Spring 5-2022

Antifragility: Disorder as the Wind That Energizes the Fire Within Us

Abdulah Bajaba

ANTIFRAGILITY: DISORDER AS THE WIND THAT ENERGIZES THE FIRE WITHIN US

by

Abdulah M. Bajaba, B.A., M.B.A.

A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Business Administration in Business Management

COLLEGE OF BUSINESS
LOUISIANA TECH UNIVERSITY

May 2022

LOUISIANA TECH UNIVERSITY

GRADUATE SCHOOL

March 23, 2022
Date of dissertation defense

We hereby recommend that the dissertation prepared by

Abdulah Bajaba B.A., M.B.A

entitled **Antifragility: Disorder as the Wind That Energizes the Fire Within Us**

be accepted in partial fulfillment of the requirements for the degree of

Doctor of Business Administration, Business Management

Marcia Dickerson
Supervisor of Dissertation Research

Kirk Ring
Head of Management and Sustainable Supply Chain Management

Doctoral Committee Members:
Kirk Ring
Bryan Fuller

Approved:

Christopher Martin
Dean of Business

Approved:

Ramu Ramachandran
Dean of the Graduate School

ABSTRACT

Today's business world is more complex and uncertain than ever due to the unpredictable interdependencies caused by factors such as technology and globalization; accordingly, stress-inducing job demands have never been more prevalent. In order to cope with such demands, employees need to go beyond resilience and embrace disorder as a tool for growth. In this dissertation, I introduce the concept of antifragility to the workplace as a psychological resource that utilizes disorder to its advantage. In order to efficiently coincide with today's complexity and uncertainty, an employee has to gain more than lose from disorder, simply put, s/he has to be antifragile. Furthermore, I distinguish among the constructs of adversity, growth, and adaptation by proposing a continuum and a circumplex on which antifragility, resilience, and fragility lie. In Study 1, I develop measures for antifragility, resilience, and fragility based on the conceptualization, assess their content validity, and conduct exploratory factor analysis to confirm their structure.

In Study 2, I test the convergent and discriminant validity of the developed scales by comparing them to existing similar constructs. Furthermore, I test the incremental validity of antifragility in predicting relevant individual outcomes above and beyond similar psychological resources. In Study 3, I test the nomological network of antifragility to assess its criterion validity. In Study 4, based on the job

demands-resources model, I test a hypothesized model involving the role of antifragility in the appraisal of stressors in the workplace. More specifically, I hypothesize an integrated moderated mediation model in which antifragility moderates the indirect relationship between challenge/hindrance stressors on approach role/resource crafting and avoidance role/resource crafting through challenge/hindrance appraisals.

APPROVAL FOR SCHOLARLY DISSEMINATION

The author grants to the Prescott Memorial Library of Louisiana Tech University the right to reproduce, by appropriate methods, upon request, any or all portions of this Dissertation. It was understood that "proper request" consists of the agreement, on the part of the requesting party, that said reproduction is for his personal use and that subsequent reproduction will not occur without written approval of the author of this Dissertation. Further, any portions of the Dissertation used in books, papers, and other works must be appropriately referenced to this Dissertation.

Finally, the author of this Dissertation reserves the right to publish freely, in the literature, at any time, any or all portions of this Dissertation.

Author_____

Date _____

G.S. Form 14
(5/03)

TABLE OF CONTENTS

ABSTRACT iii

APPROVAL FOR SCHOLARLY DISSEMINATION v

LIST OF TABLES ix

LIST OF FIGURES xi

CHAPTER 1 INTRODUCTION 1

The Need for Future Research 2

Statement of Purpose and Research Questions 9

Contributions 12

CHAPTER 2 STUDY 1: SCALE DEVELOPMENT 15

Introduction 15

Theoretical Development of the Triad 18

The State-Like Nature of the Triad 18

Nonlinearity and Probability of Gain from Disorder 19

The Power of Optionality 21

Antifragility, Resilience, and Fragility at Work 28

Measuring Antifragility, Resilience, and Fragility 31

Phase 1: Construct Conceptualization, Item Generation, and Content Validity 31

Construct Conceptualization 31

Item Generation 32

Assessment of Content Validity....32
Phase 2: Exploratory Factor Analysis....33
Results....35
Sample 1 Results....35
Sample 2 Results....36
CHAPTER 3 STUDY 2: SCALE VALIDATION I....39
Introduction....39
Confirmatory Factor Analysis....40
Incremental Validity....41
Methods....42
Results....43
CHAPTER 4 STUDY 3: SCALE VALIDATION II....49
Introduction....49
Theoretical Background and Hypothesis Development....51
Methods....57
Results....58
CHAPTER 5 STUDY 4: THE ROLE OF ANTIFRAGILITY IN THE APPRAISAL OF STRESSORS....66
Introduction....66
Theoretical Framework and Hypothesis Development....67
Challenge/Hindrance Stressors and Appraisals on Job Crafting....73
Antifragility as a Personal Resource....78
Methods....81
Participants and Procedures....81

Measures 82

Analysis....83

Results 85

CHAPTER 6 GENERAL DISCUSSION 97

Implications....101

Limitations 104

Future Directions 106

Theoretical Advancement of the Triad 106

Antifragility as a Double-Edged Sword....107

Goal Setting and Motivation....108

Conclusion 108

REFERENCES 110

APPENDIX A SURVEY INSTRUMENTS....127

APPENDIX B HUMAN USE APPROVAL LETTER 133

APPENDIX C ITEM POOLS FOR ANTIFRAGILITY, RESILIENCE, AND FRAGILITY SCALES....135

LIST OF TABLES

Table 1 *Summary of Recent Call for Research* 7

Table 2 *Comparison among Fragility, Resilience, and Antifragility* 30

Table 3 *Summary of the Studies and Samples Used* 35

Table 4 *Items and Item Loadings from Exploratory Factor Analysis and Confirmatory Factor Analysis* 37

Table 5 *Means, Standard Deviations, Reliabilities, and Zero-Order Correlations (Samples 1 & 2)* 44

Table 6 *Means, Standard Deviations, Reliabilities, and Zero-Order Correlations (Sample 3)* 45

Table 7 *Confirmatory Factor Analysis Results (Sample 3)* 47

Table 8 *Comparison Between Resilience and PsyCap Resilience (Sample 3)* 48

Table 9 *Incremental Validity Analysis (Standardized Coefficients; Sample 3)* 50

Table 10 *Summary of The Hypothesized Nomological Network* 59

Table 11 *Confirmatory Factor Analysis Results (Sample 4)* 60

Table 12 *Means, Standard Deviations, Reliabilities, and Zero-Order Correlations (Sample 4)* 61

Table 13 *Regression Results for the Antecedents of Antifragility (Standardized Coefficients)* 62

Table 14 *Regression Results for the Outcomes of Antifragility (Standardized Coefficients)* 63

Table 15 *Means, Standard Deviations, Reliabilities, and Correlations (Sample 5)* 87

Table 16 *CFA Marker Technique Results (Sample 5))* 88

Table 17 *Confirmatory Factor Analysis Results (Sample 5)* 89

Table 18 *Challenge Appraisal and Approach Job Crafting Regression Results (Unstandardized Coefficients)*.....90

Table 19 *Hindrance Appraisal and Avoidance Job Crafting Regression Results (Unstandardized Coefficients)*.....91

Table 20 *Bootstrap Analysis Results for the Indirect Effect of Challenge Stressors on Approach Role Crafting Through Challenge Appraisal (Unstandardized Coefficients)* 92

Table 21 *Bootstrap Analysis Results for the Indirect Effect of Challenge Stressors on Approach Resource Crafting Through Challenge Appraisal (Unstandardized Coefficients)* 93

Table 22 *Bootstrap Analysis Results for the Indirect Effect of Hindrance Stressors on Avoidance Role Crafting Through Hindrance Appraisal (Unstandardized Coefficients)* 93

Table 23 *Bootstrap Analysis Results for the Indirect Effect of Hindrance Stressors on Avoidance Resource Crafting Through Hindrance Appraisal (Unstandardized Coefficients)* 94

Table 24 *Bootstrap Analysis Results for the Conditional Indirect Effect of Challenge Stressors on Approach Role Crafting Through Challenge Appraisal (Unstandardized Coefficients)* 95

Table 25 *Bootstrap Analysis Results for the Conditional Indirect Effect of Challenge Stressors on Approach Resource Crafting Through Challenge Appraisal (Unstandardized Coefficients)*.....95

Table 26 *Bootstrap Analysis Results for the Conditional Indirect Effect of Hindrance Stressors on Avoidance Role Crafting Through Hindrance Appraisal (Unstandardized Coefficients)* 96

Table 27 *Bootstrap Analysis Results for the Conditional Indirect Effect of Hindrance Stressors on Avoidance Resource Crafting Through Hindrance Appraisal (Unstandardized Coefficients)* 96

LIST OF FIGURES

Figure 1: The Hypothesized Model for Antifragility.....11

Figure 2: The Gain/Loss from Disorder Continuum 23

Figure 3: The Approach-Avoidance Gain-Loss Circumplex of Disorder Receptivity 25

Figure 4: The Nomological Network of Antifragility (Sample 4).....64

Figure 5: The Average Correlations Across Samples 1, 2, 3, & 4.....65

CHAPTER 1

INTRODUCTION

"I have not failed. I've just found 10,000 ways that won't work." - Thomas A. Edison

Today, we live in a world that is more unpredictable, complex, dynamic, and uncertain than ever before, whether that is in business, medicine, politics, or life due to a range of causes, including globalization and technological developments. Although statistical and predictive analyses can narrow down the possibilities of what the future might hold, any outcome is still plausible due to the hard-to-detect interdependencies of the complex system we function in. For instance, the coronavirus disease 2019 (COVID-19) pandemic struck the world by surprise when it hit in 2019 with its impact still affecting the lives of many to this day. According to the Stress in America 2020 report by the American Psychological Association (2020), nearly 8 in 10 adults (78%) reported that COVID-19 has been a significant source of stress in their life and nearly two in three adults (67%) reported that their levels of stress have increased over the course of the COVID- 19 pandemic. The impact of the pandemic has also manifested itself in the workplace as the recent State of the Global Workplace 2021 report by Gallup (2021) state that, globally, employees' daily stress levels have increased from 38% in 2019 to 43% in 2020, reaching a record high, with employees in the U.S. and Canada reporting the highest levels of daily stress at 57%.

Nassim Taleb (2012), in his book, *Antifragile: Things that gain from disorder*, describes those events that result from such interdependencies, like COVID-19, as *Black Swans*: "large-scale unpredictable and irregular events of massive consequences" (6). Over-relying on predictive approaches when trying to deal with today's Black Swans fosters a society that is vulnerable and unstable, in other words, *Fragile* (Taleb, 2012). This is due to our tendency to utilize the findings of the predictive approaches to prevent or avoid uncertainty, stress, or disorder instead of facing and learning how to deal with them. Following such approaches limits our ability to handle such difficulties in the future when we are not able to predict them and, as a result, end up facing them anyway; moreover, the harm such difficulties have on us tends to increase the less prepared we are, put differently, the more we rely on the predictive approaches (Taleb, 2012). Accordingly, due to our limited ability to accurately predict future events and the harm it brings when we are not ready to handle their volatility, we are better off being *Antifragile* (Mygatt, Steele, & Voloshchuk, 2020; Taleb, 2012; Waters et al., 2021; Williams, 2020).

The Need for Future Research

Taleb (2012) describes antifragility as the capability or capacity to gain from disorder rather than lose from it. Being antifragile involves seeking disorder, uncertainty, and volatility to learn and grow from them instead of avoiding them, which is the opposite of fragility; it involves embracing errors and mistakes making things that are antifragile able to deal with the unknown (Taleb, 2012). In other words, the more antifragile the thing is, the more it is used to dealing with disorder, and the more equipped it will be able to deal with it whenever and wherever it occurs. Antifragility has been discussed in numerous fields such as economics, physics, risk-analysis, molecular

biology, transportation planning, engineering, and computer science (Derbyshire & Wright, 2014; Grube, Muggia, & Gostinčar, 2013; Levin, Brodfuehrer, & Kroshl, 2014; Lichtman, Vondal, Clancy, & Reed, 2016; Monperrus, 2017; Ghodrat, Naji, Komaie-Moghaddam, & Podgornik, 2015). The capacity of being antifragile is not restricted to a specific entity, time, or field. For instance, our immune system can become more antifragile (i.e., less fragile) to flu when we have had the flu shots; democracy might lead to a much more antifragile political system that does not over-depend on one individual to make all the decisions unlike dictatorship (Taleb, 2012). Similarly, some individuals can also be more or less antifragile than others, depending on their capacity to gain rather than lose from disorder. Disorder, in this case, refers to a cluster of stress-inducing factors such as uncertainty, variability, imperfection, incomplete knowledge, randomness, stressors, dispersion of outcomes, chance, chaos, etc. (Taleb, 2012: 13). Although antifragility has been introduced in numerous fields, little research has systematically studied or even discussed it in the management and psychology fields (i.e., the context of individuals at work).

When talking about the individual capability of adaptation and flexibility in general, the words Resilience or Robustness usually come to mind. A quite large amount of research has been conducted on such concepts in the fields of clinical psychology and organizational behavior (Luthans, Youssef-Morgan, & Avolio, 2015; Masten, Cutuli, Herbers, & Reed, 2009). According to Luthans (2002), resilience is defined as “the capacity to rebound or bounce back from adversity, conflict, failure, or even positive events, progress, and increased responsibility” (702). In addition, Masten et al. (2009) defined resilience as “patterns of positive adaptation during or following significant

adversity or risk" (118). These definitions or conceptualizations of resilience emphasize the ability of the individual to recover from stressful situations or disorder and return to the original state of equilibrium. That being said, newer efforts suggest that the concept of resilience does not only include bouncing back but also going beyond the point of equilibrium, indicating a possible ability for growth following disorder (Avolio & Luthans, 2006; Luthans, 2002; Youssef & Luthans, 2005). Such changes or inconsistencies can reduce the conceptual clarity of the construct being studied, including its measurement model. Taleb (2012) describes and distinguishes resilience from antifragility by stating that resilient individuals resist shocks and stay the same whereas antifragile individuals are the ones who get better from shocks. In general, resilience has been described as a *reactive capacity* that is mostly exhibited in times of *unplanned* setbacks (Luthans et al., 2015). For instance, resilient individuals are more likely to adapt to a stressful situation (whether it is positive or negative) only if they have to or are forced to rather than purposefully pursuing it for growth.

Taleb (2012) states that antifragility is beyond resilience or robustness in that things that are antifragile almost always grow from stress, and thus, pursue it rather than resist or react to it as the benefits of growing outweigh the costs of engaging in disorder. In other words, antifragility indicates a proactive approach to dealing with disorder rather than a reactive one as in resilience (Taleb, 2012). Recent research calls for the reevaluation our current understanding of the mix of psychological resources and an investigation into the nature of resilience in comparison with other constructs of adversity, growth, and adaptation (Luthans et al., 2015; Dawkins, Martin, Scott, & Sanderson, 2013; Youssef-Morgan, 2014).

Living in a world that is complex and uncertain can put a lot of pressure and stress on those living in it; similarly, having too many uncertain and complex demands at work tends to consume and deplete the job and personal resources of the employees (Bakker & Demerouti, 2017). That being said, not all stressors or demands are perceived the same; some stressors are perceived as challenging (i.e., provide opportunities for growth and learning) while others are perceived as hindering (i.e., impose stress without compensation; Cavanaugh, Boswell, Roehling, Boudreau, 2000; Rodell, & Judge, 2009). Accordingly, the appraisal process in explaining the outcomes resulting from such challenging and hindering stressors is of utmost importance (Lazarus & Folkman, 1984) and requires further investigation (Crane & Searle, 2016; O'Brien & Beehr, 2019).

Furthermore, the possible factors that might be altering the outcome of the stressor appraisal process is another research avenue that requires attention (Bakker & Demerouti, 2017; Lepine, Zhang, Crawford, & Rich, 2016). For instance, leaders tend to play an important role in (1) the management of meaning regarding organizational goals (Piccolo & Colquitt, 2006; Smircich & Morgan, 1982) and (2) the provision of job and/or personal resources required to deal with the job demands (Bakker & Demerouti, 2017; Breevart, Bakker, Demerouti, & Derks, 2016). Having personal resources, independent of the leader, is also another potential factor that can alter the stressor appraisal process, such as antifragility. Those who are antifragile are argued to have a heightened sense of self-efficacy in dealing with life stressors, are better able to recognize opportunities of growth from stressors, and are more cognitively flexible due to their past experience dealing with disorder (Taleb, 2012).

