-quality relationships, psychological safety, and learning from failures in work organizations. *Journal of Organizational Behavior*, 30, 709-729.
- Carroll, A. B. (1998). The four faces of corporate citizenship. *Business and Society Review*, 100/101, 1-7.
- Christian, M. S., Bradley, J. C., Wallace, J. C., & Burke, M. J. (2009). Workplace safety: A meta-analysis of the roles of person and situation factors. *Journal of Applied Psychology*, 94(5), 1103-1127.
- Colquitt, J. A., Scott, B. A., & LePine, J. A. (2007). Trust, trustworthiness, and trust propensity: A meta-analytic test of their unique relationship with risk taking and job performance. *Journal of Applied Psychology*, 92(4), 909-927.
- Currall, S. C., & Judge, T. A. (1995). Measuring trust between organizational boundary role persons. *Organizational Behavior and Human Decision Processes*, 64, 151-170.
- Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, 44(2), 350-383.
- Edmondson, A. (2003). Speaking up in the operating room: How team leaders promote learning in interdisciplinary action teams. *Journal of Management Studies*, 40, 1419-52.
- Edmondson, A. (2011, March 15). *Strategies for learning from failure*. Harvard Business School Interview. Retrieved from: <https://www.youtube.com/watch?v=dGT7X5R1bpw>

- Edmondson, A. (2011). Strategies for learning from failure. *Harvard Business Review* (April 2011 issue).
- Edmondson, A. C. (2002). The local and variegated nature of learning in organizations. *Organizational Science*, 13(2), 128-46.
- Edmondson, A. C. (2004). Psychological safety, trust, and learning in organizations: A group-level lens. In R.M. Kramer & K.S. Cook (Eds), *Trust and distrust in organizations: Dilemmas and approaches* (pp. 239-272). New York: Russell Sage.
- Edmondson, A., & Lei, Z. (2014). Psychological safety: The history, renaissance and future of an interpersonal construct. *Annual Review Organizational Psychology Organizational Behavior*, 2014(1), 23-43.
- Evans, M. G. (1991). The problem of analyzing multiplicative composites: Interaction revisited. *American Psychologist*, 46, 6-15.
- Ferrin, D. L., Bligh, M. C., & Kohles, J. C. (2008). It takes two to tango: An interdependence analysis of the spiraling of perceived trustworthiness and cooperation interpersonal and intergroup relationships. *Organizational Behavior and Human Decision Processes*, 107, 161-178.
- Gell-Man, M. (1994). Complex adaptive systems: Complexity: metaphors, models and reality. *SFI Studies in the Sciences of Complexity*, Proc. Vol. XIX. Addison-Wesley.
- George, J. M. (1990). Personality, affect, and behavior in groups. *Journal of Applied Psychology*, 75 (2), 107-116.
- George, J. M. (1991). State or trait: Effects of positive mood on prosocial behavior at work. *Journal of Applied Psychology*, 76, 299-307.
- George, J. M., & Bettenhausen, K. (1990). Understanding prosocial behavior, sales performance, and turnover: A group-level analysis in a service context. *Journal of Applied Psychology*, 75 (6), 698-709.

- George, J. M., & Brief, A. P. (1992). Feeling good—doing good: A conceptual analysis of the mood at work-organizational spontaneity relationship. *Psychological Bulletin*, *112*(2), 310-329.
- George, J. M., & Jones, G. R. (1997). Organizational spontaneity in context. *Human Performance*, *10*(2), 153-170.
- Gillespie, N. (2003). *Measuring trust in work relationships: The behavioral trust inventory*. Paper presented at the annual meeting of the Academy of Management, Seattle, WA.
- Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory*. Chicago: Aldine.
- Graham, J. W. (1989). *Organizational citizenship behavior: Construct definition, operationalization, and validation*. Chicago, IL: Loyola University of Chicago.
- Gong Y, Cheung, S., Wang, M., & Huang, J. (2012). Unfolding the proactive process for creativity: Integration of the employee proactivity, information exchange, and psychological safety perspectives. *Journal of Management*, *38*(5):1611-33.
- Hopkins, A. (2009). *Failure to learn: The BP Texas City refinery disaster*. CCH Australia Limited, McPherson's Printing Group. ISBN: 978-1-921322-44-0.
- Hu, L., & Bentler, P. (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.
- Jöreskog, K., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago, IL: Scientific Software International Inc.
- Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal*, *33*(4), 692-724.
- Kahn, W. A. (2007). Meaningful connections: Positive relationships and attachments at work. In J. E. Dutton, & B. R. Ragins (Eds.), *Exploring positive relationships at work: Building a theoretical and research foundation* (pp. 189–206). Mahwah, NJ: Lawrence Erlbaum Associates.

- Kahneman, D. (2003) A Perspective on Judgment and Choice, Mapping Bounded Rationality, *American Psychologist*. Vol. 58, No. 9, 697 – 720.
- Kahneman, Daniel. (2011). Thinking Fast and Slow. Doubleday Canada, ISBN: 978-0-385-67651-9.
- Katz, Daniel (1964). The motivational basis of organizational behavior. *Behavioral Science*, 9, 131-146.
- Koys, D. J. (2001). The effects of employee satisfaction, organizational citizenship behavior, and turnover on organizational effectiveness: A unit-level longitudinal study. *Personnel Psychology*, 54(1), 101-114.
- MacCallum, R.C., Browne, M.W., & Sugawara, H. M. (1996). Power analysis and determination of sample size. *Psychological Methods*, 1(2), 130-149.
- May, D., Gilson, R., & Harter, L. (1999). *Engaging the human spirit at work: Exploring the psychological conditions of meaningfulness, safety, and availability*. Chicago, IL: The Academy of Management.
- Mayer, R., Davis, J., & Schoorman, F. D. (1995). An integrative model of organizational trust. *The Academy of Management Review*, 20(3), 709-734.
- Mayer, R. C., & Davis, J. H. (1999). The effect of the performance appraisal system on trust for management: A field quasi-experiment. *Journal of Applied Psychology*, 84(1), 123-136.
- McEvily, B., & Tortoriello, M. (2011). Measuring trust in organizational research: Review and recommendations. *Journal of Trust Research*, 1(1), 23-63.
- Motowidlo, S. J., Borman, W. C., & Schmit, M. J. (1997). A theory of individual differences in task and contextual performance. *Human Performance*, 10(2), 71-83.
- Motowidlo, S., & Van Scotter, J. (1994). Evidence that task performance should be distinguished from contextual performance. *Journal of Applied Psychology*, 79(4), 475-480.