Depending on the type of appraisal we give to a certain stressor, we tend to deal with it accordingly (Lazarus & Folkman, 1984). More specifically, whether an individual appraises a stressor as irrelevant or as an opportunity for personal growth, well-being, and development alters the way s/he cope with this stressor (primary appraisal; Lazarus & Folkman, 1984). In addition, whether the individual has the resources and ability to utilize such growth opportunity also influences the type of coping strategy s/he implements (secondary appraisal; Lazarus & Folkman, 1984). One form of coping can be illustrated in how the individual crafts his/her job (Bruning & Campion, 2018; Zhang & Parker, 2019). Job crafting refers to the changes the employee makes to their job in an effort to improve it for themselves (Bruning & Campion, 2018: 500). A significant amount of research has investigated the important role job crafting plays in the workplace such as increased work engagement, job satisfaction, and job performance as well as reduced job strain to name a few (Rudolph, Katz, Lavigne, & Zacher, 2017; for a review, see Wang, Demerouti, & Bakker, 2017).

The job crafting literature over the past two decades has mostly drawn insight from two dominant perspectives: the original theory of Wrzesniewski & Dutton (2001) and the job demands-resources perspective of Tims, Bakker, & Derks (2012). In order to eliminate inconsistencies and divergence, recent efforts in the job crafting literature have attempted to conceptualize a more comprehensive and parsimonious view on job crafting (Bruning & Campion, 2018; Zhang & Parker, 2019). This dissertation adopts the view of Bruning & Campion (2018) due to the availability of a valid measure of the types of job crafting they are proposing. The authors developed a taxonomy of job crafting such that it can be generally categorized into four quadrants based on two axes — role/resource and

approach/avoidance crafting — resulting in four main categories: approach role crafting, approach resource crafting, avoidance role crafting, and avoidance resource crafting. Due to the importance of job crafting as a daily coping mechanism (Wrzesniewski & Dutton, 2001), and the recent efforts of integrating its perspectives, scholars call for research that seeks to explain the complex mechanisms of how approach and avoidance job crafting are shaped and stimulated (Zhang & Parker, 2019), such as the role of individual appraisals (Lepine, Podsakoff, & Lepine, 2005; see Table 1 for a summary of the recent call for research).

Table 1

Summary of Recent Call for Research

Source	Call for Research	Dissertation Topic
Taleb (2012)	In his book, Nassim Taleb (2012) introduced the concept of ***antifragility*** as the capability to gain from disorder and emphasized its importance in today's uncertain and volatile world. Moreover, he argues that it goes beyond the construct of resilience by stating the following: "*antifragility* is beyond resilience or robustness. The resilient resists shocks and stays the same; the antifragile gets better" (Taleb, 2012: 3). Although the concept of *antifragility* has been introduced in multiple disciplines (e.g., economics, physics, risk-analysis, molecular biology, transportation planning, engineering, computer science; Ghodrat, Naji, Komaie-Moghaddam, & Podgornik, 2015; Derbyshire & Wright, 2014; Grube, Muggia, & Gostinčar, 2013; Levin, Brodfuehrer, & Kroshl, 2014; Lichtman, Vondal, Clancy, & Reed, 2016; Monperrus, 2017), **it has yet to be introduced in the field of management and psychology.**	Antifragility as a Construct

Source	Call for Research	Dissertation Topic
Luthans, Youssef-Morgan, & Avolio (2015)	"Research is needed to **further distinguish between the construct of resilience and other constructs of adversity, adaptation, and growth**: "additional research is needed to further delineate the conceptual and empirical convergence and divergence among these overlapping constructs relevant to resilience" (170).	Continuum and Circumplex
Dawkins, Martin, Scott, & Sanderson (2013)	"Further theorization and investigation are needed **to affirm the nature of each of the components of PsyCap**" (351).	Continuum and Circumplex
Youssef-Morgan (2014)	"Periodically **reevaluate the current mix of psychological resources** in light of new evidence" (135).	Continuum and Circumplex
O'Brien & Beehr (2019)	"Future research can advance our understanding of the degree to **which appraisals are causal mechanisms in the challenge–hindrance framework by further examining them as mediators**" (968).	Challenge/Hindrance Appraisals as Mediators of Challenge/Hindrance Stressors
Crane & Searle (2016)	"The management of meaning is an important role for managers and relates to the ability of managers to influence the meaning of workplace goals (Piccolo & Colquitt, 2006; Smircich & Morgan, 1982). Managers may be able to influence the appraisal of hindrance stressors as a challenge by communicating to employees the potential for stressors to build capabilities. However, **the capacity for the appraisal process to impact the outcomes resulting from challenge– hindrance stressors is an important area of future research**" (10).	Challenge/Hindrance Appraisals as Mediators of Challenge/Hindrance Stressors
Zhang & Parker (2019)	"We propose that future research seek to **uncover the complex mechanisms of how approach crafting and avoidance crafting are shaped and stimulated**. A relevant question, given our focus on trying to bring the literature together, **concerns whether there are variables that predict all types of job crafting (including approach and avoidance types) in the same direction**" (140).	Job Crafting as an Outcome

Statement of Purpose and Research Questions

As with any dissertation, this work has several purposes. The first purpose of this dissertation is to introduce the concept of antifragility and fragility to the field of management and psychology while revisiting resilience as conceptualized by Taleb (2012). More specifically, I describe antifragility as a state-like, psychological capacity to gain more than lose from disorder at work; resilience as a state-like, psychological capacity to minimize the losses associated from disorder at work; and fragility as a state-like, psychological rigidity to lose more than gain from disorder at work. The second purpose of this dissertation involves proposing the gain/loss from disorder continuum and the approach-avoidance gain-loss circumplex of disorder receptivity in which I compare antifragility, resilience, and fragility to demonstrate the relationship amongst these similar, yet unique constructs of adversity, growth, and adaptation. The third purpose of this dissertation is to develop reliable and valid measures of antifragility, resilience, and fragility for future use in management and psychology research. I attempt to conceptualize the domain of antifragility, resilience, and fragility, and develop an initial item pool for all constructs, which are further purified through item-reduction methods such as focus groups and item sorting. I utilize both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to develop and validate the constructs through testing the factorial structure, convergent validity, and discriminant validity. Furthermore, I test the resulting validated measure of antifragility in terms of incremental validity as well as its proposed nomological networks to further assess its validity as a construct.

Fourth, I empirically test a theoretical model involving antifragility to emphasize its role in the workplace (see Figure 1). More specifically, I investigate the role of antifragility as a moderator in shaping the cognitive appraisals of challenge and hindrance stressors experienced

by individuals at work. Lastly, I investigate a moderated mediation effect of antifragility and challenge and hindrance stressors on the four categories of job crafting (approach role crafting, approach resource crafting, avoidance role crafting, and avoidance resource crafting) through challenge and hindrance appraisals.

Thus, the specific research questions of this dissertation are:

1. Is antifragility empirically distinct from resilience and fragility?
2. Do antifragility, resilience, and fragility lie on the same continuum?
3. Does challenge appraisal explain the relationship between challenge stressors and (a) approach role crafting and (b) approach resource crafting?
4. Does hindrance appraisal explain the relationship between hindrance stressors and (a) avoidance role crafting and (b) avoidance resource crafting?
5. To what degree does antifragility influence the relationship between challenge (hindrance) stressors and challenge (hindrance) appraisal?
6. To what degree does antifragility influence the indirect relationship between challenge stressors and (a) approach role crafting and (b) approach resource crafting through challenge appraisal?
7. To what degree does antifragility influence the indirect relationship between hindrance stressors and (a) avoidance role crafting and (b) avoidance resource crafting through hindrance appraisal?

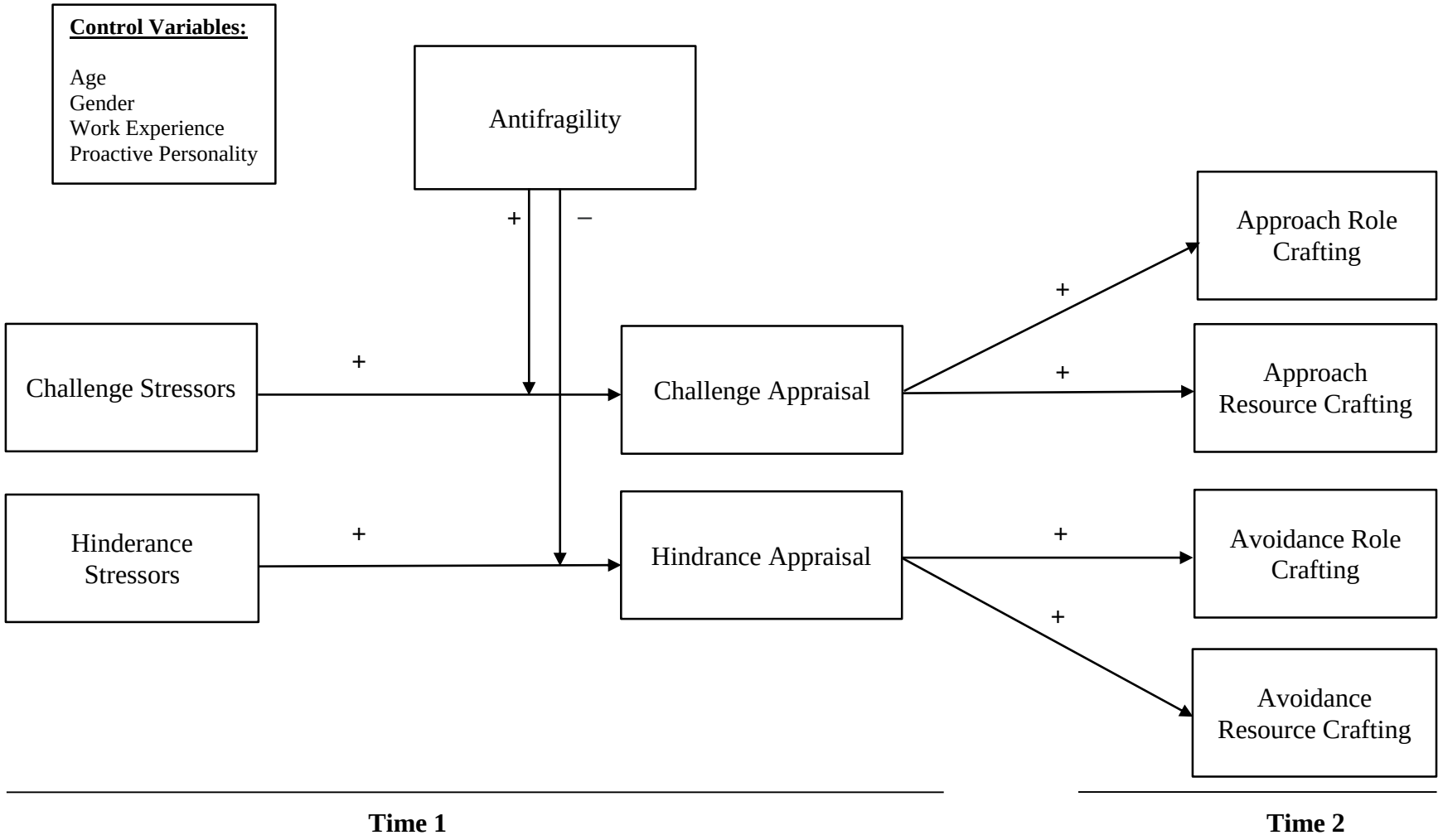


Figure 1: The Hypothesized Model for Antifragility

Contributions

This dissertation has several theoretical and practical contributions to the literature. First, this dissertation contributes to the literature of Positive Organizational Behavior (POB) by introducing and developing a scale for the construct antifragility. Luthans (2002) first described POB as "the study and application of positively oriented human resource strengths and psychological capacities that can be measured, developed, and effectively managed for performance improvement in today's workplace" (59). For a construct to be included in the conception of POB, it has to be positive, measurable, state-like, and related to desired attitudinal, behavioral, and performance outcomes (Luthans et al., 2015), which antifragility is argued to have all. Second, this dissertation reconceptualizes resilience from the perspective of Taleb (2012) and argues for a continuum and a circumplex on which antifragility, resilience, and fragility fall, which opens up the possibility of moving along the continuum from fragility to resilience to antifragility due to their state-like nature. To illustrate, similar to how resilience can be developed at work (Masten et al., 2009), antifragility can also be trained and developed at work, which introduces a more effective psychological capacity when dealing with disorder and stress that supervisors and Human Resources (HR) managers should focus on.

Third, this dissertation contributes to the literature of job demands-resources (Bakker & Demerouti, 2017) by testing the interactive effects of challenge/hindrance stressors (i.e., job demands) under the presence of personal resources (i.e., antifragility) on job crafting. According to Bakker & Demerouti (2017), having personal resources should mitigate the hindering effects of job demands on outcomes such as motivation and

job strain, and indirectly, job crafting (275). Fourth, this dissertation contributes to the literature of the transactional theory of stress (Lazarus & Folkman, 1984) by testing the mediating effect of cognitive appraisals in explaining the effects of challenge/hindrance stressors on job crafting. Although stressors can be generally categorized as either challenge or hindrance stressors (Cavanaugh et al., 2000; Rodell, & Judge, 2009), recent efforts show inconsistent results regarding how this categorization of stressors relate to relevant outcomes (Bakker & Sanz-Vergel, 2013; Searle & Auton, 2015; Webster, Beehr, & Love, 2011). Thus, having an antifragile individual is argued to reshape the cognitive appraisals of the experienced challenge/hindrance stressors, resulting in different levels and types of job crafting. Lastly, this dissertation contributes to the literature of stress management and coping by testing a newly developed measure and conceptualization of job crafting (Bruning & Campion, 2018). Individuals who are motivated by the challenge stressors (i.e., higher levels of challenge appraisal) are argued to engage in more approach role/resource crafting to increase their job resources and challenge demands. On the other hand, individuals who are de-motivated by the hindrance stressors (i.e., higher levels of hindrance appraisal) are argued to engage in more avoidance role/resource crafting to decrease hindrance demands (avoidance role/resource crafting).

In Chapter 1, I briefly introduced the concept of antifragility at work, provided some examples of it, and compared it with the concepts of resilience and fragility. Furthermore, I mentioned some of the most recent calls for research regarding (1) distinguishing between resilience and other constructs of adversity and growth, (2) investigating the role of challenge/hindrance stressors as well as their appraisals in predicting relevant individual outcomes, (3) exploring the role of personal resources in

shaping the cognitive appraisals of workplace stressors, and (4) testing the newly conceptualized and developed measure of job crafting. Lastly, I discussed some of the contributions this dissertation provides to the area of POB. In Chapter 2, I introduce the concept of antifragility in more depth and compare it with the concepts of resilience and fragility in terms of definition and attributes. Moreover, I discuss the first step in developing the antifragility, resilience, and fragility scales through domain specification, item generation, content validity, and EFA. In Chapter 3, I discuss the validation process of the antifragility, resilience, and fragility scales developed in Chapter 2 through CFA and assessing their convergent and discriminant validity as well as incremental validity. In Chapter 4, I discuss the process of validating the antifragility measure being developed in terms of its criterion validity and nomological network. Moreover, I cross-validate the proposed gain/loss from disorder continuum across the sample of that study and those of the previous studies. In Chapter 5, I theoretically argue for and empirically examine a model in which the role of antifragility as a psychological resource is emphasized. I also discuss the methods, results, implications, limitations, and future directions of the study.

CHAPTER 2

STUDY 1: SCALE DEVELOPMENT

Introduction

One of the criteria through which successful individuals are perceived is through their ability to overcome the inevitable difficulties in the ever-changing world, including instances of failure, uncertainty, and/or overload. In the workplace, such difficulties can be described as role overload, role ambiguity, role conflict, time pressure, increased responsibility, etc. (Bakker & Demerouti, 2017). The stress resulting from such difficulties can positively affect the quality of life of those experiencing it as it can be an opportunity for personal growth and development (Park, Cohen, & Murch, 1996; Snyder, 1999). That being said, stress can also have detrimental effects on the well-being and performance of the individual if s/he is exposed to unbearable levels and/or is unable to handle it correctly (Anderson, 1976). As a result, constructs of adversity, coping, and adaptation have been a topic of interest for decades in both clinical psychology and management to determine whether an individual will react positively to stress (Dewe, O'Driscoll, & Cooper, 2010); one such construct is resilience.

Research on resilience refers to it as the ability or capacity of positive adaptations when dealing with instances of adversity (Masten et al., 2009). Prior research has been inconsistent with how they describe resilience in terms of what constitutes positive adaptation and what is meant by adversity (Britt, Shen, Sinclair, Grossman, & Klieger,

2016; Fikretoglu & McCreary, 2012). For instance, some scholars define resilience by emphasizing personal growth or positive changes after adversity (Luthans et al., 2015; Maguen, Vogt, King, King, & Litz, 2006; Matos, Neushotz, Griffin, & Fitzpatrick, 2010); simply put, they refer to it as the capacity to not only "bounce back" but also go beyond from adversity and positive, challenging events (e.g., record sales performance, leading a new project; Luthans et al., 2015: 148). Other scholars define resilience solely by emphasizing stable functioning or recovery during times of high stress or trauma (Bonanno, 2004; Masten & Narayan, 2012; Winwood, Colon, & McEwen, 2013). In terms of adversity, some scholars argue that adversity is characterized by traumatic events while others suggest chronic stressors constitute adversity (Britt et al., 2016). Such conceptual differences cause ambiguity regarding how the notions of positive adaptation and adversity relate to resilience and do not only diverge the literature on resilience but also makes it unclear whether the measures for resilience are representative/valid. Accordingly, resilience as a concept will be revisited and compared to other constructs of adversity and growth.

In general, resilience has been described as a reactive capacity rather than a proactive one, indicating that it is considered a defensive mechanism against adversity (Luthans et al., 2015). Accordingly, resilient individuals are more likely to grow from stress only when it is imposed upon them, thus, limiting their opportunities for growth. Furthermore, having a capacity that is reactive tends to indicate that the experience or situation that is being reacted to does not generate enough gain, relative to the loss, for the individual to pursue it, and thus, react to or deal with it only when needed. Living in a generation of rapid technological development and globalization, individuals need to

accommodate such dynamism with much more cognitive flexibility and complexity than ever before. As a result, individuals need to get exposed to many more instances of challenging stress in order to grow and keep pace with today's dynamism; they need to find value in pursuing disorder and stress, more gains than losses. Put differently, they need to develop the capacity to be antifragile.

Taleb (2012) describes things that are antifragile as those that benefit from shocks, thrive, and grow when exposed to volatility, randomness, disorder, and stressors, and love adventure, risk, and uncertainty; whereas, resilient things resist shocks and mostly stay the same (3). Living in an age of complexity and dynamism that is supplemented by volatility, uncertainty, and stress, individuals have to embrace disorder to flourish. The concept of antifragility has been discussed in numerous fields except those of management and psychology (Ghodrat et al., 2015; Derbyshire & Wright, 2014; Grube et al., 2013; Levin et al., 2014; Lichtman et al., 2016; Monperrus, 2017). One reason might be due to the vast existing literature on resilience (see Britt et al., 2016, for a review). Accordingly, no validated measure of antifragility exists in the literature. Answering the recent calls for research (Dawkins et al., 2013; Luthans et al., 2015; Youssef-Morgan, 2014), this study attempts to (1) re-evaluate the current mix of psychological resources by introducing the concepts of fragility and antifragility to the field of management and psychology and revisiting the concept of resilience as conceptualized by Taleb (2012), (2) propose a continuum and circumplex on which antifragility, resilience, and fragility are compared, (3) develop initial item pools for antifragility, resilience, and fragility, and (4) assess the dimensionality of the constructs through EFA.

Theoretical Development of the Triad

In this section, I will discuss the triad of antifragility, resilience, fragility in terms of their conceptual domain, attributes, and how they relate to each other. First, I will discuss the state-like nature of the triad and how malleable they are rather than hard-wired. Second, I will describe how these concepts are compared in terms of probability and linearity of gain/loss from disorder. Third, I will introduce the concept of optionality and how the acquired type of optionality distinguish between antifragility, resilience, and fragility resulting in a continuum of gain/loss from disorder. Fourth, I will introduce a circumplex of disorder receptivity on which these three concepts are further distinguished. Lastly, I will discuss the triad in the context of work and how their attributes translate to the workplace.

The State-Like Nature of the Triad

Resilience has been conceptualized both as a trait and a capacity (Britt et al., 2016). Whereas trait resilience, or resiliency, has been referred to as a unique personal trait or a cluster of traits of positive adaptation after stress (Connor & Davidson, 2003; Ong, Bergeman, Bisconti, & Wallace, 2006; Sinclair, Waitsman, Oliver, & Deese, 2013), resilience as capacity has been described more as a state-like, malleable characteristic of positive adaption after stress (Luthans et al., 2015). Proponents of resilience as a capacity argue for and found support for the potential for developing and improving resilience through brief training programs, on-the-job activities, and micro-interventions (Luthans, Luthans, & Avey, 2014; Luthans, Avey, Avolio, Norman, & Combs, 2006; Luthans, Avey, Avolio, & Peterson, 2010; Luthans, Avey, & Patera, 2008). As a result, I

conceptualize antifragility as a psychological capacity and fragility as a psychological rigidity that are state-like rather than trait-like.

Although antifragility and fragility can have trait-like components (e.g., antifragile or fragile mentality or personality), I believe that it is not sufficient to conceptualize it solely as such as it suggests that antifragility is reserved only for the gifted. Taleb (2012) discussed that the more an individual is exposed to certain levels of stress throughout his/her life, the more antifragile they become; similarly, the less an individual is exposed to stress by avoiding or preventing it, the more likely s/he will become fragile. In other words, he emphasized the role of the individual in dealing with stressors, and how the type of action s/he takes can develop antifragility or fragility in them (Taleb, 2012). Moreover, conceptualizing antifragility and fragility as capacities opens up the possibility for them to be developed through education, experience, and targeted training programs similar to those of resilience (Luthans et al., 2006; Luthans et al., 2010; Luthans et al., 2008; Luthans et al., 2014). Lastly, it also sets the basis for comparison between antifragility, resilience, fragility, and other capacities (or incapacities) of adversity and growth, thus, facilitating the integration of research efforts on such constructs.

Nonlinearity and Probability of Gain from Disorder

Taleb (2012) proposes that antifragile individuals or things tend to embrace errors and uncertainty due to their capacity to gain more than lose from them. Living in a complex system filled with hard-to-detect interdependencies makes it more likely to experience high levels of uncertainty, and thus stress, making it essential to be antifragile to flourish in such a system. Although some scholars have suggested that resilient

individuals can grow from stressful situations (Maguen et al., 2006; Luthans et al., 2015), Britt et al. (2016) argue that growth resulting from resilience can sometimes be exaggerated (Frazier et al., 2009), and that is not a necessary condition for resilience. This can be further supported by the reactive nature of resilience, as described by Luthans et al. (2015), indicating a more defensive approach to stress rather than a proactive one; namely, dealing with stress is seen more like a costly transaction rather than a profitable one. Although resilience can be useful as a short-term solution to dealing with constant stress, it might not be as effective in the long term as resilient individuals might not gain more than they lose when dealing with stress, resulting in consumed resources without an enticing compensation (Taleb, 2012).

On the other hand, antifragility is more of a proactive capacity that seeks uncertainty and stress due to the potential gains that outweigh the costs associated with dealing with disorder (Taleb, 2012). Although antifragile individuals might lose more than they gain in some interactions with disorder, the likelihood of such instances is minimal and is overwritten by the increased probability for gain rather than loss, such that in the long run, they will end up with much higher gains than losses. Moreover, Taleb (2012) discussed the concept of nonlinearity, stating that the gains experienced by those who are antifragile far exceeds the losses incurred in a nonlinear fashion. Resilient individuals, however, experience decreased probabilities for losses but also for gains due to their reactive nature. That being said, it is worthy of mentioning that disorder/stress is beneficial for antifragile individuals up to a certain point, after which the nonlinearity effect flips to incur exponential losses for small gains (Taleb, 2012). For instance, the human body can gain from going to the gym and working out; however, overdoing it can

result in serious injuries that last for weeks or months. In other words, after a certain point or maximum, you become fragile to a particular source.

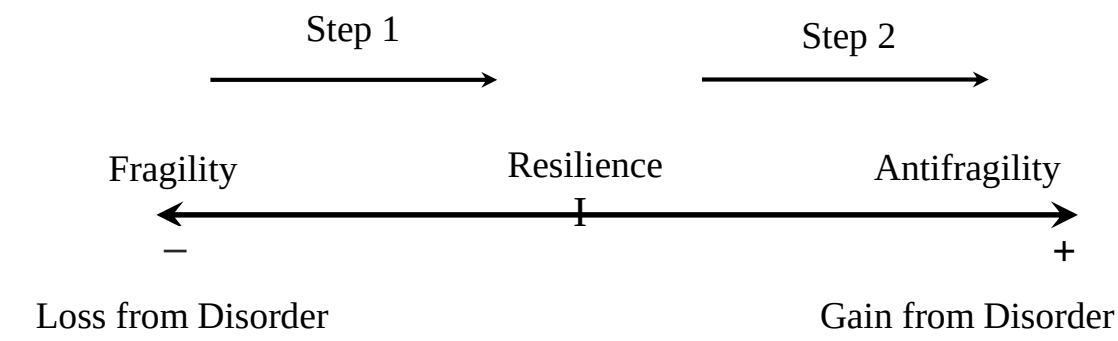
Fragility, as Taleb (2012) refers to, is the opposite of antifragility. It involves losing more than gaining from disorder, stress, and uncertainty. Whereas resilient individuals can at least resist shocks and minimize losses from disorder, fragile individuals are most susceptible to them. The probability of experiencing losses is high, whereas the probability of experiencing gains is at a minimum. Moreover, the nonlinearity perspective discussed by Taleb (2012) suggests that the loss incurred by fragile individuals are exponential compared to those who are resilient or antifragile, resulting in a tendency to experience post-traumatic stress rather than post-traumatic growth as in the case of antifragile individuals. Accordingly, those who are fragile are more likely to avoid or resist change or disorder through primary or secondary control; namely, they are more likely to be change-resistant or passive about it, respectively (Fuller, Marler, Bajaba, & Lovett, 2018). On the other hand, those who are resilient are more likely to be able to adapt if the opportunity presents itself, while those who are antifragile are more likely to pursue and initiate such an opportunity to reap its benefits.

The Power of Optionality

The difference between fragility, resilience, and antifragility can be resembled in the difference between glass, rubber, and muscle, respectively. Glass breaks whenever it experiences shocks to the point of not getting back to how it used to be; rubber returns to its original state whenever it experiences shocks; and muscle grows whenever it experiences shocks such that it needs shocks to thrive, otherwise, it becomes weak. One of the main differences between the three concepts is the power of optionality (Taleb,

2012). Optionality refers to the ability to recognize and choose the best option in times of asymmetry (Taleb, 2012). Optionality has two components: asymmetry and rationality. Whereas asymmetry refers to any situation in which there are contrasts of outcomes, in this case, gains and losses, rationality refers to the ability to recognize and choose the most favorable option with the maximum gain and minimum loss (Taleb, 2012). An option here refers to a perception or a means of dealing with an asymmetric situation; thus, having and recognizing many options to choose from expands someone's ability to harvest as much gain as possible while minimizing the losses.

Antifragile and resilient individuals differ from those who are fragile in terms of the availability of options, or optionality (Taleb, 2012). Fragile individuals tend to experience stressful situations without having optionality, rendering them more susceptible to whatever the situation forces on them; this is due to the tendency of those who are fragile to avoid or prevent stressful situations without confronting them and gaining experience on how to deal with them (Taleb, 2012). On the other hand, those who are resilient tend to have the optionality to adapt, meaning they can recognize and choose opportunities in such situations through which they can minimize the losses associated with them. Those who are antifragile take this one step further by showing optionality to gain, which refers to the ability to recognize and choose opportunities of not only minimum losses but also maximum gains. Simply put, for an individual to be antifragile, s/he has to become resilient first by showing optionality to adapt; only then can an individual become antifragile through developing optionality to gain (see Figure 2; Taleb, 2012).



Step 1 → Develop optionality to adapt to disorder (i.e., resistance or minimization of loss from disorder).
Step 2 → Develop optionality to gain from disorder (i.e., growth from disorder).

Figure 2: The Gain/Loss from Disorder Continuum

The perspective that resilience is a necessary yet not sufficient condition for someone to be antifragile can be explained utilizing insight from the conservation of resources theory (Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014; Hobfoll, 2001). One of the principles of the theory involves the *primacy of resource loss*, which states that individuals are more affected by losing resources than gaining ones of equal amounts. Resources in this context refer to objects, states, conditions, and other things that are valuable to people (Halbesleben et al., 2014; Hobfoll, 1988). This can be supported by the drastic impact that accompanies resource loss, compared to resource gain, on well-being, such as burnout (Shirom, 1989), depression, (Kessler, Turner, & House, 1988), and other physiological outcomes (De Vente, Olff, Van Amsterdam, Kamphuis, & Emmelkamp, 2003; Melamed, Shirom, Toker, Berliner, & Shapira, 2006). As a result, individuals are more likely to think about gaining resources once they have mastered how to conserve what they already have; put differently, they will begin to develop antifragility once they have developed resilience.

This perspective emphasizes the proposed state-like nature of all these constructs and places the triad of fragility, resilience, and antifragility on a continuum based on their average gain from disorder and degree of optionality. Such continuum would be expected to have a quasi-simplex pattern to its correlations (Ryan & Connell, 1989), meaning that constructs that are closest to each other would be more strongly correlated than distinct ones, which should be more weakly, or even negatively, correlated. It is also worthy to note that although someone who is fragile can become resilient or antifragile with experience and embracement of disorder, the reverse can occur as well. Someone who is antifragile or resilient can also become fragile if they do not keep exposing themselves to occasional stress as the world is dynamic and everchanging, further emphasizing the state-like nature of such constructs (Taleb, 2012). Thus, I hypothesize the following:

Hypothesis 1. *Antifragility will be positively related to resilience.*

Hypothesis 2. *Fragility will be negatively related to resilience.*

Hypothesis 3. *Fragility will be more negatively related to antifragility than to resilience.*

Another way to conceptualize the difference between the triad of fragility, resilience, and antifragility involves utilizing a circumplex on which the core factors of each concept are discussed (see Figure 3). The two dimensions of such circumplex should reflect the tendency of the capacity or rigidity to result in approaching or avoiding disorder as well as gaining or losing from it, forming the approach-avoidance gain-loss circumplex of disorder receptivity.

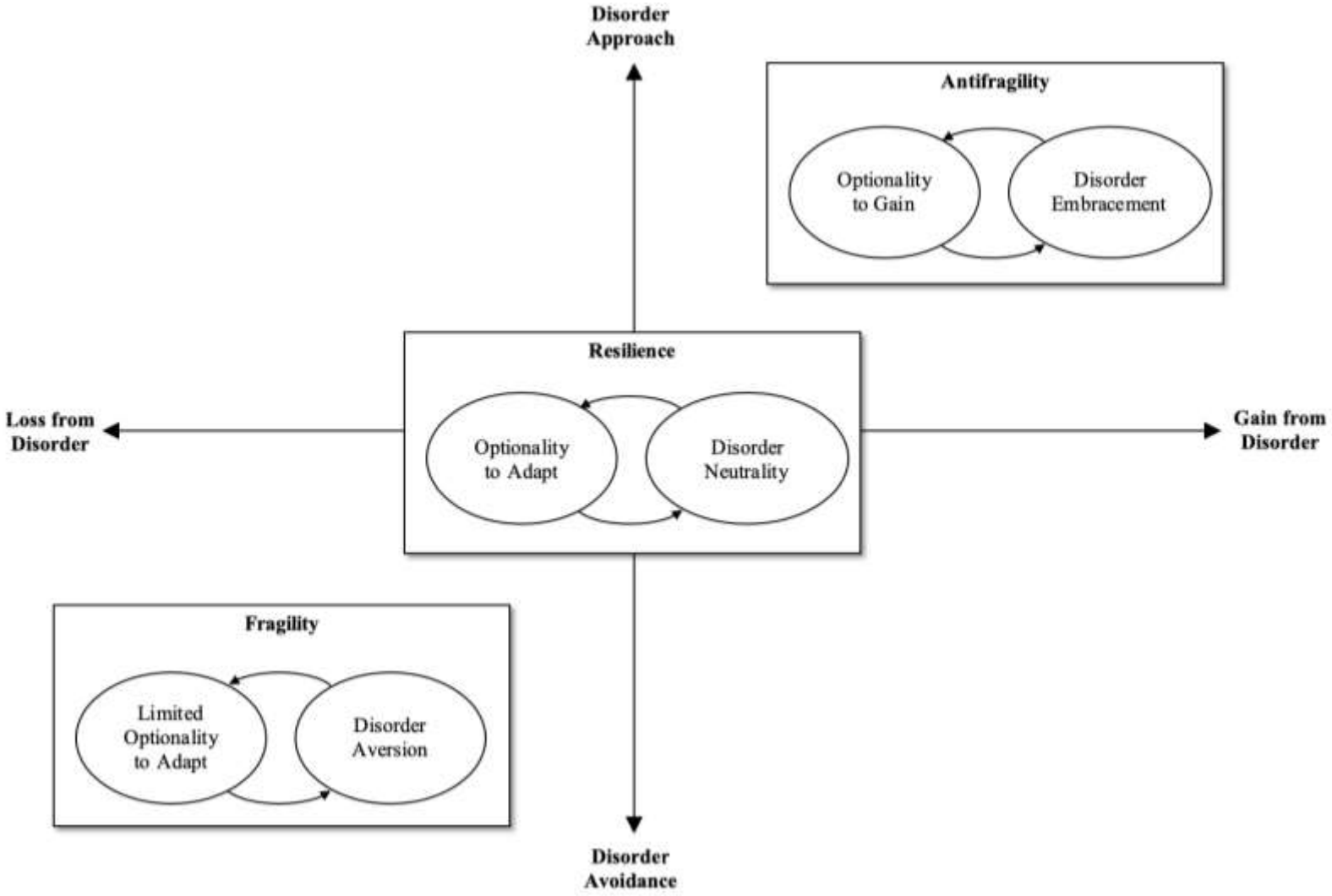


Figure 3: The Approach-Avoidance Gain-Loss Circumplex of Disorder Receptivity

According to the circumplex, fragility is represented by two main factors or components: limited optionality to adapt and disorder aversion. Limited optionality to adapt refers to the limitation or lack of ability to recognize and choose opportunities with minimum losses in times of asymmetry (i.e., disorder) whereas disorder aversion refers to one's negative attitude towards disorder and its forms that is exemplified in anxiety, distress, and displeasure. Being fragile tends to be reflected as a loop of loss from disorder due to the limited optionality to adapt, rendering fragile individuals more susceptible to disorder, and thus, averting it. Furthermore, being unable to embrace disorder and avert it as a result is more likely to stabilize or worsen the already limited optionality to adapt due to the limited experience/growth resulting from the lack of exposure to challenging or stressful situations. Accordingly, fragility is more likely to engender tendencies of avoidance of disorder as well as loss from it. This can be further illustrated by the state-like nature of the concept such that the rigidity to be fragile is malleable based on the frequency of exposure to disorder and the resulting growth. As a result, someone who is fragile is more likely to stay as such or become even more fragile as the cycle continues, unless outside support is provided to enhance their capacity to embrace disorder, and thus, enhance their optionality to adapt, resulting in an increased likelihood to approach disorder and gain from it in future instances, and the cycle continues.