- O'Reilly, C., & Chatman, J. (1986). Organizational commitment and psychological attachment: The effects of compliance, identification, and internalization on prosocial behavior. *Journal of Applied Psychology, 71*(3), 492-499.
- Organ, D.W. (1988). *Organizational citizenship behavior: The good soldier syndrome*. Lexington, MA: Lexington Books.
- Organ, D.W. (1990). The motivational basis of organizational citizenship behavior. In B. M. Staw & L.L. Cummings (Eds.), *Research in organizational behavior* (pp. 12, 43-72). Greenwich, CT: JAI Press.
- Podsakoff, P. M., MacKenzie, S. B., Paine, J. B., & Bachrach, D. G. (2000). Organizational citizenship behaviors: A critical review of the theoretical and empirical literature and suggestions for future research. *Journal of Management, 26*(3), 513-563.
- Robinson, S. L. (1996). Trust and breach of the psychological contract. *Administrative Science Quarterly, 41*(4), 574-599.
- Rousseau, D. M., Burt, S. B., Sitkin, R. S., & Camerer, C. (1998). Not so different after all: A cross discipline review of trust. *Academy of Management Review, 23*(3), 393-404.
- Schein, E. (1985). *Organizational culture and leadership*. San Francisco, CA: Jossey-Bass Publishers.
- Schein, E. (1999). *The corporate culture survival guide*. San Francisco, CA: Jossey-Bass Publishers.
- Schein, E. (2006). From brainwashing to organizational therapy: A conceptual and empirical journey in search of 'systemic health' and a general model of change dynamics. A drama in five acts. *Organization Studies, 27*(2), 287-301.
- Schein, E. H., & Bennis, W. (1965). *Personal and organizational change through group methods*. New York: Wiley.
- Schoorman, F. D., Mayer, R. C., & Davis, J. H. (1996). Organizational trust: Philosophical perspectives and conceptual definitions. *Academy of Management Review, 21*, 337-340.

- Schoorman, F. D., Mayer, R. C., & Davis, J. (2007). An integrative model of organizational trust: Past, present, and future. *Academy of Management Review*, 2, 344-354.
- Simon, H. A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics*, 69, 99-118.
- Simon, H. A. (1979). Information processing models of cognition. *Annual Review of Psychology*, 30, 363-396.
- Smith, C. A., Organ, D. W., & Near, J. P. (1983). Organizational citizenship behavior: Its nature and antecedents. *Journal of Applied Psychology*, 68, 655-663.
- Van Dyne, L., Cummings, L. L., & Parks, J. M. (1995). Extra-role behaviors: In pursuit of construct and definitional clarity (a bridge over muddied waters). In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (pp. 215-285). Greenwich, CT: JAI Press.
- Van Scotter, J. R., & Motowidlo, S. J. (1996). Interpersonal facilitation and job dedication as separate facets of contextual performance. *Journal of Applied Psychology*, 81, 525-531.
- Weick, K. E. (1993). The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative Science Quarterly*, 38(1993), 628-652.
- Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage Publications Inc.
- Weick, K. E., & Roberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly*, 38, 357-381.
- Weick, K. E., & Sutcliffe, K. M. (2001). *Managing the unexpected: Assuring high performance in an age of complexity* (1st ed.). San Francisco, CA: Jossey-Bass.
- Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected: Resilient performance in an age of uncertainty* (2<sup>nd</sup> ed.). San Francisco, CA: Jossey-Bass.
- West, M., & Anderson, N. (1996). Innovation in top management teams. *Journal of Applied Psychology*, 81(6), 680-693.

Williams, L. J., & Anderson, S. E. (1991). Job satisfaction and organizational commitment as predictors of organizational citizenship and in-role behaviors. *Journal of Management*, *17*, 601- 617.



## APPENDICES

This appendix contains a copy of a report originally prepared by John Gajda and Walter Slipetz, Cohort II students of the Oklahoma State University, Ph.D. in Business Program for Executives. This assignment was part of the Fall 2014 curriculum and outlines the steps taken at that time to develop and produce the first psychometric measure of volitional vulnerability.

**Psychometrics & Scale Development**

**Group Project**

**Fall 2014**

**Instructor:** Dr. Craig Wallace

*Volitional Vulnerability*

**Submitted by:**

John Gajda and Walter Slipetz

Cohort II

**Date:** October 11, 2014

The purpose of this paper is to design and validate a psychometric scale of measurement for vulnerability.

## **Methods**

Development of the new scale for Volitional Vulnerability consisted of the following steps:

- Preparation, Review and Refinement of Item Generation List
- IRB Approval Process
- Use of MTurk Services
- Exploratory Factor Analysis
- Confirmatory Factor Analysis
- Nomological Network and Related Constructs

These steps are discussed in the results section that follows.

## **RESULTS**

### **Preparation, Review and Refinement of Item Generation List**

- According to researcher Dr. Brené Brown, the underpinnings of vulnerability include courage, compassion and connection.
- Construct and factor definitions were developed based on Brown's theory
  - ***Vulnerability***: "the degree to which one willingly exposes oneself to threat, damage or attack in pursuit of an organizational goal"
  - ***Courage to be imperfect***: "the inner strength and confidence necessary to recognize and reveal one's personal flaws."
  - ***Human compassion***: "sympathetic consciousness of others' distress together with a desire to alleviate it."

- **Connection:** “the energy that exists between people when they feel seen, heard, and valued; when they can give and receive without judgment; and when they derive sustenance and strength from the relationship”
- Definitions were used to generate/ brainstorm an initial list of 50 items
- 8 subject content experts supported the sorting of preliminary item list
- Item list was refined to 22 questions across 3 factors based on SME agreement of 80%

**The Twenty-Two Questions that were used in the survey process were labeled in the data analysis as follows:**

Q1 - 13 I am not afraid to risk revealing my flaws if it means achieving an important organizational goal.

Q1 - 14 I can show my weaker side.

Q1 - 15 I am comfortable discussing my shortcomings if it helps achieve an organizational goal.

Q1 - 16 It's okay to open up and reveal one's imperfections to others when pursuing a goal.

Q1 - 17 I am brave enough to admit that I am not perfect.

Q1 - 18 Admitting your personal vulnerability is pure courage.

Q2 - 17 Working effectively with others requires compassion in all relationships.

Q2 - 18 Empathy towards others is an important part of being connected.

Q2- 19 Human compassion is the birthplace of joy.

Q2 - 20 I feel authentic when I am compassionate towards others.

Q2 - 21 I am grateful for moments of human compassion.

Q2 - 22 Practicing human compassion makes us kinder and gentler.

Q2 - 23 I function best when I practice human compassion.

Q2 - 24 I function best when I am shown human compassion.

Q2 - 25 I have capacity for human compassion.

Q2 - 26 I care about other people's distress.

Q3 - 23 It bothers me to feel disconnected from other human beings.

Q3 - 24 Being connected to others gives me a sense of belonging.

Q3 - 25 When I am connected with other people, I feel a personal sense of worthiness.

Q3 - 26 I feel a sense of rejection when I am not connected to someone.

Q3 - 27 I feel like a failure when I am not connected with other people

Q3 - 28 It helps me be a better employee if I feel connected to people in my organization

### **IRB Approval Process**

IRB approval process was based on the following timeline:

- September 6, 2014 – application for review of human subjects research was submitted to OSU IRB Institutional Review Board
- September 18, 2014 - Following 3 subsequent requests for modifications/additional information, approval of IRB application was granted

## Use of MTurk Services

### Timeline

- September 24, 2014 – Amazon Mechanical Turk survey launched
  - 200 responses collected
  - 23 responses screened out due to suspected/problematic response patterns
  
- September 26, 2014 – Survey re-launched
  - Additional 23 responses collected
  - 4 screened out
  - Total of 196 responses used in data analysis

## **Exploratory Factor Analysis**

### **Goals of this Analysis**

1. Look at the reliability of the data (coefficient alpha) received from MTurks
2. Run EFA to look at dimensionality of the scale i.e. 6 items that load on one factor called *Courage to be Imperfect*, 10 items that load on a factor called *Human Compassion* and 6 items that load on *Necessary Connection*.

### **Step 1 – Reliability Data**

#### **Method**

- Using jmp, one scale was loaded at a time for coefficient alpha/ reliability to the Y column.
- In jmp, each scale was loaded as follows: Analyze > Multivariate Methods > Item Reliability > Cronbach's Alpha
- Cronbach's alpha is a measure of internal consistency.
- High numbers for Cronbach's alpha indicate strong reliability. (NOTE: A reliability coefficient of 0.70 or higher is considered acceptable in most social science research situations.)
- The number in the left column at the top indicates the Cronbach alpha for the entire set.
- Each number below indicates what the alpha would be if the item were omitted.
- Jmp output for each of these item reliability tests is shown in Exhibits 1, 2 and 3 on the following pages.

**Exhibit 1 – Reliability Test for *Courage to be Imperfect* Scale**

Cronbach's $\alpha$		$\alpha$	-.8	-.6	-.4	-.2	0	.2	.4	.6	.8
Entire set	0.8452										
Excluded		$\alpha$	-.8	-.6	-.4	-.2	0	.2	.4	.6	.8
Col											
Q1_13	0.8029										
Q1_14	0.8191										
Q1_15	0.7856										
Q1_16	0.7886										
Q1_17	0.8388										
Q1_18	0.8705										

**Interpretation**

- The Cronbach's alpha for the entire set for *Courage to be Imperfect* (Exhibit 1) is 0.8452. This indicates acceptable reliability for the entire set. It is observed that the exclusion of item Q1\_18 would increase the Cronbach's alpha to 0.8705.



**Exhibit 2 – Reliability Test for *Human Compassion* Scale**

<b>Cronbach's <math>\alpha</math></b>		$\alpha$	-.8	-.6	-.4	-.2	0	.2	.4	.6	.8
Entire set	0.8955										

<b>Excluded</b>		$\alpha$	-.8	-.6	-.4	-.2	0	.2	.4	.6	.8
Col											
Q2_17	0.8890										
Q2_18	0.8902										
Q2_19	0.8856										
Q2_20	0.8801										
Q2_21	0.8824										
Q2_22	0.8862										
Q2_23	0.8795										
Q2_24	0.8862										
Q2_25	0.8874										
Q2_26	0.8846										

**Interpretation**

- The Cronbach's alpha for the entire set for *Human Compassion* (Exhibit 2) is 0.8955.

This indicates acceptable reliability for the entire set. It is observed that the exclusion of any single item in this set would reduce the Cronbach's alpha for the entire set.

**Exhibit 3 – Reliability Test for *Necessary Connection* Scale**

Cronbach's $\alpha$		$\alpha$	-.8	-.6	-.4	-.2	0	.2	.4	.6	.8	
Entire set	0.8425											
Excluded		Col	$\alpha$	-.8	-.6	-.4	-.2	0	.2	.4	.6	.8
	Q3_23	0.8047										
	Q3_24	0.8199										
	Q3_25	0.8114										
	Q3_26	0.8086										
	Q3_27	0.8236										
	Q3_28	0.8300										

**Interpretation**

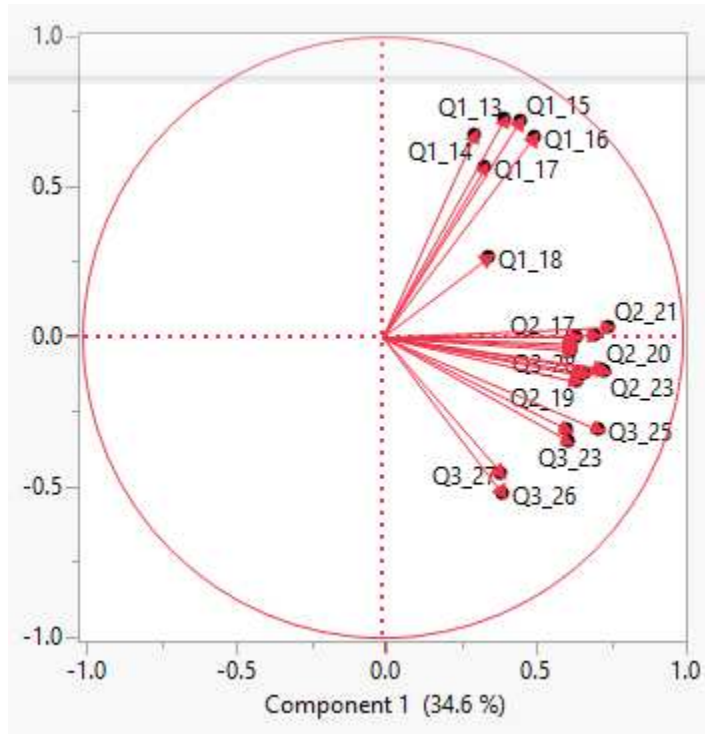
- The Cronbach's alpha for the entire set for *Necessary Connection* (Exhibit 3) is 0.8425. This indicates acceptable reliability for the entire set. It is observed that the exclusion of any single item would reduce the Cronbach's alpha for the entire set.

## Step 2 – Factor Analysis

### Method

- Run Principal Components first in order to do a Factor Analysis.
- Note: Principal Components is not a Factor Analysis.
- Run in jmp as follows: Analyze > Multivariate Methods > Principal Components
- All 3 Factors (Courage to be Imperfect, Human Compassion and Necessary Connection ) are used
- Default estimation method is set at ML (Maximum Likelihood)
- All 22 items are moved to Y variable
- Factor Analysis > Select ML and CFA (same as EFA) and number of factors is 3 > select Quartermin for an Oblique Rotation Method
- Jmp helps determine the strength of loading based on shading
- Factor loading is a correlation between a latent factor
- LF is generated from shared variance among the items
- The part where they are all correlated is called the factor (i.e. they are all measuring the same thing)
- Note: Look for numbers 0.40 or higher for each item
- Look at Eigenvalues to determine how many factors you have
- The rule of thumb is that if the Eigenvalue is greater than one, it could be a factor (this is not a hard & fast rule)
- After assessing Eigenvalues, do a Scree Plot
- Jmp output for each of these steps is presented in Exhibits 4 to 8 on the following pages

**Exhibit 4 Factor Loading Plot**



**Interpretation**

The Factor Loading Plot illustrated above presents a clear break between the factor, *Courage to be Imperfect* (Q1\_13 to Q1\_18 inclusive), and the factors for *Human Compassion* (Q2) and *Necessary Connection* (Q3). The latter two factors are less clearly separated.