Resilience, on the other hand, can be reflected as a loop between two factors: optionality to adapt and disorder neutrality. Disorder neutrality refers to one's neutral attitude towards disorder and its forms that is exemplified in indifference, disengagement, and impassivity.

Unlike fragility, resilience engenders tendencies of reactivity such that resilient individuals do not necessarily embrace disorder nor avert it, resulting in neither approach nor avoidance of disorder. This results from the optionality to adapt that resilient individuals possess, making them able to adapt to disorder when it occurs through loss minimization, yet not gain much. Such lack of gain and loss renders disorder neither enticing nor threatening, hence, the neutral attitude towards disorder. On the other hand, optionality to adapt can be sufficiently developed through mere welcoming and adapting through disorder and challenges occasionally imposed by the environment without necessarily seeking them. Therefore, having a neutral attitude towards disorder is more likely to provide the individual with the occasional experience needed to develop optionality to adapt, rendering them more neutral towards disorder, and the cycle continues.

Lastly, antifragility is reflected as a loop of gain from disorder through optionality to gain, resulting in positive experiences associated with disorder, and thus, embracing/seeking it. Disorder embracement refers to one's positive attitude towards disorder and its forms that is exemplified in excitement, thrill, and enjoyment. Furthermore, being able to embrace disorder is more likely to increase one's optionality to gain through constant exposure to disorder and its associated challenges, resulting in increased learning experiences rendering that individual more antifragile to future disorder. Accordingly, someone who is antifragile is more likely to approach and gain from disorder as the cycle continues, unless they are faced with a traumatic situation that is beyond their capacity to handle or limited their exposure to disorder; this is due to the constant dynamism and uncertainty disorder brings, which necessitates the need for

constant learning experience and exposure to disorder to keep up, further emphasizing the state-like nature of such capacity.

Antifragility, Resilience, and Fragility at Work

In the context of the workplace, being able to adapt to the constant job demands and stressors, whether they result from abusive supervision, organizational bureaucracies, or even environmental forces, is a strong aspect of any employee's application. Examples of such demands include role overload, role ambiguity, role complexity, time pressure, emotionally demanding interactions with customers, increased responsibility, leading a new project, etc. (Bakker & Demerouti, 2017). Most employees tend to experience job demands or stressors on a daily basis, which can lead to a range of individual and performance outcomes depending on how the employees cope with and perceive stress (Lazarus & Folkman, 1984). For instance, an employee who is fragile is more likely to perceive disorder and stress as a costly transaction that nets him/her more losses than gains due to the lack of resources by the employee that are needed in such situations.

Although the needed resources can be job-related (e.g., performance feedback, opportunities for growth, social support), they can also be personal, such as resilience and antifragility. A fragile employee is less likely to recognize and pursue opportunities within these stressors through which they can minimize their cost; such opportunities can, for instance, be altering the perception of the meaning behind such stressor into a more motivating one or finding more efficient ways to perform a new stressful task (Taleb, 2012). Simply put, those who are fragile tend to find it difficult to minimize the costs associated with disorder or stressors, let alone generate gains (Taleb, 2012). Accordingly, I define fragility at work as the rigidity of an individual to experience more losses than

gains, more downsides than upsides, from disorder at work through limited optionality to adapt and disorder aversion (see Table 2). Gains may be emotional (e.g., positive emotion, motivation), financial (e.g., bonus pay, increased salary), cognitive (e.g., mental growth, experience), or even social (e.g., potential connections, expanded network); similarly, losses may be emotional (e.g., negative emotion, exhaustion), financial (e.g., opportunity costs), cognitive (e.g., poor decision-making), or social (e.g., loss of a potential connection).

On the other hand, an employee who is resilient may find stressors a steppingstone to something more rewarding later on rather than actually gaining from the stressors themselves. To illustrate, they see stressors as a zero-sum transaction or one with little reward since they are able to minimize the losses associated with the stressors but not able to fully reap their benefits (Taleb, 2012). Therefore, although a resilient employee might adapt to increased responsibility and uncertainty, s/he might not pursue it per se. Therefore, I define resilience at work as the capacity of an individual to minimize the losses, without necessarily maximizing the gains, associated with disorder at work through optionality to adapt and disorder neutrality. Lastly, those who are antifragile find joy and excitement in stressors as they are able to gain from them in addition to minimizing their costs (Taleb, 2012).

Table 2

Comparison among Fragility, Resilience, and Antifragility

Attributes \ Rigidity/Capacity	Fragility	Resilience	Antifragility
Definition	The rigidity of an individual to experience more losses than gains, more downsides than upsides, from disorder at work through limited optionality to adapt and disorder aversion.	The capacity of an individual to minimize the losses, without necessarily maximizing the gains, associated with disorder at work through optionality to adapt and disorder neutrality	The capacity of an individual to experience more gains than losses, more upsides than downsides, from disorder at work through optionality to gain and disorder embracement.
Ability to Gain from Disorder	Very Low	Low to Moderate	Very High
Average Gain from Disorder	Negative	Neutral	Positive
Frequency of Gain from Disorder	Almost Never	Sometimes	Almost Always
Attitude Towards Disorder	Resistant	Reactive	Proactive
Behavior Towards Disorder	Avoid	Adapt	Pursue
Disorder Control Orientation	Primary/Secondary	Secondary	Primary
Optionality	Limited Optionality to Adapt to Disorder	Optionality to Adapt to Disorder	Optionality to Gain from Disorder
Example	e.g., an employee avoids and is emotionally affected by the stressful challenges associated with a new project, resulting in possibly rejecting the new project.	e.g., an employee welcomes and is able to adapt to and recover from the stressful challenges associated with a new project, resulting in accepting the new project.	e.g., an employee initiates and is able to personally grow from the stressful challenges associated with a new project, resulting in pursuing the project.

Antifragile employees tend to be able to recognize and pursue opportunities of growth in disorder regardless of the subsequent gains, resulting in them pursuing and initiating challenging situations to benefit from at work (e.g., volunteering to lead a new project, going on an expatriate assignment, learning a new set of skills). As a result, I define antifragility at work as the capacity of an individual to experience more gains than losses, more upsides than downsides, from disorder at work through optionality to gain and disorder embracement.

Measuring Antifragility, Resilience, and Fragility

Due to the lack of measurements of antifragility and fragility in the field of management and psychology, in the following section, I endeavor to make the concepts of fragility and antifragility measurable. Moreover, due to the inconsistent conceptualization of resilience in the literature, I will also create a measure for resilience that is consistent with the framework presented in this dissertation. In order for future research to accurately test the relationships between antifragility, resilience, fragility, and other constructs of interest, sound construct development and measurement is a must (Edwards, 2003; Schwab, 1980). In phase 1, I discuss the methods through which I specified the domain of the constructs, generated items accordingly, and assessed their content validity. In phase 2, I empirically test the dimensionality and structure of the resulting scales utilizing EFA.

Phase 1: Construct Conceptualization, Item Generation, and Content Validity

Construct Conceptualization

In this dissertation, I follow three general steps that capture the essence of construct development according to previous reviews (Clark & Watson, 1995; DeVellis,

2017; Hinkin, 1998; Lambert & Newman, 2019; MacKenzie, Podsakoff & Podsakoff, 2011). The first step in this process is to accurately define the construct. In the previous section, I discussed the concepts of antifragility, resilience, and fragility and compared them in terms of definition, attributes, and examples. I relied on previous literature and Taleb's (2012) conceptualization of the triad to specify the domain of the constructs to be operationalized and adapt them to the workplace. In other words, I attempted to draw the differences between antifragility, resilience, and fragility to avoid construct redundancy, proliferation, or relabeling existing constructs (see Table 2; Credé, Tynan & Harms, 2017; Lambert & Newman, 2019). Furthermore, I followed the recommendations suggested by Podsakoff, MacKenzie, & Podsakoff (2016) in defining the constructs.

Item Generation

To generate the items for antifragility, resilience, and fragility, I relied on the definitions I developed based on Taleb's (2012) conceptualization of the concepts; in other words, I utilized a deductive approach to item generation (Hinkin, 1998). I generated items that adhered to the recommendations suggested by scholars (Bradburn, Sudman, & Wansink, 2004; Lambert & Newman, 2019; Tourangeau, Rips, & Rasinski, 2000) such that the items are clear, simple, unidimensional, uncontaminated from related constructs, and free of jargon or slang. The initial item pools for antifragility, resilience, and fragility are 38, 35, and 45, respectively.

Assessment of Content Validity

Content validity is an important step in validating a construct as it refers to "the degree to which items in an instrument reflect the content universe to which the instrument will be generalized" (Straub, Boudreau, & Gefen, 2004: 424). In order to

assess the content validity of the developed antifragility, resilience, and fragility scales, I followed the steps of Anderson and Gerbing (1991) and MacKenzie, Podsakoff, and Fetter (1991). First, using ten subject matter experts (SMEs, faculty, and doctoral students in a mid-sized southeastern U.S. university), I conducted *item sorting* by listing the definitions of antifragility, resilience, and fragility and then asking the SMEs to assign each item to one of the three constructs. Accordingly, I assessed the proportion of the SMEs who assigned the items to their intended construct. A rate of 75% was considered acceptable, and the item was retained (Hinkin, 1998). Second, I assessed the degree to which the SMEs assigned each item to its intended construct using Likert scales for clarity (ranging from 1 "very unclear" to 5 "very clear") and fit (ranging from 1 "very poor fit" to 5 "very good fit"). I retained items with a fit and clarity of four each to ensure a clear representation of the domain under examination, resulting in 26 items for antifragility, 20 for resilience, and 36 for fragility. Utilizing these two steps might not prove content validity, yet, it can provide evidence of content adequacy (Schriesheim, Powers, Scandura, Gardiner, & Lankau, 1993).

Phase 2: Exploratory Factor Analysis

The items that survived the content validity assessment were used to measure the intended constructs, assess their structure, and test whether these items conform to the psychometric properties of a new measure (Hinkin, 1998). Utilizing two samples for additional accuracy, I conducted EFA using SPSS 26 with principal axis factoring extraction and oblique rotation (Promax), as few constructs are uncorrelated in the real world (see Table 2 for a summary of the samples used in this dissertation; Conway & Huffcutt, 2003; Hair, Black, Babin, & Anderson, 2018). Items were subject to these

criteria: a factor loading above .40 (Ford, MacCallum, & Tait, 1986), a communality above .40, an item-total correlation above .40, and a difference between cross-loadings of .25 or more (Nunnally, 1978; Hair et al., 2018). Items that did not meet all these criteria in at least one sample were examined for conceptual appropriateness, then dropped one at a time, and the EFA was rerun after each item was dropped. For instance, some of the items that exhibited poor statistical fit for the antifragility scale were negatively worded or described situations as "distressful, stressful, disorder, etc.," which may not fit with the antifragile person's positive perceptions of situations of disorder (e.g., seeing them as opportunities for growth or development). Thus, items that described such situations more objectively had much better reliability and validity. Finally, I conducted Bartlett's test of sphericity to check that there was sufficient correlation between the items to proceed (Hair et al., 2018). Reliability, using Cronbach's coefficient alpha, was assessed for the measures. After removing items with low reliability and validity, the final number of items for antifragility, resilience, and fragility was 10, 9, and 12, respectively (see Table 3).

The data for the two EFA samples were collected through Qualtrics, for which its reliability as a data source has been supported by previous research (Porter, Outlaw, Gale, & Cho, 2019). The data for both samples were collected from full-time employees in the U.S. The participants were instructed to assess on a Likert-type scale to which they agreed with each statement about themselves at work from 1 (strongly disagree) to 7 (strongly agree). Furthermore, data on age, gender, education, race/ethnicity, years of work experience, and industry sector were collected. Multiple attention checks were incorporated into the questionnaire to eliminate biased observations (Meade & Craig,

2012). Examples of possible attention checks include “please respond ‘somewhat disagree’ for this item” and “I am honestly answering these questions.”

Table 3

Summary of the Studies and Samples Used

Study	Sample	Sample Size	Population	Purpose
Study 1	Sample 1	223	Full-Time Employees in the U.S.	Exploratory Factor Analysis
	Sample 2	205	Full-Time Employees in the U.S.	Exploratory Factor Analysis
Study 2	Sample 3	185	Full-Time Employees in the U.S.	Confirmatory Factor Analysis & Incremental Validity Analysis
Study 3	Sample 4	179	Full-Time Employees in the U.S.	Confirmatory Factor Analysis & Criterion Validity Analysis
Study 4	Sample 5	T1: 444 T2: 215	Full-Time Employees in the U.S.	Hypothesized Model Analysis

Results

Sample 1 Results

The sample consisted of 223 participants, 46% females, and an average age of 42. The average work experience was 19 years, and the majority of the participants had at least a bachelor’s degree (70%). Moreover, the majority of the participants (72%) worked in the private sector. Five factors had an Eigenvalue above 1 (2 for antifragility, 1 for resilience, and 2 for fragility) with a cumulative variance explained of 63.97%. The factor loadings ranged from .38 to .89 for antifragility, from .53 to .84 for resilience, and .52 to .95 for fragility (see Table 3). The KMO test resulted in a value of 0.92, indicating the sampling adequacy to run a factor analysis (Hutcheson & Sofroniou, 1999). Bartlett’s test

of sphericity has also been found to be significant (χ^2 = 4254.12, p < 0.000), indicating that the correlations among the items were different from zero. The means, standard deviations, reliabilities, and zero-order correlations between the constructs, their factors, and the demographic variables for Sample 1 are shown in Table 4.

Sample 2 Results

The sample consisted of 205 participants, of which 45% were female, who reported an average age of 43. The average work experience was 19 years, and the majority of the participants had at least a bachelor's degree (75%). Furthermore, the majority of the participants worked in the private sector (71%). Like Sample 1, five factors had an Eigenvalue above 1 (2 for antifragility, 1 for resilience, and 2 for fragility) with a cumulative variance explained of 61.41%. Factor loadings ranged from .35 to .99 for antifragility, from .45 to .83 for resilience, and .52 to .97 for fragility (see Table 3). The KMO test resulted in a value of 0.89, indicating sampling adequacy to run a factor analysis (Hutcheson & Sofroniou, 1999). Bartlett's test of sphericity has also been found to be significant (χ^2 = 3498.72, p < 0.000), indicating that the correlations among the items were different from zero. The means, standard deviations, reliabilities, and zero-order correlations between the constructs, their factors, and the demographic variables for Sample 2 are shown in Table 4.

Table 4

Items and Item Loadings from Exploratory Factor Analysis and Confirmatory Factor Analysis

Items	Sample 1 (EFA)	Sample 2 (EFA)	Sample 3 (CFA)	Sample 4 (CFA)
Antifragility	**.86[a]**	**.87[a]**	**.90[a]/.82[b]/.70[c]**	**.90[a]/.73[b]/.58[c]**
Optionality to Gain	**.81[a]**	**.78[a]**	**.85[a]**	**.91[a]**
I can recognize alternative ways of dealing with work challenges to maximize my gains and minimize my losses.	.58	.47	.66	.82
I am particularly good at recognizing growth opportunities within rapidly changing work roles.	.60	.35	.73	.76
I am able to use my past errors to maximize my gains in future endeavors at work.	.61	.69	.69	.80
At work, I am able to take advantage of challenging tasks to maximize my learning or personal growth.	.58	.47	.81	.87
My past experience helps me choose opportunities for growth when dealing with work challenges.	.79	.56	.78	.82
Disorder Embracement	**.85[a]**	**.87[a]**	**.88[a]**	**.88[a]**
I embrace change at work.	.82	.65	.80	.69
Trying out rapidly changing roles at work is thrilling.	.89	.99	.88	.88
I like to experiment with new work-related tasks regardless of the outcome.	.60	.65	.71	.76
I prefer to work in an environment that is dynamic and changing.	.38	.62	.81	.83
It is thrilling to experience uncertainties at work.	.54	.81	.68	.76
Resilience	**.89[a]**	**.88[a]**	**.92[a]/.92[b]/.57[c]**	**.92[a]/.92[b]/.56[c]**
I can recover from a stressful situation at work.	.75	.83	.77	.74
I find it relatively easy to bounce back to normal functioning after stressful situations at work.	.76	.72	.70	.76
I have ways to reduce the distress associated with uncertainty at work.	.53	.45	.74	.76
I am able to quickly adapt to work situations that require a lot of energy and effort.	.61	.63	.80	.61
I can reduce my distress even in times of uncertainty at work.	.59	.65	.72	.78

Items	Sample 1 (EFA)	Sample 2 (EFA)	Sample 3 (CFA)	Sample 4 (CFA)
I am able to efficiently use my energy during times of disorder at work so that I do not wear out.	.59	.69	.80	.79
I can psychologically recover from a project at work that requires a lot of effort and energy.	.84	.71	.77	.74
I can minimize losses in my job performance that result from uncertainty at work.	.58	.56	.64	.67
I can mentally reduce the pressure resulting from stressful or challenging situations at work.	.73	.45	.84	.85
Fragility	**.93[a]**	**.93[a]**	**.93[a]/.87[b]/.76[c]**	**.92[a]/.88[b]/.79[c]**
Limited Optionality to Adapt	**.93[a]**	**.91[a]**	**.88[a]**	**.86[a]**
At work, I find it hard to recognize alternative ways of doing things.	.89	.71	.52	.50
At work, I find it difficult to utilize alternative ways of doing things.	.95	.79	.66	.58
I find it difficult to recover from the distress associated with rapid changes at work.	.75	.68	.83	.84
I tend to have job performance problems when I try out new tasks or roles.	.68	.97	.67	.67
I tend to have distress when I try out new tasks or roles.	.68	.87	.85	.87
It is hard to cope with the distress that comes from rapid change at work.	.60	.66	.83	.71
Disorder Aversion	**.90[a]**	**.89[a]**	**.92[a]**	**.91[a]**
Uncertainty at work causes me distress.	.78	.52	.78	.90
Uncertainty in the workplace negatively affects me.	.76	.64	.86	.91
I dislike work roles with risky outcomes.	.76	.73	.75	.70
Stressful situations at work do me more harm than good.	.57	.79	.84	.69
Uncertainty at work does me more harm than good.	.87	.88	.91	.78
When I make errors at work, it causes me distress.	.52	.85	.67	.66

Note: a = Cronbach's Alpha; b = Composite Reliability; c = Average Variance Extracted.

CHAPTER 3

STUDY 2: SCALE VALIDATION I

Introduction

One of the weaknesses of EFA is its limited ability in quantifying the goodness of fit of the resulting factor structure (Long, 1983); moreover, items that loaded clearly on a certain factor in EFA might demonstrate a lack of fit in another context due to the lack of external consistency (Gerbing & Anderson, 1988). Therefore, it is always important to conduct CFA using a different sample to confirm the findings of the EFA and establish construct validity (Hinkin, 1998; Schwab, 1980). Construct validity refers to the extent to which a construct actually measures what is supposed to measure (Hair et al., 2018). Two of the most common purposes of CFA is to establish convergent and discriminant validity (types of construct validity) of the constructs in the measurement model. Convergent validity refers to "the extent to which indicators of a specific construct converge or share a high proportion of variance in common" (Hair et al., 2018: 659); on the other hand, discriminant validity refers to "the extent to which a construct is truly distinct from other constructs both in terms how much it correlates with other constructs and how distinctly measured variables represent only this single construct" (Hair et al., 2018: 659). The first purpose of this study is to test the convergent and discriminant validity of the antifragility, resilience, and fragility scales developed in the previous chapter by conducting CFA. Another process through which one can further validate developed

constructs is through examining their incremental validity (Hunsley & Meyer, 2003). Put simply, incremental validity refers to the extent to which the developed constructs add unique variance beyond already existing similar constructs in predicting relevant outcomes. Therefore, the second purpose of this study is to investigate the incremental validity of antifragility as a psychological resource that can be developed to thrive at work.

Confirmatory Factor Analysis

I conducted CFA in two separate steps in line with Maynes and Podsakoff (2014). In the first step, I tested the convergent and discriminant validity across the three constructs of the gain/loss from disorder continuum — antifragility, resilience, and fragility — by specifying a three-factor measurement model. I expect a quasi-simplex pattern to the continuum such that adjacent constructs are expected to be more related than non-adjacent ones. For instance, I expect that the correlation between antifragility and resilience to be higher than the correlation between antifragility and fragility, which should be weaker or negatively correlated (Ryan & Connell, 1989). That being said, although fragility is proposed to be the polar opposite of antifragility, there are numerous factors other than gain/loss from disorder that can contaminate such a relationship, resulting in fragility not being the true polar opposite of antifragility. Therefore, although proposing a quasi-simplex pattern implies the order on which the constructs are placed on the continuum, it does not imply equal theoretical spacing between the constructs (Howard, Gagné, & Bureau, 2017). In the second step, I compared the developed antifragility and resilience measures with Luthans, Youssef, & Avolio's (2007) resilience measure, as antifragility should be correlated yet distinct from them. Furthermore, I argue

that the resilience measure developed in this paper should be redundant with that of Luthans et al. (2007), as both measures cover the same conceptual domain and do not refer to any growth or positive gain from disorder; that being said, the new measure should better reflect the conceptual distinction between itself and antifragility and fragility.

Incremental Validity

Regarding testing the incremental validity of antifragility, I examined the ability of antifragility to add unique variance above and beyond both resilience measures in predicting thriving at work and its dimensions as these constructs are positive and state-like (or open to development) psychological resources that are proposed to be related to desired attitudinal, behavioral, and performance outcomes (Luthans et al., 2015). Thriving at work is defined as a positive psychological state that is characterized by a joint sense of vitality and learning (Spreitzer et al., 2005). Learning refers to the cognitive dimension of thriving, in which an individual has a sense that they are constantly acquiring and applying knowledge, and vitality refers to the affective dimension of thriving, where an individual feels energized and alive. Spreitzer et al. (2005) emphasized the necessity for both learning and vitality to be present for someone to thrive, in other words, experience an upward trajectory (Hall et al., 2009). A meta-analysis by Kleine, Rudolph, and Zacher (2019) found that thriving at work predicted a variety of desirable work outcomes (e.g., task performance, job satisfaction, subjective health, and burnout) above and beyond positive affect and work engagement. Further, they found psychological capital to be an antecedent of thriving at work.

Resilience and antifragility are expected to positively predict thriving at work and its dimensions. Resilient individuals tend to have optionality to adapt and a neutral attitude towards disorder in its many forms. In other words, they are more likely to minimize the losses associated with their job demands and relatively gain from the experience to the extent of sustaining their optionality to adapt. Therefore, they are likely to experience more learning and vitality after dealing with their work demands than someone who is less resilient or fragile due to their experience in dealing with imposed disorder. On the other hand, those who are antifragile tend to have optionality to gain and a positive attitude towards disorder, making them much more competent at recognizing opportunities of growth as well as loss minimization than those who are resilient due to their wealth of experience in dealing not only with imposed disorder but self-created or pursued disorder as well. Accordingly, antifragile individuals are likely to experience more vitality and even much more learning than resilient individuals, as they are better able at taking advantage of their demands at work. Thus, I hypothesize:

Hypothesis 4: *Resilience will be positively related to (a) learning, (b) vitality, and (c) thriving at work.*

Hypothesis 5: *Antifragility will be more positively related to (a) learning, (b) vitality, and (c) thriving at work than resilience.*

Methods

Due to the purpose of CFA to confirm the findings of EFA, it is highly recommended to collect data from a new sample that is different from that of EFA (Lambert & Newman, 2019; Messick, 1995). The data were collected through Qualtrics from 185 full-time U.S. workers (Sample 3). Fifty-four percent of the participants were

female, and the average age was 44 years. The average work experience was 23 years, and approximately half of the participants had at least a bachelor's degree (52%). Moreover, the majority of the participants worked in the private sector (66%). The refined measures of antifragility, resilience, and fragility from the previous study, in addition to Luthans et al.'s (2007) measure of resilience, were used (e.g., "I usually take stressful things at work in stride"). Thriving at work was measured utilizing Porath, Spreitzer, Gibson, & Garnett's (2012) 10-item scale (e.g., "I have developed a lot as a person"). The participants were instructed to assess on a Likert-type scale to which they agreed with each statement about themselves at work from 1 (strongly disagree) to 7 (strongly agree). Attention checks and data on demographic variables were collected as in the previous study.

Results

AMOS 26 was used to conduct CFA. Table 5 shows the means, standard deviations, reliabilities, and zero-order correlations between the constructs, factors, and the demographic variables for Sample 3. Table 6 shows the CFA results for the examined models in Steps 1 and 2. In step 1, the best fit model was the three-factor model where antifragility, resilience, and fragility were all separate with a difference in χ^2 of 452.39 ($p < .01$) from the two-factor model. For antifragility, resilience, and fragility, respectively, the composite reliabilities were .82, .92, and .87; the AVEs were .70, .57, and .76; the average factor loadings were .76, .75, and .76 (see Table 3).

Table 5

Means, Standard Deviations, Reliabilities, and Zero-Order Correlations (Samples 1 & 2)

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Antifragility	3.80/3.69	.60/.62	**.86/.87**	.83**	.93**	.56**	-.24**	-.15**	-.27**	.02	-.20**	-.08	.23**	-.13
2. Optionality to Gain	4.01/3.93	.61/.57	.82**	**.81/.78**	.55**	.61**	-.24**	-.24**	-.17*	.13	-.10	.06	-16*	-.08
3. Disorder Embracement	3.58/3.44	.79/.84	.90**	.48**	**.85/.87**	.43**	-.20**	-.06	-.30**	-.06	-.23**	-.16*	.24**	-.14*
4. Resilience	3.88/3.80	.63/.61	.68**	.59**	.60**	**.89/.88**	-.43**	-.35**	-.40**	.19**	-.11	.16*	.07	.05
5. Fragility	2.58/2.82	.91/.82	-.32**	-.23**	-.31**	-.49**	**.93/.93**	.87**	.86**	-.19**	-.01	-.30**	.11	-.02
6. Limited Optionality to Adapt	2.30/2.50	.98/.96	-.18**	-.20**	-.13	-.43**	.91**	**.93/.91**	.50**	-.26**	-.13	-.37**	.17*	-.03
7. Disorder Aversion	2.86/3.14	1.01/.93	-.40**	-.22**	-.44**	-.47**	.92**	.67**	**.90/.89**	-.07	.11	-.14	.03	-.01
8. Age	42.31/42.80	11.23/11.49	-.15*	-.10	-.15*	.00	-.16*	-.19**	-.11	—	-.10	.82**	-.07	-.04
9. Gender	.46/.45	.50/.50	-.19**	-.09	-.22**	-.07	-.05	-.10	.00	.02	—	.00	-.13	.24**
10. Work Experience	19.49/19.04	12.10/11.48	-.20**	-.12	-.21**	.05	-.26**	-.34**	-.14*	.85**	.06	—	-.25**	.02
11. Education	3.78/3.89	1.29/1.32	.16*	.08	.19**	.05	.05	.09	.00	-.13	-.18**	-.29**	—	-.15**
12. Sector	.28/.29	.45/.46	-.13*	-.11	-.12	-.10	.03	.01	.05	-.06	.09	-.03	-.06	—

Note: Sample 1 *N* = 223; Sample 2 *N* = 205. Sample 1 M and SD appear first. Sample 1 correlations appear below the diagonal; Sample 2 correlations appear above the diagonal. Coefficient alpha reliabilities appear in the diagonals, with Sample 1 first. Gender (0 = Male, 1 = Female); Education (1= High School Graduate, 2 = Some College Credit, 3 = Associate Degree, 4 = Bachelor's Degree, 5 = Master's Degree, 6 = Doctorate Degree); Work Experience (in years); Sector (0 = Private, 1 = Public).
**$p < .01$; *$p < .05$., two-tailed.

Table 6

Means, Standard Deviations, Reliabilities, and Zero-Order Correlations (Sample 3)

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Antifragility	5.09	.95	**.90**															
2. Optionality to Gain	5.47	.92	.86**	**.85**														
3. Disorder Embrace	4.70	1.21	.92**	.59**	**.88**													
4. Resilience	5.27	.94	.60**	.63**	.46**	**.92**												
5. Fragility	3.29	1.24	-.60**	-.58**	-.51**	-.60**	**.93**											
6. Limited Optionality to Adapt	2.85	1.22	-.49**	-.54**	-.36**	-.57**	.89**	**.88**										
7. Disorder Aversion	3.73	1.51	-.59**	-.51**	-.54**	-.53**	.93**	.65**	**.92**									
8. PsyCap Resilience	5.44	.83	.36**	.49**	.20**	.64**	-.48**	-.56**	-.34**	**.73**								
9. Thriving at Work	5.37	1.07	.66**	.71**	.50**	.52**	-.51**	-.42**	-.49**	.36**	**.92**							
10. Learning	5.50	1.12	.62**	.67**	.46**	.45**	-.43**	-.37**	-.41**	.34**	.89**	**.90**						
11. Vitality	5.23	1.26	.58**	.61**	.44**	.49**	-.48**	-.39**	-.47**	.31**	.92**	.63**	**.91**					
12. Age	44.10	12.85	-.05	.05	-.11	.08	-.03	-.11	.04	.30**	.06	-.01	.11	—				
13. Gender	.54	.50	-.08	-.08	-.06	-.17*	.04	-.05	.10	.09	-.12	-.04	-.16*	.08	—			
14. Work Experience	22.61	12.77	-.03	.09	-.11	.11	-.07	-.16*	.02	.37**	.09	.07	.10	.87**	.11	—		
15. Education	3.31	1.42	.02	-.07	.08	-.05	-.04	-.03	-.04	-.19*	-.00	-.01	.01	-.08	-.13	-.16*	—	
16. Sector	.34	.48	-.00	.00	-.01	.09	-.02	-.03	.00	-.00	.10	.12	.06	-.06	.21**	-.01	-.03	—

Note: *N* = 185; M = Mean; SD = Standard Deviation; Cronbach's Alpha in Bold; Gender (0 = Male, 1 = Female); Education (1= High School Graduate, 2 = Some College Credit, 3 = Associate Degree, 4 = Bachelor's Degree, 5 = Master's Degree, 6 = Doctorate Degree); Work Experience (in years); Sector (0 = Private, 1 = Public).
**$p < .01$; *$p < .05$., two-tailed.

Furthermore, the variance explained estimates were greater than the square of the phi correlation between the constructs, and the phi correlations were less than 1 for all the constructs (Hair et al., 2018; Lambert & Newman, 2019). In Step 2, although the best fitting model was the three-factor model where antifragility and both resilience measures were all separate, the difference in χ^2 of 50.68 ($p < .01$) from the two-factor model, albeit significant, was much smaller compared to the difference in χ^2 from the one-factor model.

I also compared the resilience measure developed in this paper and that of the PsyCap resilience measure (see Table 7; Luthans et al., 2007). While there was a phi correlation of .80 ($p <. 01$) between them, the newly developed measure exhibited stronger psychometric properties. The Cronbach's coefficient alpha reliability and composite reliability were higher for the current measure (.92 and .92) versus the PsyCap resilience scale (.73 and .75). Further, the highest and average factor loadings were stronger for the current scale (.83 and .75) than the PsyCap one (.76 and .58). The PsyCap resilience scale had an average variance extracted of .35, compared to .57 for the newly developed measure. Furthermore, the square roots of the AVE for both resilience scales were less than their correlation with each other.