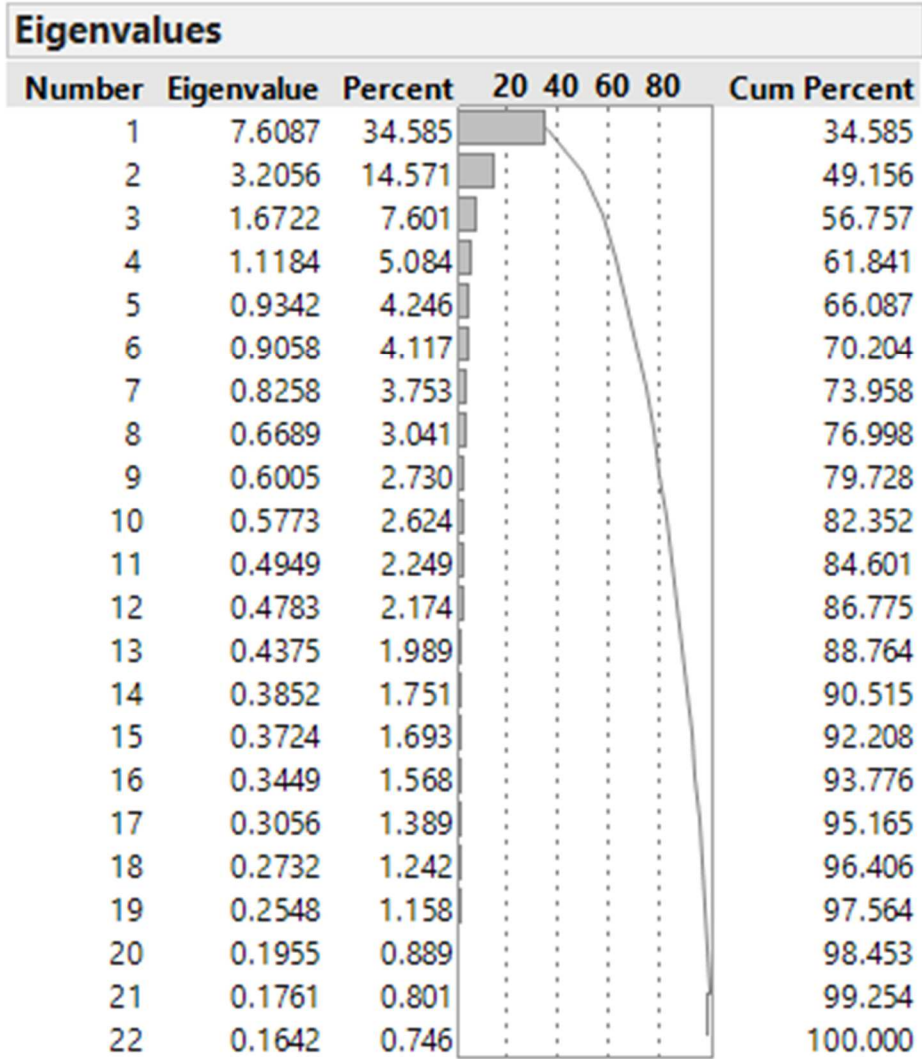
### Exhibit 5 Rotated Factor Loading

<b>Rotated Factor Loading</b>			
	Factor 1	Factor 2	Factor 3
Q1_13	-0.014392	0.849305	-0.078330
Q1_14	-0.104637	0.724015	-0.000185
Q1_15	-0.051087	0.914960	0.020229
Q1_16	0.010569	0.826749	0.064549
Q1_17	0.126125	0.488324	-0.140971
Q1_18	0.110956	0.320418	0.085958
Q2_17	0.521851	0.126541	0.080533
Q2_18	0.597866	0.055490	-0.019096
Q2_19	0.718322	-0.077641	-0.033517
Q2_20	0.727732	0.009113	0.028203
Q2_21	0.698943	0.121887	-0.010727
Q2_22	0.623752	0.004655	0.084519
Q2_23	0.770764	-0.018708	-0.003021
Q2_24	0.717803	-0.029865	-0.124364
Q2_25	0.678617	-0.015869	-0.085882
Q2_26	0.655456	0.090239	0.010406
Q3_23	0.360119	0.002712	0.485003
Q3_24	0.449264	-0.045686	0.323449
Q3_25	0.570346	-0.043922	0.320694
Q3_26	-0.045930	-0.051998	0.891543
Q3_27	-0.055370	0.004320	0.838249
Q3_28	0.381835	0.162193	0.319840

#### Interpretation

- In this “unclean” output (shown above), there are many data below 0.40.
- These will be removed one at a time to obtain a “clean” measure of the constructs.
- A clean measure of constructs is presented in Exhibit 8

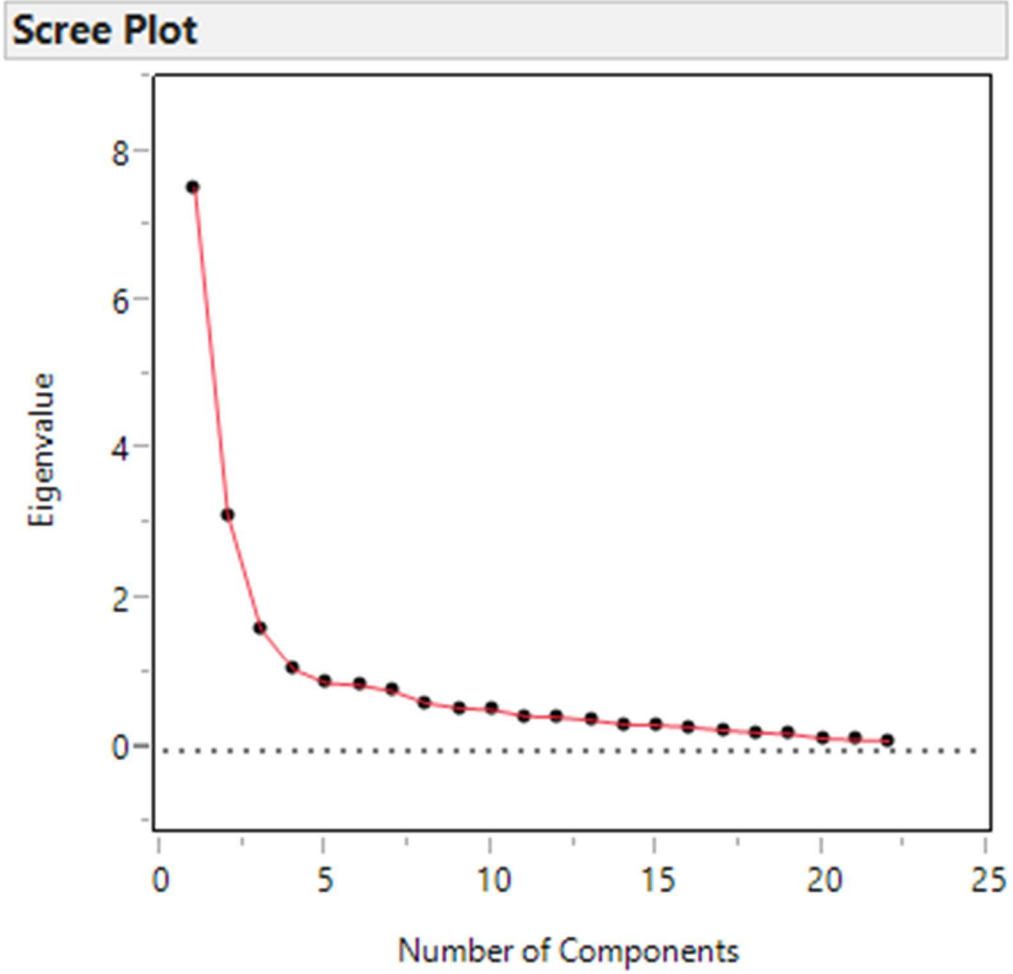
**Exhibit 6 – Eigenvalues**



**Interpretation**

There are 4 Eigenvalues that are greater than 1 suggesting the possibility of 4 factors.

Exhibit 7 – Scree Plot



**Interpretation**

The Scree Plot shows one reasonably sharp elbow and one slight elbow suggesting the possibility of three factors.

### Exhibit 8 – Clean Measure of Constructs

Rotated Factor Loading			
	Factor 1	Factor 2	Factor 3
Q1_13	0.013821	0.840089	-0.054994
Q1_14	-0.079748	0.716087	0.021231
Q1_15	-0.022581	0.903527	0.040631
Q1_16	0.031911	0.821295	0.083236
Q1_17	0.119562	0.487600	-0.124568
Q2_17	0.525521	0.118448	0.093259
Q2_18	0.570398	0.062105	-0.014812
Q2_19	0.723838	-0.092636	-0.004568
Q2_20	0.738842	-0.006496	0.058078
Q2_21	0.694958	0.114120	0.007253
Q2_22	0.640323	-0.010764	0.104243
Q2_23	0.776978	-0.032475	0.013477
Q2_24	0.717873	-0.045713	-0.095339
Q2_25	0.669677	-0.023169	-0.055694
Q2_26	0.657419	0.080406	0.034255
Q3_23	0.350587	0.012263	0.461060
Q3_26	-0.021590	-0.042246	0.905279
Q3_27	-0.014378	0.004570	0.829103

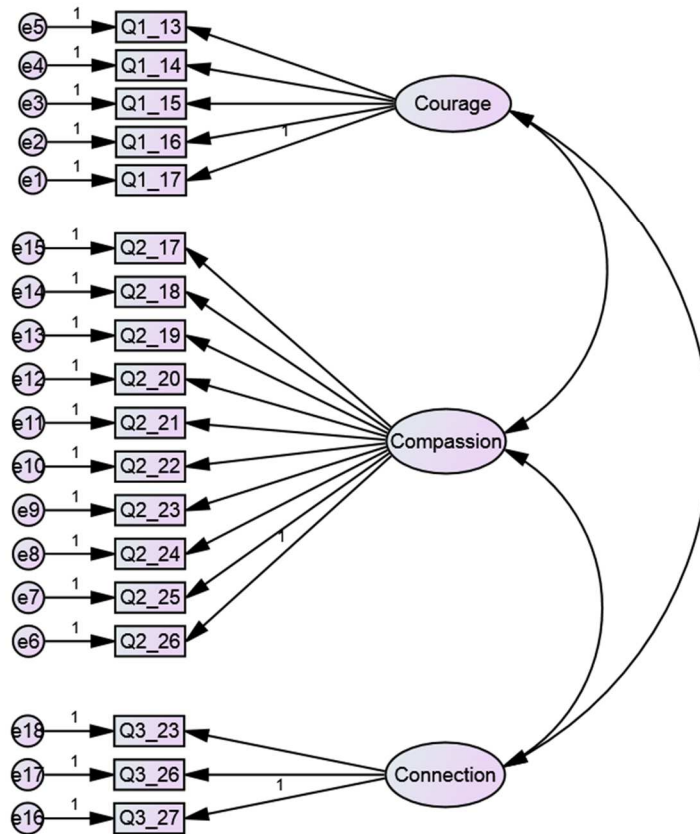
#### Interpretation

The following 4 items were removed due to poor fit and in order to obtain a clean measure of the constructs: *Courage to Be Imperfect* Items Q1\_18; *Necessary Connection* Items Q3\_24, Q3\_25 and Q3\_28.



## Confirmatory Factor Analysis of Volitional Vulnerability 3-Factor Scale

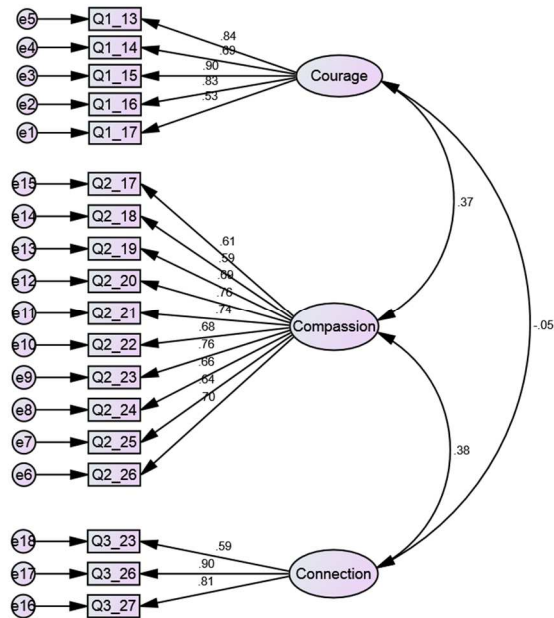
### Step 1: Create Preliminary Model Using SPSS AMOS



### Interpretation

- The above model derives from the EFA Clean Measure of Construct Three-Factor Rotated Loading chart.

**Step 2: Run the Preliminary Model**



**Interpretation**

- Observe that there are a number of factor loadings below 0.70.
- For Courage, there are two at .69 and .53. (We may delete the latter).
- For Compassion, there are 6 loadings below .70, ranging from .59 to .69. We will assess model fit summary and covariance between errors for potential changes / improvements.
- For Connection, there is one loading below .70 at .59. (We will leave this one for the time being as it would be valuable to maintain 3 observed variables for Connection).
- Covariances between factors are low (all below 0.38) and reasonable.