Regarding the incremental validity analysis, hierarchical regression analysis was conducted utilizing SPSS 26, and thriving at work was regressed on antifragility, resilience, and Luthans et al.'s (2007) resilience. Table 8 shows the incremental validity analysis results. Models 1-6 test the incremental validity of antifragility above and beyond the two resilience measures when predicting the individual dimensions of thriving at work whereas Models 7-9 test it when predicting thriving at work as a whole.

Table 7

Confirmatory Factor Analysis Results (Sample 3)

Models	***df***	χ^2	χ^2/df	**CFI**	**SRMR**	**RMSEA**	**AIC**	$\Delta\chi^2$
One-Factor Model (A+R+F Merged)	432	1741.12	4.03	.66	.11	.13	1931.12	
Two-Factor Model (A+R Merged)	429	1217.54	2.84	.80	.09	.10	1413.54	523.58**
Three-Factor Model	425	765.15	1.80	.91	.07	.07	969.15	452.39**
One-Factor Model (A+R+PR Merged)	275	1016.15	3.70	.70	.11	.12	1166.15	
Two-Factor Model (R+PR Merged)	272	544.66	2.00	.89	.08	.07	700.66	471.49**
Three-Factor Model	270	493.98	1.83	.91	.08	.07	653.98	50.68**

Note: N = 185; A = Antifragility; R = Resilience; F = Fragility; PR = PsyCap Resilience; $\Delta\chi^2$ = change in χ^2 from the previous model accounting for the appropriate degrees of freedom.
**p < .01; *p < .05.

In terms of learning, resilience significantly predicted learning while making Luthans et al.'s (2007) resilience insignificant after it was; antifragility significantly predicted learning while making resilience insignificant.

Table 8

Comparison Between Resilience and PsyCap Resilience (Sample 3)

Measure Characteristics	**Resilience**	**PsyCap Resilience**
Cronbach's Alpha	.92	.73
Composite Reliability	.92	.75
Largest Factor Loading	.83	.76
Smallest Factor Loading	.64	.42
Average Factor Loading	.75	.58
MSV	.64	.64
AVE	.57	.35
Phi Correlation	.80**	

Note: *N* = 185; MSV = Maximum Shared Variance; AVE; Average Variance Extracted. ***p* < .01; **p* < .05.

In terms of vitality, resilience significantly predicted vitality while making Luthans et al.'s (2007) resilience insignificant after it was; antifragility explained variance above and beyond resilience in predicting vitality, yet resilience remained significant. Lastly, resilience significantly predicted thriving at work while making Luthans et al.'s (2007) resilience insignificant after it was; antifragility significantly predicted thriving at work while making resilience insignificant. Thus, Hypotheses 4 and 5 were supported.

CHAPTER 4

STUDY 3: SCALE VALIDATION II

Introduction

In order to further test the validity of the developed constructs, it is encouraged to examine the nomological network of the developed constructs. In other words, it is encouraged to test the theoretical predictions about the direction and magnitude of the correlations among constructs related to the developed constructs to support its existence in its expected nomological network (Cronbach & Meehl, 1955; Lambert & Newman, 2019). Being able to find support for the nomological network of a developed construct facilitates the understanding of its conceptual space and validates it. Hair et al. (2018) describe the nomological validity as "a test of validity that examines whether the correlations between constructs in the measurement theory make sense" (659). In this study, I conduct a correlation analysis as well as a regression analysis to examine the nomological network of antifragility as a positive psychological resource (see Table 9).

Table 9

Incremental Validity Analysis (Standardized Coefficients; Sample 3)

	Learning			**Vitality**			**Thriving at Work**		
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
PsyCap Resilience	.34**	.09	.11	.31**	-.01	.01	.36**	.04	.07
Resilience		.39**	.05		.49**	.21*		.49**	.15
Antifragility			.55**			.45**			.55**
R^2	.12	.21	.40	.10	.24	.36	.13	.27	.46
ΔR^2	.12	.09	.20	.10	.14	.13	.13	.14	.19
F	24.39**	23.839**	40.66**	19.32**	28.07**	34.26**	27.19**	33.75**	51.96**
df	183	182	181	183	182	181	183	182	181

**Note*:* $N = 185$
**$p < .01$; *$p < .05$., two-tailed.

Theoretical Background and Hypothesis Development

A significant amount of research has emphasized the role personality traits and stable tendencies play in predicting relevant individual outcomes at work (e.g., Cellar et al., 2011; Hülsheger, Alberts, Feinholdt, & Lang, 2013; Judge & Bono, 2001). An example of a personality trait that received much attention over the past two decades is proactive personality. Proactive personality is defined as a stable tendency to actively self-initiate environmental change (Bateman & Crant, 1993). Those who are proactive tend to be active change agents in that they scan for opportunities, show initiative, take action, and persevere until they bring about change (Bateman & Crant, 1993: 105); they tend to be future-oriented and be on the lookout for ways to improve the current situation through meaningful change instead of passively reacting to external constraints (Fuller et al., 2018; Seibert, Crant, & Kraimer, 1999). Proactive personality has been found to predict proactive behaviors, such as taking charge, individual innovation, problem prevention, voice behavior, and issue selling credibility (Parker & Collins, 2010), job performance and career success (Bajaba, Fuller, Marler, & Bajaba, 2021), and many other relevant individual outcomes (see Fuller & Marler, 2009 for a quantitative review). Those who are antifragile tend to be proactive in the way they tackle disorder and challenges. For instance, antifragile individuals are more likely to actively look for challenges and/or create disparities when there is none to grow from (Taleb, 2012). Namely, they actively expose themselves to learning opportunities and stress instead of passively waiting for them to be imposed by the environment. Thus, I hypothesize the following:

Hypothesis 6. *Antifragility will be significantly and positively related to proactive personality.*

Employees differ in how they react to challenges or difficult tasks at work, whether they are a result of adverse or positive events. Research on achievement motivation has emphasized the role of goal orientation in predicting such reactions over the years (Delahaij, & van Dam, 2016; Huang & Luthans, 2015; Leung, Chen, & Chen, 2014; Matsuo, 2019; Middleton, Walker, & Reichard, 2018). Goal orientation has been defined as "one's dispositional or situational goal preferences in achievement situation" (Payne, Youngcourt, & Beaubien, 2007: 128). Goal orientation has been categorized into three types: learning goal orientation, prove (performance) goal orientation, and avoid (performance) goal orientation (VandeWalle, 1997). Whereas the two types of performance goal orientation indicate a desire to get approval and positive judgments about one's competence (prove dimension) or avoid negative evaluations about one's competence (avoid dimension), learning goal orientation indicates a desire to develop one's competencies or skills through mastery (VandeWalle, 1997). Those who have a learning goal orientation tend to view challenging situations as opportunities to learn and grow from and are instrumental in achieving their goal of self-development (VandeWalle, 1997).

Learning goal orientation has been linked to many positive individual outcomes such as intrinsic motivation and skill improvement (Hirst, Van Knippenberg, & Zhou, 2009), self-regulation (Bouffard, Boisvert, Vezeau, & Larouche, 1995), seeking out self-improvement information (Janssen & Prins, 2007), and innovative performance (Lu, Lin, & Leung, 2012). In order to be antifragile, the employee has to approach challenges and

view them as growth opportunities, in other words, have a learning goal orientation; only then can an employee develop optionality to gain and be antifragile through exposure and experience (Taleb, 2012). Furthermore, someone who is antifragile almost always views disorder and stressful challenges as necessary steps towards self-development due to his/her ability to find meaning in them and recognize the most optimal means to tackle them and maximize the gains and minimize the losses. Thus, I hypothesize the following:

Hypothesis 7. *Antifragility will be significantly and positively related to learning goal orientation.*

Another important dispositional variable that has been prominent in the literature and been linked to many relevant constructs (e.g., satisfaction, engagement, and popularity; Judge, Locke, Durham, & Kluger, 1998; Rich, LePine, & Crawford, 2010; Scott & Judge, 2009) is core self-evaluation (CSE). Judge, Erez, & Bono (1998) define CSE as the "fundamental premises that individuals hold about themselves and their functioning in the world" (16). Accordingly, self-esteem, generalized self-efficacy, emotional stability, and locus of control were identified as CSE traits (Chang, Ferris, Johnson, Rosen, & Tan, 2012). Self-esteem refers to the overall evaluation of one's self-worth (Rosenberg, 1965). Generalized self-efficacy refers to one's evaluation of his/her ability to cope with an extensive range of situations (Chen, Gully, & Eden, 2001). Emotional stability refers to one's tendency to feel calm and secure under stress (Eysenck, 1990). Lastly, locus of control refers to one's belief that desired outcomes can be achieved as a result of his/her own will and behavior rather than fate (Chang et al., 2012; Rotter, 1966).

Judge, Locke, and Durham (1997) suggested that all these four traits underlie the construct of CSE, which has been associated with many desired outcomes (e.g., positive affectivity, organizational citizenship behavior, and decreased strain; Chang et al., 2012). Someone who is antifragile needs to have high CSE to tackle stressors and grow from them. For instance, s/he has to have high self-efficacy about themselves, such that they believe in their capability to overcome stressful situations. Antifragile individuals also tend to have a high internal locus of control, which can be described through their proactive nature to initiate challenges to learn from rather than relying on the external environment to provide them. Furthermore, in order to tackle stressors successfully, antifragile individuals need to be calm, collected, and secure when tackling stressors to ensure the most optimal means to tackle them is chosen. Lastly, and most importantly, antifragile individuals tend to have high self-appraisal and self-esteem such that they value themselves and believe that they deserve growth because they are people of worth. Thus, I hypothesize the following:

Hypothesis 8. *Antifragility will be significantly and positively related to core self-evaluation.*

One of the expected outcomes associated with antifragility involves the willingness to face challenges and uncertainty in the achievement of personal growth; more specifically, willingness to take risks (WTR). Dewett (2006) defines WTR as "a willingness to engage potential risks at work in an effort to produce positive organizationally relevant outcomes such that one is open to the possibility of negative personal outcomes as a result" (28 & 29). Someone who is willing to take risks tends to believe in his/her capability, idea, or efforts in achieving his/her goal. Dewett (2006)

further adds that WTR does not necessarily indicate blind willingness to take risks; instead, it involves the calculated risks of potential benefits and potential risks. Similarly, someone who is antifragile is more likely to be willing to take risks due to his/her capability in recognizing opportunities for growth in challenges and uncertainty. Furthermore, they believe that even the negative outcomes associated with risks serve as sources of information for how to behave in the future, and as a result, they are more motivated to engage in risk-taking (Taleb, 2012). For instance, antifragile individuals are more willing to take the risk and go on expatriate assignments for the learning opportunity it offers (e.g., exploring new cultural traditions, languages, patterns of communication) regardless of the uncertainty and stress they can bring. Therefore, I hypothesize the following:

Hypothesis 9. *Antifragility will be significantly and positively related to willingness to take risks.*

An outcome that is more specific than WTR involves venture creation within organizations and strategic renewal, or intrapreneurship (Gawke, Gorgievski, & Bakker, 2019). Apart from entrepreneurship, starting new ventures without using already existing organizational resources, intrapreneurship has become crucial for organizations to survive once they have been established (Ireland, Hitt, & Sirmon, 2003; Morris, Webb, & Franklin, 2011). This is due to the importance of innovation and taking risks to provide a competitive advantage in the market through providing valuable, rare, inimitable, and nonsubstitutable resources (Barney, 1991). Therefore, employees at all levels within organizations need to embrace intrapreneurship through encouraging innovative behavior

(e.g., initiating new projects, experimenting with new products) and providing the necessary resources (Belousova & Gailly, 2013; Globocnik & Salomo, 2015).

Forms of intrapreneurship involve both strategic renewal behavior (e.g., changing the existing structure, products, or work practices of the organization) and venture behavior (e.g., exploring new products or setting up new business units within the organization to reach new market segments; Gawke et al., 2019). In order for an employee to engage in intrapreneurship, s/he has to not only be willing to take risks but also have the capacity to recognize such opportunities and embrace the disorder it brings. Accordingly, antifragile individuals are more likely to engage in intrapreneurial behavior due to their constant need for growth and achievement; they are more likely to explore potential avenues through which they can benefit themselves and the organization such as initiating new projects, expanding the collaborative network, or setting up a new business unit. Thus, I hypothesize the following:

Hypothesis 10. *Antifragility will be significantly and positively related to intrapreneurship.*

Research on stress and well-being in the workplace has never reached such a peak due to increased globalization and complexity of today's business world (Bliese, Edwards, & Sonnentag, 2017; Grant & Langan-Fox, 2007; LePine et al., 2005). Experiencing constant stress or stressful events at work can affect an employee's well-being due to the depletion of job and personal resources (Hobfoll, 1988, 2001). One outcome of such chronic resource depletion is burnout, which is defined as a state of emotional exhaustion, physical fatigue, and cognitive weariness caused by one's professional work (Melamed et al., 2006; Shirom, Melamed, Toker, Berliner, & Shapira,

2005). Emotional exhaustion refers to the lack of energy needed to invest in relationships with other people at work (Melamed et al., 2006: 330). Physical fatigue refers to the feeling of tiredness and low energy levels in carrying out daily tasks at work (Melamed et al., 2006: 330). Lastly, cognitive weariness refers to "slower thinking and impaired mental agility" (Melamed et al., 2006: 330).

An employee who does not manage his/her resources efficiently at work or is unable to utilize the job demands at work to generate more personal and social resources is more likely to experience burnout (Bakker & Demerouti, 2017; Hobfoll, 1988, 2001). On the other hand, antifragile employees are more likely to better utilize their current resources to gain more personal and social resources (e.g., growth and network expansion) and to minimize resource depletion (e.g., efficiently restructure job demands and find meaning in them). The capacity of antifragile employees to embrace disorder imposes less mental fatigue on them; furthermore, their capacity to recognize resource generation or resource conservation opportunities within stressful events or challenges further negates the negative effects associated with job demands. Thus, I hypothesize the following:

Hypothesis 11. *Antifragility will be significantly and negatively related to burnout.*

Methods

Data were collected through Qualtrics from 179 full-time U.S. workers (Sample (4). Demographic responses indicate that sample was 52% female, with an average age of 48, had an average of 24 years of work experience, primarily had at least a bachelor's degree (67%), and mostly (72%) worked in the private sector. Measures were presented

on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). The final measures of antifragility, resilience, and fragility from the previous study were used. Proactive personality was measured using Bateman and Crant's (1993) 10-item scale. Learning goal orientation was measured using VandeWalle's 1997) 6-item scale. CSE was assessed using Judge, Erez, Bono, and Thoresen's (2003) 12-item scale. WTR was measured using Dewett's (2006) 8-item scale. Intrapreneurial behavior was assessed using Gawke et al.'s (2019) short 8-item scale. Burnout was measured using a 14-item adapted version of the Shirom-Melamed Burnout Measure (SMBM) by Toker, Melamed, Berliner, Zeltser, and Shapira (2012; Shirom & Melamed, 2006). As in previous studies, attention checks were used to establish data quality. Lastly, the final versions of the resilience and fragility scales developed in this dissertation were also measured to further confirm the structure of the continuum.

Results

Table 10 shows the CFA results for antifragility, resilience, and fragility for Sample 4. As in Sample 3, the best fit model was also the three-factor model where antifragility, resilience, and fragility were all separate with the largest difference in χ^2 of 630.40 ($p < .01$) from the two-factor model. For antifragility, resilience, and fragility, respectively, the composite reliabilities were .73, .92, and .88; the AVEs were .58, .56, and .79; the average factor loadings were .80, .74, and .73 (see Table 3). Table 11 shows the means, standard deviations, reliabilities, and zero-order correlations between the constructs, factors, and demographic variables for Sample 4. As expected, antifragility was found to be significantly and positively correlated with proactive personality, learning goal orientation, CSE, WTR, and intrapreneurship (r = 0.64, .46, .65, .43, and

.59, respectively); antifragility was significantly and negatively correlated with burnout (r = -.40). This provides initial support for Hypotheses 6-11.