### Step 3: Analyze Model Fit Summary

#### Model Fit Summary

##### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	39	330.040	132	<b>.000</b>	<b>2.500</b>
Saturated model	171	.000	0		
Independence model	18	1892.303	153	.000	12.368

##### RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	<b>.059</b>	<b>.844</b>	<b>.798</b>	.652
Saturated model	.000	1.000		
Independence model	.240	.322	.242	.288

##### Baseline Comparisons

Model	NFI	RFI	IFI	TLI	CFI
	Delta1	rho1	Delta2	rho2	
Default model	.826	.798	.887	.868	<b>.886</b>
Saturated model	1.000		1.000		1.000

Independence model	.000	.000	.000	.000	.000
--------------------	------	------	------	------	------

**Parsimony-Adjusted Measures**

Model	PRATIO	PNFI	PCFI
Default model	.863	.712	<b>.765</b>
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

**NCP**

Model	NCP	LO 90	HI 90
Default model	198.040	148.384	255.385
Saturated model	.000	.000	.000
Independence model	1739.303	1602.773	1883.228

**FMIN**

Model	FMIN	F0	LO 90	HI 90
Default model	1.710	1.026	.769	1.323
Saturated model	.000	.000	.000	.000
Independence model	9.805	9.012	8.305	9.758

**RMSEA**

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	<b>.088</b>	<b>.076</b>	<b>.100</b>	<b>.000</b>
Independence model	.243	.233	.253	.000

### Overall Conclusion regarding Summary Model Fit

Several indicators suggest unacceptable model fit including:

- GFI
- AGFI
- CFI
- PCFI
- RMSEA
- P-Values

In order to further assess the possibility of model fit issues, we need to go to modification indices and deal with covariance between errors and only the errors that are on the same factor. (See Step 4)

**Step 4 Evaluate Modification Indices and Co-variances**

**Covariances: (Group number 1 - Default model)**

	M.I.	Par Change
e18 <--> Compassion	23.986	.142
e15 <--> e16	5.221	.070
<b>e14 &lt;--&gt; e15</b>	<b>13.044</b>	.076
e13 <--> e15	6.323	.071
e12 <--> e17	5.383	.063
e12 <--> e16	5.373	-.066
e12 <--> e14	5.238	-.045
<b>e12 &lt;--&gt; e13</b>	<b>12.382</b>	.093
e11 <--> e17	5.646	-.059
e11 <--> e14	9.328	.055
e11 <--> e13	5.126	-.055
e10 <--> e16	6.140	.066
e10 <--> e11	9.156	.050

	M.I.	Par Change
e9 <--> e17	7.829	-.086
e9 <--> e16	5.032	.072
e8 <--> e16	6.162	-.075
e8 <--> e14	4.583	-.045
e8 <--> e10	7.525	-.053
<b>e8 &lt;--&gt; e9</b>	<b>11.865</b>	.080
e6 <--> e14	4.363	-.044
e5 <--> e17	4.151	-.060
e5 <--> e9	5.311	.056
e5 <--> e7	4.080	-.043
e4 <--> e14	4.873	-.059
e3 <--> e9	4.946	-.054
e2 <--> e13	4.568	-.064
e1 <--> Connection	4.067	-.109
e1 <--> e13	5.708	-.099

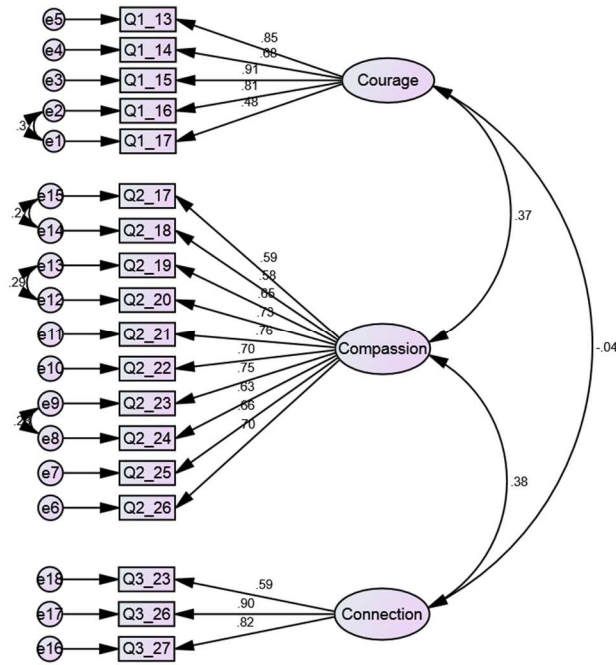
	M.I.	Par Change
e1 <--> e11	8.172	.080
e1 <--> e7	7.256	.083
e1 <--> e5	8.546	-.097
e1 <--> e3	4.927	-.073
<b>e1 &lt;--&gt; e2</b>	<b>21.042</b>	.158

### Interpretation

The above table shows the co-variances between errors. We are interested only in the covariance between errors on the same factor. We have highlighted in bold the co-variances listed that occur on the same and we will co-vary these errors and then assess the effect on Factor Loadings.



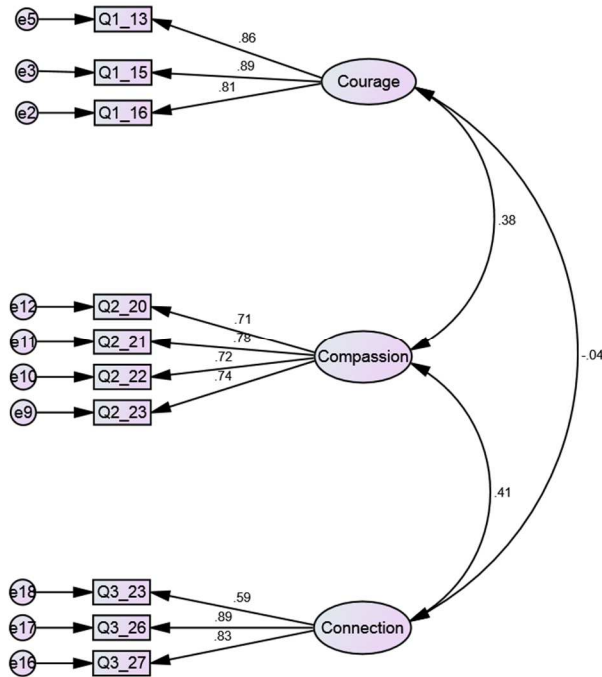
## Step 5 Model with Covaried Errors



### Interpretation

Covarying the 4 pair of error terms in every instance reduced the Factor Loadings on the related variables. For example, by covarying the error terms on Q1\_16 and Q1\_17, the factor loading fell from .83 and .53 to .81 and .48 respectively. There was modest improvement in the other factor loadings. Therefore, we will begin to adjust the model by deleting substandard observed variables (such as Q1\_17) one at a time and monitoring the effect on the Factor Loadings with each deletion.