Table 10

Summary of The Hypothesized Nomological Network

	Proactive Personality	**Learning Goal Orientation**	**Core Self-Evaluation**	**Willingness to Take Risks**	**Intrapreneurial Behavior**	**Burnout**
Antifragility	Positive	Positive	Positive	Positive	Positive	Negative

Table 12 shows the regression results for the antecedents of antifragility; proactive personality, learning goal orientation, and CSE all significantly predicted antifragility above and beyond age, gender, and education, providing full support for Hypotheses 6-8. Tables 13 and 14 show the regression results for WTR, intrapreneurship, and burnout as outcomes of antifragility. Antifragility significantly predicted each of the mentioned outcomes above and beyond age, gender, and education, providing full support for Hypotheses 9-11. Figure 4 summarizes the results of the examined nomological network of antifragility. Lastly, I calculated the aggregate Pearson correlations across Samples 1-4 and Phi correlations across Samples 3 and 4 (see Figure 5). As expected, antifragility and resilience were positively correlated with each other ($\bar{r}$ = .61, $\overline{\Phi}$ = .74), and fragility and resilience were negatively correlated with each other ($\bar{r}$ = -.55, $\overline{\Phi}$ = -.72), supporting Hypotheses 1 and 2. While antifragility was negatively correlated with fragility ($\bar{r}$ = -.42, $\overline{\Phi}$ = -.72), it was not more negatively correlated with fragility than resilience; thus, Hypothesis 3 was not supported.

Table 11

Confirmatory Factor Analysis Results (Sample 4)

Models	***df***	χ^2	χ^2/ ***df***	**CFI**	**SRMR**	**RMSEA**	**AIC**	$\Delta\chi^2$
One-Factor Model (A+R+F Merged)	432	1882.31	4.36	.62	.12	.14	2072.31	
Two-Factor Model (A+R Merged)	429	1433.15	3.341	.74	.10	.12	1629.15	449.16**
Three-Factor Model	425	802.75	1.89	.90	.07	.07	1006.75	630.40**

Note: N = 179; A = Antifragility; R = Resilience; F = Fragility; $\Delta\chi^2$ = change in χ^2 from the previous model accounting for the appropriate degrees of freedom.
**p < .01; *p < .05.

Table 12

Means, Standard Deviations, Reliabilities, and Zero-Order Correlations (Sample 4)

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Antifragility	5.26	.93	**.90**																	
2. Optionality to Gain	5.68	.93	.85**	**.91**																
3. Disorder Embracement	4.83	1.17	.91**	.55**	**.88**															
4. Resilience	5.41	.85	.59**	.51**	.53**	**.92**														
5. Fragility	3.13	1.12	-.53**	-.39**	-.53**	-.66**	**.92**													
6. Limited Optionality to Adapt	2.59	1.02	-.54**	-.48**	-.47**	-.63**	.87**	**.86**												
7. Disorder Aversion	3.67	1.45	-.44**	-.26**	-.49**	-.57**	.94**	.64**	**.91**											
8. Intrapreneurship	4.22	1.54	.59**	.43**	.59**	.46**	-.41**	-.37**	-.37**	**.94**										
9. Burnout	2.35	.84	-.40**	-.34**	-.37**	-.39**	.48**	.44**	.43**	-.21**	**.92**									
10. Willingness to Take Risks	4.66	1.19	.43**	.31**	.43**	.46**	-.29**	-.22**	-.29**	.43**	-.12	**.94**								
11. Learning Goal Orientation	5.53	1.00	.65**	.56**	.58**	.63**	-.49**	-.50**	-.41**	.63**	-.30**	.55**	**.89**							
12. Core Self-Evaluation	5.26	.84	.46**	.47**	.35**	.60**	-.61**	-.58**	-.53**	.32**	-.59**	.19*	.48**	**.86**						
13. Proactive Personality	5.43	.92	.64**	.54**	.59**	.62**	-.47**	-.44**	-.42**	.66**	-.33**	.54**	.69**	.49**	**.93**					
14. Age	47.82	14.09	-.18*	-.05	-.24**	.00	-.07	-.09	-.05	-.34**	.06	-.08	-.20**	-.01	-.27**	—				
15. Gender	.52	.50	-.19*	-.08	-.23**	-.11	.09	.04	.11	-.24**	.06	-.14	-.16*	-.09	-.17*	.18*	—			
16. Work Experience	23.69	15.61	-.12	.01	-.21**	.06	-.10	-.16*	-.05	-.32**	.12	-.04	-.15*	-.03	-.24**	.91**	.17*	—		
17. Education	3.74	1.29	.04	.00	.07	-.14	.14	.14	.12	.17*	-.11	.12	.12	.03	.02	-.29**	-.19*	-.40**	—	
18. Sector	.28	.45	.05	.07	.03	.03	.02	-.02	.04	.03	.02	.05	.03	-.01	.03	-.01	.13	.03	-.19**	—

Note: *N* = 179; M = Mean; SD = Standard Deviation; Cronbach's Alpha in Bold; Gender (0 = Male, 1 = Female); Education 1= High School Graduate, 2 = Some College Credit, 3 = Associate Degree, 4 = Bachelor's Degree, 5 = Master's Degree, 6 = Doctorate Degree); Work Experience (in years); Sector (0 = Private, 1 = Public).
***p* < .01; **p* < .05., two-tailed.

Table 13

Regression Results for the Antecedents of Antifragility (Standardized Coefficients)

	Antifragility				
Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	6.29**	1.92**	2.60**	3.61**	1.25
Age	-.15*	.02	-.05	-.16*	-.01
Gender	-.16*	-.08	-.08	-.13†	-.07
Education	-.03	.02	-.06	-.04	-.02
Proactive Personality		.63**			.32**
Learning Goal Orientation			.63**		.13*
Core Self-Evaluation				.45**	.36**
R^2	.06	.42	.43	.26	.51
ΔR^2	.06	.36	.38	.20	.45
F	3.44*	31.26**	33.03**	14.94**	29.42**
df	175	174	174	174	172

Note: *N* = 179; Gender (0 = Male, 1 = Female); Education 1= High School Graduate, 2 = Some College Credit, 3 = Associate Degree, 4 = Bachelor's Degree, 5 = Master's Degree, 6 = Doctorate Degree).
**$p < .01$; *$p < .05$; †$p < .10$., two-tailed.

Table 14

Regression Results for the Outcomes of Antifragility (Standardized Coefficients)

	Willingness to Take Risks		**Intrapreneurship**		**Burnout**	
Variables	Model 1	Model 2	Model 4	Model 5	Model 7	Model 8
Constant	4.95**	1.54*	5.45**	.84	2.17**	4.10**
Age	-.03	.03	-.29**	-.21**	.02	-.04
Gender	-.12	-.05	-.18**	.09	.04	-.03
Education	.08	.10	.05	.07	-.09	-.11
Antifragility		.42**		.53**		-.41**
R^2	.03	.20	.15	.41	.01	.17
ΔR^2	.03	.17	.15	.27	.01	.16
F	1.81	10.74**	10.18**	30.72**	.79	8.93**
df	175	174	175	174	175	174

Note: *N* = 179; Gender (0 = Male, 1 = Female); Education 1= High School Graduate, 2 = Some College Credit, 3 = Associate Degree, 4 = Bachelor's Degree, 5 = Master's Degree, 6 = Doctorate Degree).
**$p < .01$; *$p < .05$; $^{\dagger}p < .10$., two-tailed.

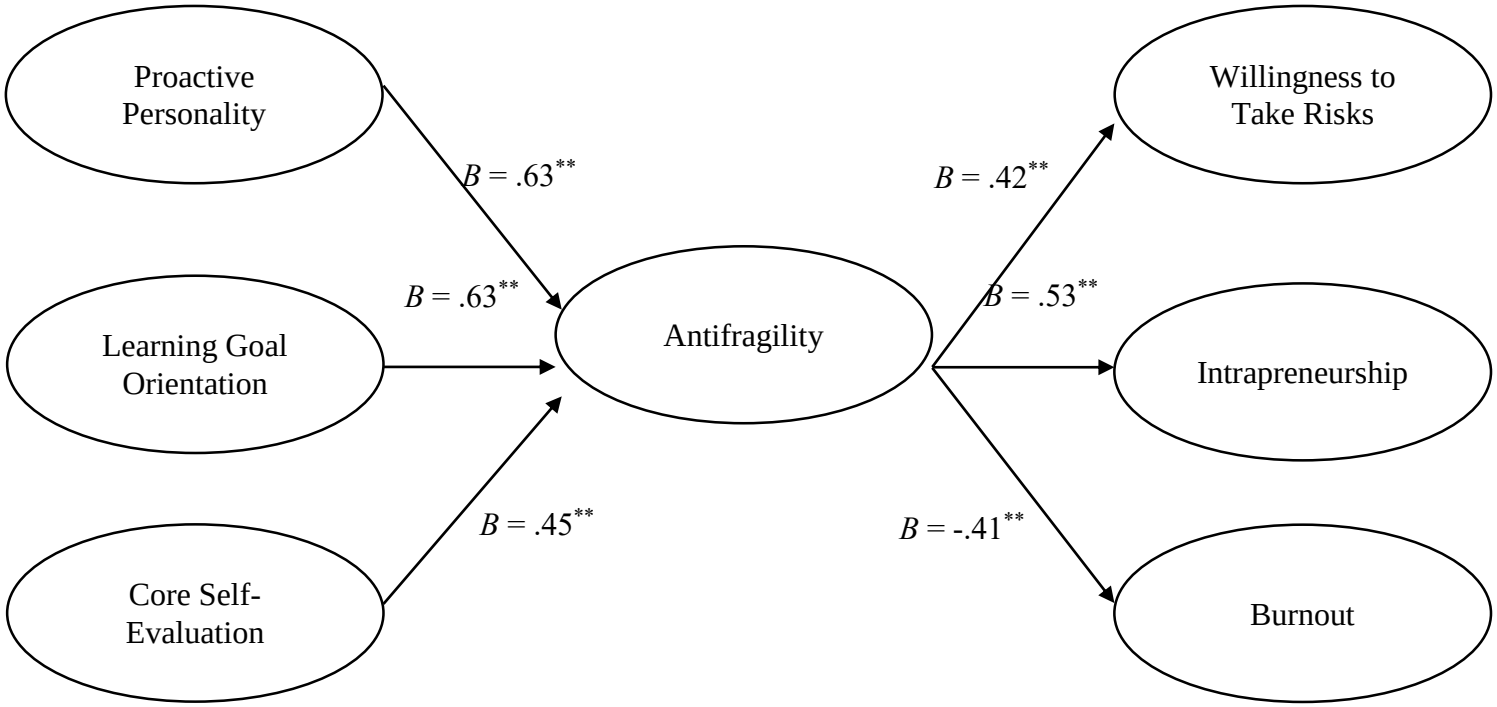
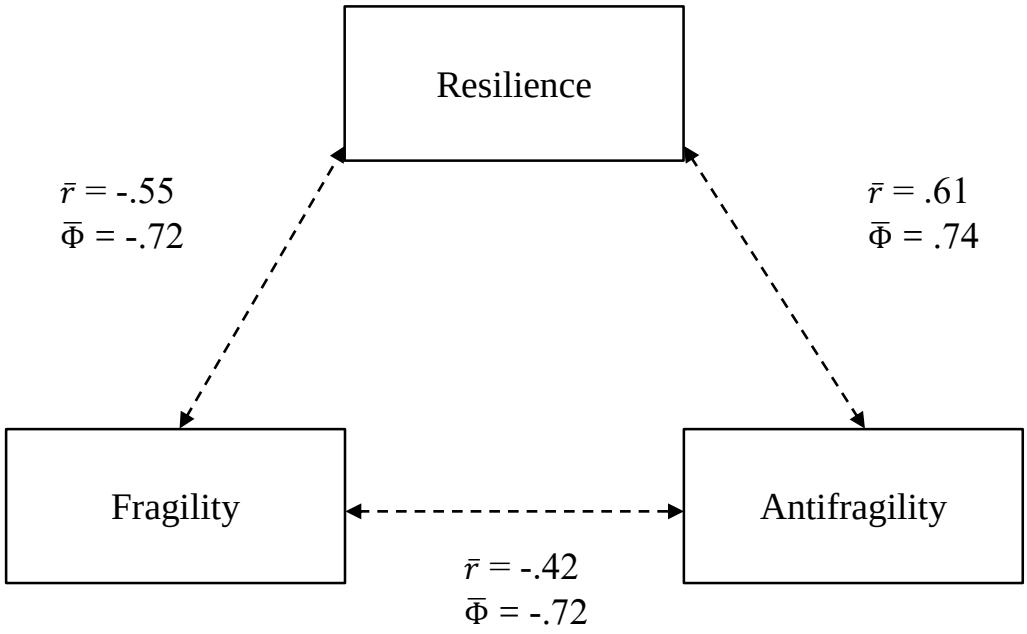


Figure 4: The Nomological Network of Antifragility (Sample 4)



Note: $\bar{r}$ = Average Pearson Correlation Coefficient; $\bar{\Phi}$ = Average Phi Correlation. $\bar{r}$ is calculated from Samples 1-4; $\bar{\Phi}$ is calculated from Samples 3 & 4.

Figure 5: The Average Correlations Across Samples 1, 2, 3, & 4

.

CHAPTER 5

STUDY 4: THE ROLE OF ANTIFRAGILITY IN THE APPRAISAL OF STRESSORS

Introduction

Numerous researchers have emphasized the role stressors or job demands (both terms will be used interchangeably throughout this chapter) play in the workplace (see Bakker & Demerouti, 2017 for a review; Crawford, LePine, & Rich, 2010); however, they differentiated between two types of stressors: challenge and hindrance (Cavanaugh et al., 2000; Crane & Searle, 2016; Lepine et al., 2005; Podsakoff, LePine, LePine, 2007). Whereas challenge stressors were perceived as positive forms of stress that stimulate learning and growth, hindrance stressors were perceived as distress that depletes employee's resources without proper compensation or gain (Cavanaugh, Boswell, Roehling, & Boudreau, 1998). Examples of challenge stressors included high workload, high levels of responsibility, and time pressure, whereas hindrance stressors were exemplified in role conflict, role ambiguity, red tape, hassles, and organizational politics (Cavanaugh et al., 2000). That being said, recent efforts found out that this categorization does not necessarily always hold as an individual's appraisal of the stressor is what constitutes the stressor as challenge or hindrance (Lazarus & Folkman, 1984; LePine, Zhang, Crawford, & Rich, 2016; Mazzola & Disselhorst, 2019; Searle & Auton, 2015).

Accordingly, scholars call for research that investigates the effect of challenge/hindrance stressors on various outcomes in the context of challenge/hindrance appraisals when other possible influential factors are present (Crane & Searle, 2016; Lepine et al., 2016; O'Brien & Beehr, 2019). Furthermore, a newly developed measure of job crafting by Bruning and Campion (2018) serves as a potential outcome of experienced role stressors demonstrating which job crafting path (i.e., coping style) the employee is more likely to gravitate towards based on his/her categorization of the stressor. Therefore, in this chapter, I test a hypothesized model of the role of antifragility as a psychological resource in the appraisal of stressors at work, and as a result, the utilized job crafting path (Figure 1). First, I argue for the direct effect of challenge/hindrance stressors in predicting the different paths of job crafting as proposed by Bruning and Campion (2018), and how such direct effect is mediated by challenge/hindrance appraisal. Second, I argue for the moderating effect of antifragility in influencing the relationship between challenge/hindrance stressors and challenge/hindrance appraisals. Third, I argue for the interaction of antifragility and challenge/hindrance stressors in predicting challenge/hindrance appraisals. Lastly, I argue for a moderated mediation model in which antifragility moderates the indirect effect of challenge/hindrance stressors on job crafting through challenge/hindrance appraisal.

Theoretical Framework and Hypothesis Development

Job Demands-Resources (JD-R) theory is one of the most prominent theories in when it comes to discussing job characteristics and how they impact relevant individual outcomes such as strain, motivation, and performance (Bakker & Demerouti, 2017; Bakker, Demerouti, & Euwema, 2005; Bakker, Demerouti, & Sanz-Vergel, 2014;

Crawford, LePine, & Rich, 2010; Halbesleben, 2010; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Nahrgang, Morgeson, & Hofmann, 2011). According to the JD-R theory, all job characteristics can be classified into one of two types: job demands or job resources (Bakker & Demerouti, 2017). Job demands are described as "those physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological effort and are therefore associated with certain physiological and/or psychological costs" (Bakker & Demerouti, 2017: 274). Examples of such job demands include emotionally demanding interactions with co-workers or customers and high workload or pressure. On the other hand, job resources were described as "physical, psychological, social, or organizational aspects of the job that are functional in achieving work goals, reduce job demands and the associated physiological and psychological costs, or stimulate personal growth, learning, and development" (Bakker & Demerouti, 2017: 274). Examples of such job resources include skill variety, performance feedback, autonomy, and opportunities for growth.