## Step 6 New and Improved Model



### Interpretation

Following the deletion of 7 variables that were loading below the threshold of 0.70, we retain the above model. With the exception of Q3\_23 which loads at 0.59, all other factor loadings are acceptable. The reason for retention of Q3\_23 is simply to illustrate the need for a minimum of 3 variables on one factor (a sort of placeholder). The items pertaining to this factor will need to be reworked in the future in order to make this a viable scale of measurement. We will proceed with a review of standardized residual covariances in the next step. This will be followed by a review of summary fit and finally validity analysis.

**Step 7                      Standardized Residual Co-variances**

**Standardized Residual Covariances (Group number 1 - Default model)**

	Q3_23	Q3_26	Q3_27	Q2_20	Q2_21	Q2_22	Q2_23	Q1_13	Q1_15	Q1_16
Q3_23	0									
Q3_26	0.012	0								
Q3_27	<b>-0.566</b>	0.11	0							
Q2_20	<b>3.292</b>	0.348	<b>-0.56</b>	0						
Q2_21	<b>2.914</b>	<b>-1.635</b>	<b>-0.408</b>	-0.144	0					
Q2_22	<b>2.694</b>	-0.262	<b>0.981</b>	<b>-0.527</b>	<b>0.421</b>	0				
Q2_23	<b>3.504</b>	<b>-0.99</b>	0.386	<b>0.528</b>	-0.273	-0.024	0			
Q1_13	<b>1.726</b>	<b>-1.487</b>	<b>-0.645</b>	<b>-0.402</b>	<b>0.819</b>	<b>-1.04</b>	0.038	0		
Q1_15	<b>1.522</b>	-0.265	0.236	0.102	0.38	<b>-0.648</b>	<b>-0.91</b>	0.014	0	
Q1_16	<b>2.632</b>	<b>0.496</b>	<b>1.037</b>	<b>0.47</b>	<b>1.407</b>	-0.131	0.222	-0.078	0.038	0

**Interpretation**

Examining the above table of Standardized Residual Covariances, we are looking for any numbers above 0.4. These numbers have been highlighted in bold. Not surprisingly, given its poor Factor Loading, it is immediately evident that Q3\_23 is causing major problems. It also appears that Q1\_13 and Q1\_16 are problematic followed by Q2\_20, 21 and 22.

**Step 8            Assess New Summary Model Fit**

**Model Fit Summary**

**CMIN**

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	23	86.324	32	<b>.000</b>	<b>2.698</b>
Saturated model	55	.000	0		
Independence model	10	964.204	45	.000	21.427

**RMR, GFI**

Model	RMR	GFI	AGFI	PGFI
Default model	<b>.066</b>	<b>.922</b>	<b>.866</b>	.537
Saturated model	.000	1.000		
Independence model	.289	.440	.315	.360

**Baseline Comparisons**

Model	NFI	RFI	IFI	TLI	CFI
	Delta1	rho1	Delta2	rho2	
Default model	.910	.874	.942	.917	<b>.941</b>

Model	NFI	RFI	IFI	TLI	CFI
	Delta1	rho1	Delta2	rho2	
Saturated model	1.000		1.000		.1000
Independence model	.000	.000	.000	.000	.000

### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.711	.647	<b>.669</b>
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

### NCP

Model	NCP	LO 90	HI 90
Default model	54.324	30.481	85.827
Saturated model	.000	.000	.000
Independence model	919.204	821.918	1023.899

### FMIN

Model	FMIN	F0	LO 90	HI 90
-------	------	----	-------	-------

Model	FMIN	F0	LO 90	HI 90
Default model	.447	.281	.158	.445
Saturated model	.000	.000	.000	.000
Independence model	4.996	4.763	4.259	5.305

**RMSEA**

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	<b>.094</b>	<b>.070</b>	<b>.118</b>	<b>.002</b>
Independence model	.325	.308	.343	.000

**AIC**

Model	AIC	BCC	BIC	CAIC
Default model	132.324	135.104	207.484	230.484
Saturated model	110.000	116.648	289.732	344.732
Independence model	984.204	985.413	1016.882	1026.882

**ECVI**

Model	ECVI	LO 90	HI 90	MECVI
Default model	.686	.562	.849	.700

Model	ECVI	LO 90	HI 90	MECVI
Saturated model	.570	.570	.570	.604
Independence model	5.100	4.595	5.642	5.106

### **HOELTER**

Model	HOELTER	HOELTER
	.05	.01
Default model	104	120
Independence model	13	15

### **Interpretation**

- CMIN/DF moved from 2.5 to 2.6 so marginal change and still acceptable
- P-Value improved remained the same at zero suggesting poor model fit
- RMR improved from .059 to .066 and remains acceptable.
- GFI improved from .844 to .92 and is now acceptable
- AGFI improved from .798 to .866 and is still unacceptable
- CFI improved from .866 to .94 and is now acceptable
- RMSEA improved from .088 (unacceptable) to .094 (unacceptable)
- We can conclude that the overall model fit is slightly improved in some areas

**Step 9: Validity Analysis for 3 Factor Model of Vulnerability**

**Validity and Reliability Table**

	<b>CR</b>	<b>AVE</b>	<b>MSV</b>	<b>ASV</b>
<b>Compassion</b>	0.827	0.544	0.17	0.157
<b>Courage</b>	0.893	0.735	0.144	0.073
<b>Connection</b>	0.818	0.606	0.17	0.086

No Validity Concerns

**Validity Analysis**

Composite Reliability is acceptable given that CR > .70. Discriminant validity is evidenced based on MSV and ASV being less than the AVE for all factors.



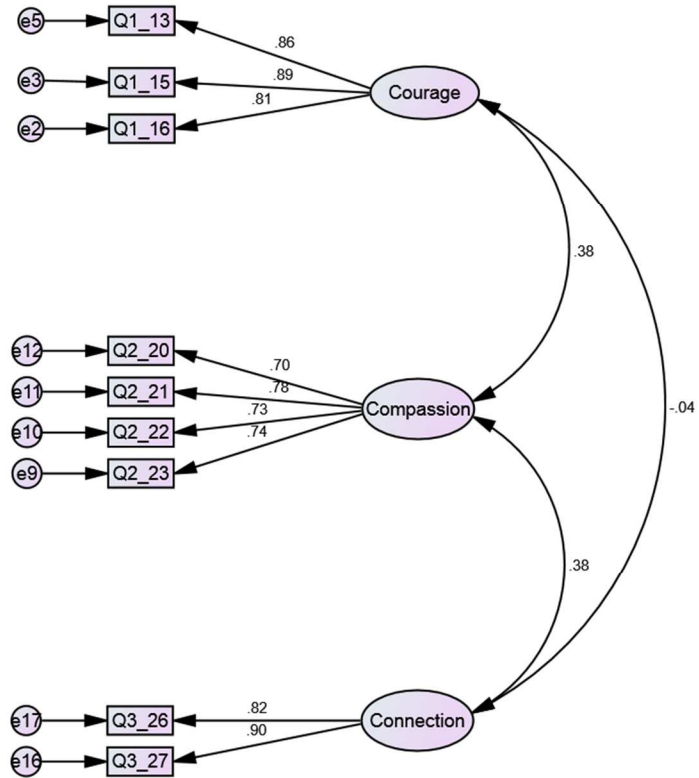
**Factor Correlation Matrix with Square Root of the AVE on the Diagonal**

<b>Compassion</b>	<b>Courage</b>	<b>Connection</b>
0.738		
0.38	0.857	
0.412	-0.038	0.778

**Analysis:**

Further evidence of discriminant validity is observed based on the shared variance between each pair of factors/constructs being less than the Square Root of AVE on the diagonal value, specifically below the diagonal value by column.

**Step 10: 3 Factor Model of Vulnerability with Q3\_23 Removed**



**Interpretation**

- All factor loadings are at 0.70 or above.
- Covariances are low and reasonable.

**Step 11 Model Fits Summary for 3 Factor Model of Vulnerability with Q3\_23 Removed**

**Model Fit Summary**

**CMIN**

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	21	45.420	24	<b>.005</b>	<b>1.892</b>
Saturated model	45	.000	0		
Independence model	9	856.025	36	.000	23.778

**RMR, GFI**

Model	RMR	GFI	AGFI	PGFI
Default model	<b>.034</b>	<b>.953</b>	<b>.912</b>	.508
Saturated model	.000	1.000		
Independence model	.280	.465	.331	.372

**Baseline Comparisons**

Model	NFI	RFI	IFI	TLI	CFI
	Delta1	rho1	Delta2	rho2	
Default model	.947	.920	.974	.961	<b>.974</b>
Saturated model	1.000		1.000		1.000

Independence model	.000	.000	.000	.000	.000
--------------------	------	------	------	------	------

**Parsimony-Adjusted Measures**

Model	PRATIO	PNFI	PCFI
Default model	.667	.631	<b>.649</b>
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

**NCP**

Model	NCP	LO 90	HI 90
Default model	21.420	6.186	44.452
Saturated model	.000	.000	.000
Independence model	820.025	728.460	919.001

**FMIN**

Model	FMIN	F0	LO 90	HI 90
Default model	.235	.111	.032	.230
Saturated model	.000	.000	.000	.000
Independence model	4.435	4.249	3.774	4.762

**RMSEA**

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.068	.037	.098	.154
Independence model	.344	.324	.364	.000

### AIC

Model	AIC	BCC	BIC	CAIC
Default model	87.420	89.715	156.045	177.045
Saturated model	90.000	94.918	237.054	282.054
Independence model	874.025	875.009	903.436	912.436

### ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.453	.374	.572	.465
Saturated model	.466	.466	.466	.492
Independence model	4.529	4.054	5.041	4.534

### HOELTER

Model	HOELTER	HOELTER
	.05	.01

Model	HOELTER	HOELTER
	.05	.01
Default model	155	183
Independence model	12	14

### Interpretation

- CMIN/DF improved to 1.892 and is acceptable
- P-Value was .005 suggesting poor model fit
- RMR is 0.034 and remains acceptable.
- GFI improved to .953 and is acceptable
- AGFI improved from .866 to .912 and is now acceptable
- CFI improved from .94 to .974 and remains acceptable
- RMSEA is .068 and is unacceptable (It should be less than .06)
- We can conclude that the overall model fit is slightly improved in some areas

## Step 12 Standardized Residual Co-variances

### Standardized Residual Covariances (Group number 1 - Default model)

	Q3_26	Q3_27	Q2_20	Q2_21	Q2_22	Q2_23	Q1_13	Q1_15	Q1_16
Q3_26	0								
Q3_27	0	0							
Q2_20	<b>0.929</b>	<b>-0.521</b>	0						
Q2_21	<b>-1.068</b>	<b>-0.413</b>	-0.105	0					
Q2_22	0.28	<b>0.975</b>	-0.491	0.367	0				
Q2_23	-0.433	0.392	0.589	-0.302	-0.053	0			
Q1_13	<b>-1.455</b>	<b>-0.542</b>	-0.372	<b>0.806</b>	<b>-1.052</b>	0.036	0		
Q1_15	-0.232	0.343	0.132	0.365	<b>-0.662</b>	<b>-0.912</b>	0.016	0	
Q1_16	<b>0.526</b>	<b>1.134</b>	<b>0.497</b>	<b>1.392</b>	-0.144	0.219	-0.079	0.035	0

### Interpretation

Examining the above table of Standardized Residual Covariances, we are looking for any numbers above 0.4. These numbers have been highlighted in bold.

### Step 13: Validity Analysis

#### Validity and Reliability Table

	CR	AVE	MSV	ASV
<b>Compassion</b>	0.827	0.544	0.144	0.143
<b>Courage</b>	0.892	0.735	0.144	0.073
<b>Connection</b>	0.853	0.745	0.141	0.072

No validity concerns.

#### Validity Analysis

Composite Reliability is acceptable given that  $CR > .70$ . Discriminant validity is evidenced based on MSV and ASV being less than the AVE for all factors.



### Factor Correlation Matrix with Square Root of the AVE on the Diagonal

Compassion	Courage	Connection
0.738		
0.38	0.857	
0.376	-0.044	0.863

#### Analysis

Further evidence of discriminant validity is observed based on the shared variance between each pair of factors/constructs being less than the Square Root of AVE on the diagonal value, specifically below the diagonal value by column.

## Nomological Network and Related Constructs

The following constructs are related to the nomological network for Volitional Vulnerability:

- Team Psychological Safety – Amy Edmondson
- Learning from Failure – Amy Edmondson
- Employee Voice – Andrew R Timming
- Drive out Fear – W. Edwards Deming
- Organizational Trust – Mayers, Davis & Schoorman
- Supportiveness of Organization Context
- Team Efficacy
- Team Learning Behavior
- Impression Management – Mark R. Leary
- Social/Organizational Identity – Stuart Albert, David Whetten
- Worthiness / Self-worth
- Authenticity
- Shame – Brene Brown

*Psychological Safety* is a construct that has been closely studied by Amy Edmondson for over twenty years. Edmondson (1999) has described *Psychological Safety* as the “perceptions of the consequences of taking interpersonal risks in a particular context such as a workplace.” Using a 7-point scale from “very inaccurate” to “very accurate”, the survey scale for *Team Psychological Safety* consists of the following seven questions:

1. If you make a mistake on this team, it is often held against you.
2. Members of this team are able to bring up problems and tough issues.
3. People on this team sometimes reject others for being different.
4. It is safe to take a risk on this team.

5. It is difficult to ask other members of this team for help.
6. No one on this team would deliberately act in a way that undermines my efforts.
7. Working with members on this team, my unique skills and talents are valued and utilized.

In order to assess the relationship between Vulnerability and Psychological Safety, a bivariate correlation will be conducted based on responses to both scales using MTurks.

## VITA

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