Whereas job demands were more associated with psychological strain, burnout, exhaustion, job-related anxiety, and health complaints, job resources were more associated with motivation, work engagement, organizational commitment, and flourishing (Bakker, Demerouti, De Boer, & Schaufeli, 2003; Bakker, Demerouti, & Verbeke, 2004; Demerouti et al., 2001; Hakanen, Schaufeli, & Ahola, 2008), indicating that job demands and resources follow a unique, dual pathway (Bakker & Demerouti, 2017). That being said, the theory also suggests that job resources can interact with job demands to buffer its impact on strain (Bakker et al., 2005; Bakker, van Veldhoven, & Xanthopoulou, 2010), indicating that job resources can help employees cope better with

their job demands. Similarly, job demands can interact with job resources to increase motivation when both demands and resources are high (Bakker & Demerouti, 2017); such jobs are called “active jobs” (Karasek, 1979) in that they challenge the employees to learn and grow while having the necessary resources to do so. For instance, experiencing appreciation, innovativeness, and skill variety when high job demands, such as unfavorable work environments or pupil misbehavior, were present led to work engagement (Bakker, Hakanen, Demerouti, & Xanthopoulou, 2007; Hakanen, Bakker, & Demerouti, 2005).

That being said, job resources are not the only type of resources that can interact with experienced job demands; the JD-R theory has been extended to also include the role of personal resources in complementing job resources in mitigating the hindering effects of job demands (Bakker & Demerouti, 2017). Personal resources refer to the beliefs the individual holds with regard to how much control they have over their environment (Bakker & Demerouti, 2017: 275). Having such beliefs is mostly influenced by the individual’s past experience and/or ability in dealing with similar environments or situations. For instance, someone who is optimistic or has high self-efficacy is more likely to buffer the hindering effects of job demands while enhancing the motivating effects of job resources (Bakker & Demerouti, 2017). A study by Bakker and Sanz-Vergel (2013) found that self-efficacy and optimism were positively associated with flourishing when job demands were low rather than high; moreover, self-efficacy and optimism were positively associated with work engagement when job demands were high rather than low.

In JD-R theory, job demands are mostly described as hindering stressors that are mostly associated with physical and psychological costs (Bakker & Demerouti, 2017). However, other scholars have argued that job demands, or stressors in general, can be categorized into two types: challenge and hindrance job demands (Cavanaugh et al., 2000; Crane & Searle, 2016; Lepine et al., 2005; Podsakoff et al., 2007). Whereas challenge job demands or stressors refer to challenges that promote growth and development, hindrance job demands refer to excessive or undesirable constraints that hinder the employee from achieving a valued goal (Cavanaugh et al., 2000). Role conflict, role ambiguity, and job security have been mostly categorized as hindrance job demands; on the other hand, role overload, time pressure, and responsibility have been mostly categorized as challenging job demands (Cavanaugh et al., 2000); this categorization is known as the challenge-hindrance framework. Although the challenge-hindrance framework has found empirical support for its categorization of stressors or job demands (Crane & Searle, 2016; Lepine et al., 2005; O'Brien & Beehr, 2019; Podsakoff et al., 2007), it also had some inconsistencies in terms of its prediction of relevant individual outcomes due to its complexity (LePine et al., 2016; Mazzola & Disselhorst, 2019; Searle & Auton, 2015; Stiglbauer & Zuber, 2018). Therefore, scholars agree on the necessity of accounting for the appraisals of the job demands instead of solely relying on the categorization of the challenge-hindrance framework (Mazzola & Disselhorst, 2019; O'Brien & Beehr, 2019; Spector 2019; Stiglbauer & Zuber, 2018).

The transactional theory of stress by Lazarus and Folkman (1984) emphasizes the importance of appraisal in the stress process, and accordingly, the resulting coping strategy. The authors describe two types of appraisals when it comes to stressors: primary

and secondary (Lazarus & Folkman, 1984). Primary appraisals refer to one's evaluation of the gains and/or losses associated with the stressor; on the other hand, secondary appraisals refer to one's evaluation of his/her capability in coping with the stressor (Lazarus & Folkman, 1984). Consequently, stressors can be perceived to have positive or negative implications based on how they affect someone's personal growth and development. In other words, stressors can be appraised as a challenge or opportunity (challenge appraisal) or harmful and threatening (hindrance appraisal; Lazarus & Folkman, 1984). It is important to note the value of appraisals as the experienced stressors and events should be evaluated based on their significance to individuals experiencing it because "how a person construes an event shapes the emotional and behavioral response" (Lazarus & Folkman, 1984: 24). For instance, while challenge appraisals refer to the subjective interpretation that certain stressors are more likely to result in personal growth, gain, development, and/or well-being, hindrance stressors refer to the subjective interpretation that certain stressors are more likely to result in personal loss or harm (Lazarus & Folkman, 1984; LePine et al., 2016). According to whether the individual appraises a stressor as a challenge or hindrance, s/he is will choose an appropriate coping strategy to deal with the experienced stressor (Lazarus & Folkman, 1984).

One form of coping with stressors at work could be demonstrated in the behavior of job crafting. According to Bruning & Campion (2018), job crafting refers to "changes to a job that workers make with the intention of improving the job for themselves" (499). The authors state that job crafting activities can be identified by six defining characteristics: self-targeted, volitional, significant in change, semi-permanent, work

role-related, and within identifiable job tasks. Zhang and Parker (2019) further add two more characteristics stating that job crafting (1) is independent of manager approval and (2) involves changing the intrinsic job characteristics experienced by the worker (Bruning & Campion, 2019). Two dominant perspectives of job crafting have been discussed in the literature: role-based and resource-based perspectives (Tims et al., 2012; Wrzesniewski & Dutton, 2001). The role-based view of job crafting describes it as any continuing modification to one's job in terms of expansion or reduction of the boundaries of the task, including the relational and cognitive domains associated with it (Wrzesniewski & Dutton, 2001). On the other hand, the resource-based view of job crafting draws insight from JD-R theory and describes it as a proactive strategy to seek resources and avoid demands associated with one's job (Tims et al., 2012; Tims, Bakker, & Derks, 2013).

Furthermore, scholars have also distinguished between approach as well as avoidance activities associated with job crafting (Bipp & Demerouti, 2015; Elliot, 1999; Lazarus & Folkman, 1984). For instance, approach crafting can be described as the acceptance of challenges stressors through active, motivated, and effortful activities directed towards problem-focused and improvement-focused goals (Bruning & Campion, 2018: 501). Avoidance crafting, on the other hand, can be described as activities associated with avoiding, preventing, eliminating parts of one's job (Bruning & Campion, 2018: 502). In order to synthesize these perspectives of job crafting into a thorough and comprehensive framework for more integrated future research on job crafting, Bruning & Campion (2018) proposed and tested a taxonomy of job crafting activities in which role-based, resource-based, approach, and avoidance crafting are included and called it the role-resource approach-avoidance model of job crafting. Based on this taxonomy, four

types of job crafting were proposed – approach role crafting, approach resource crafting, avoidance role crafting, and avoidance resource crafting – under which seven job crafting activities are listed: work role expansion, social expansion, work role reduction, work organization, adoption, metacognition, withdrawal.

Challenge/Hindrance Stressors and Appraisals on Job Crafting

Integrating JD-R theory and challenge-hindrance framework, job demands can be divided into challenge job demands and hindrance job demands (Bakker et al., 2017; Cavanaugh et al., 2000; Tadić, Bakker, & Oerlemans, 2015). Based on theories of stress in general, job demands or stressors tend to be related to strain outcomes such as burnout, anxiety, and depression (Bakker & Demerouti, 2017; Jex, 1998; Lazarus & Folkman, 1984). That being said, challenge and hindrance job demands tend to vary in the magnitude of association with strain outcomes; for instance, whereas hindrance job demands tend to be strong positive predictors of strain outcomes, challenge job demands tend to be weaker predictors if not negators of strain outcomes (LePine et al., 2005; Podsakoff et al., 2007; Zhang, LePine, Buckman, & Wei, 2014). Furthermore, challenge job demands were found to be positively associated with positive individual outcomes — organizational commitment, job satisfaction, motivation, and job performance — and negatively associated with turnover intentions, turnover, and withdrawal behavior; on the other hand, hindrance job demands had the opposite effect on the same outcomes except for withdrawal behaviors where it was insignificant (LePine et al., 2005; Podsakoff et al., 2007). This trend can be explained by the overcompensation that challenge job demands provide to employees who accept it; such overcompensation can be in the form of mastery, personal growth, future gains, need satisfaction, or enhanced self-image

(Grebner, Elfering, & Semmer, 2010). Although challenge job demands can consume someone's job and/or personal resources due to the time and effort needed to overcome them, the benefits associated with them overweight the costs. On the other hand, hindrance job demands are more associated with depletion of resources (Grebner et al., 2010) without proper compensation, which is more likely to cause employees to experience strain, negative job attitudes, and decreased performance (LePine et al., 2005; Wallace, Edwards, Arnold, Frazier, & Finch, 2009).

That being said, not everyone perceives the experienced job demands through the same lens. In other words, while some employees might perceive one job demand as a challenge, other employees might view it as a hindrance (Lazarus & Folkman, 1984); this emphasizes the importance of appraisal when explaining the inconsistent or differential results associated with classified job demands or stressors a priori job (LePine et al., 2005). Bakker and Sanz-Vergel (2013) argue that whether a job demand is perceived as a challenge or hindrance depends on the occupational sector. For instance, they found that employees in the nursing profession tend to perceive work pressure (usually classified as a challenge job demand) as a hindrance; moreover, they tend to perceive emotional demands (usually classified as a hindrance job demand) as a challenge (Bakker & Sanz-Vergel, 2013). Another study by Webster et al. (2011) asked participants to report the levels of experienced challenge job demands (responsibility and workload) and hindrance job demands (role ambiguity and role conflict) and their subjective appraisals of them. The authors found that job demand appraisal differed among participants in terms which job demand is perceived as a challenge or hindrance such that some job demands had elements of both challenge and hindrance (Webster et al., 2011). In other words, the way

an employee evaluates the benefits and costs associated with a job demand is what most likely dictates his/her reaction to it instead of an a priori classification (Searle & Auton, 2015).

According to Vroom's (1964) expectancy theory, motivation plays a big role in whether individuals pursue a goal or not. Similarly, employees tend to vary in their motivation to pursue a job demand as a challenge, or instead, avoid/eliminate it as a hindrance. Expectancy theory involves three aspects when it comes to predicting motivation to pursue something: expectancy, instrumentality, and valence (Vroom, 1964). In the context of JD-R theory, expectancy refers to whether efforts expended by the employee in coping with a job demand will actually lead to overcoming it. Instrumentality refers to whether overcoming the demand will lead to obtaining an outcome. Lastly, valence refers to the value of obtained outcomes and whether it was worth the consumed resources (Vroom, 1964). Challenge job demands are more likely perceived as such due to the available job and personal resources and possibility of employees to successful cope with it, and thus, obtaining a desired outcome of high value. Accordingly, challenge job demands tend to be highly associated with increased motivation to overcome it and achieve the outcome associated with it (LePine et al., 2007). On the other hand, hindrance job demands are more likely perceived as such due to the limited job and personal resources or limited possibility to overcome it or due to the low value of the outcome to be obtained. As a result, pursuing or coping with hindrance job demands is usually viewed as sapping resources without proper compensation, and thus, they are more likely to be associated with decreased motivation tackle them (LePine et al., 2007; Vroom, 1964). Consequently, I argue that the

motivation levels associated with appraising a job demand as a challenge or hindrance is more likely dictate how employees would react, whether they would approach the job demand or avoid it.

Once the employee appraises their job demand as a challenge or hindrance, they are more likely to change aspects of their job to approach or avoid the job demand, in other words, engage in activities of job crafting. According to Bruning & Campion (2018), employees can engage in four general types of job crafting: approach role crafting, approach resource crafting, avoidance role crafting, and avoidance resource crafting. Approach role crafting involves activities that are associated with work role expansion (i.e., enlargement of one's work role to include tasks not originally assigned) and social expansion (i.e., utilizing and seeking social resources outside one's work role; Bruning & Campion, 2018, 2019). Employees engaging in such activities tend to engage in extra activities not officially assigned as part of their job description and interact with peers, supervisors, and non-specified coworkers in the organization although it is not part of their role. Approach resource crafting involves activities that are associated with work organization (i.e., re-designing the tangible structure of one's role), adoption (i.e., utilizing and using technology to enhance one's work process), and metacognition (i.e., manipulating one's psychological state towards their role; Bruning & Campion, 2018, 2019). Employees engaging in such activities tend to organize their workspace to make the work process more efficient, use new technology to optimize their efforts, and maintain positive attitudes and avoid negative ones about their role.

An employee who is experiencing challenge job demands is more likely to engage in approach role and resource crafting behaviors due to the motivation the challenge job

demands bring. Challenge job demands tend to offer outcomes of high value to the employee, and as a result, motivates the employee to approach the job demand expanding his work role and social network as well as increase their efficiency to minimize resource loss and maximize the gain. That being said, such positive relationship is more likely to be explained by the employee's appraisal of the job demand being a challenge rather than just being exposed to it; because how the employee perceives the job demand to be shapes their emotional and behavioral response according to Lazarus & Folkman (1984). Thus, I hypothesize the following:

Hypothesis 12. Challenge appraisal will mediate the relationship between challenge stressors and (a) approach role crafting and (b) approach resource crafting.

Avoidance role crafting refer to engaging in activities of work role reduction, in other words, proactively reducing work requirements, effort expenditure, or task accountability (Bruning & Campion, 2018, 2019: 628). Employees engaging in avoidance role crafting tend to delegate tasks within the organization, outsource tasks to employees outside their organization or department, and/or reduce frequency of meetings. Avoidance resource crafting refer to engaging in activities of withdrawal, in other words, removing one's self either mentally or physically from one's tasks or associated situations (Bruning & Campion, 2018, 2019: 629). Employees engaging in avoidance resource crafting tend to actively avoid coworkers, supervisors, customers, or situations associated with one's role to avoid extra job demands. An employee who is experiencing hindrance job demands is more likely to engage in avoidance role and resource crafting due to the limited benefit they bring in compensation for the lost resources, making a

hindrance job demand more of a demotivator in terms of investing resources to overcome them. Similar to challenge job demands and their appraisal, hindrance job demands appraisal is more likely to be the mechanism through which the reaction of avoidance job crafting is based upon due to the negative feelings and low valence of the outcomes associated with hindrance job demands. To illustrate, employees experiencing hindrance job demands and appraising it as such are more likely to reduce their work role and withdraw from their assigned tasks to conserve their resources and avoid unnecessary, unfulfilling losses Thus, I hypothesize the following:

> ***Hypothesis 13.*** *Hindrance appraisal will mediate the relationship between hindrance stressors and (a) avoidance role crafting and (b) avoidance resource crafting.*

Antifragility as a Personal Resource

According to transactional theory of stress, whether an individual appraises a stressor as a challenge or hindrance depends on the ratio of the environmental demand and their personal resources (Lazarus & Folkman, 1984). For instance, if the individual perceives the imposed demand as exceeding his/her ability to cope with it, then s/he is more likely to see it as hindrance and avoid/prevent it; on other hand, if the individual perceives his/her ability to successfully cope with imposed environmental demand, then s/he is more likely to see it as a challenge and pursue it. Consequently, such ratios can change over time due to developed coping effectiveness or improvements in personal abilities (Schwarzer, 1998). Furthermore, although an individual can have the personal resources to overcome a stressor, they are more likely to pursue a job demand if the outcome of overcoming it is worthwhile (Vroom, 1964); this is what Lazarus & Folkman

(1984) referred to as primary appraisal as to whether the individual see an opportunity to gain (e.g., proving her/himself, mastery, financial gain).

Being antifragile allows an individual to embrace and pursue disorder and stressors due to several reasons. First, someone who is antifragile tend to recognize opportunities to minimize the loss or resource depletion associated with undertaking a job demand, as someone who is antifragile is resilient by default (i.e., optionality to adapt; Taleb, 2012). Second, antifragile individuals tend to recognize opportunities to maximize gains and potential hidden meaning behind the job demands through which they can grow (i.e., optionality to gain; Taleb, 2012). Third, antifragile individuals have most likely been exposed to stressors often to the point that they are accustomed to them being the standard, unlike someone who is rarely exposed to stressors, resulting in a much more numb negative effect of stressors on those who are antifragile than those who are not (see Seery, Holman, & Silver, 2010 for an example). Accordingly, antifragile employees are more likely to appraise challenge job demands as even more challenging and hindrance job demands as less hindering due to the recognized opportunities to maximize the gain and minimize the losses, their practical past experience in dealing with stressors, and their embracement of disorder. In other words, antifragility acts as a personal, psychological resource in buffering the negative effects of job demands on strain and boosting the motivational effect of job resources (Bakker & Demerouti, 2017). Thus, I hypothesize the following:

> ***Hypothesis 14.*** *Antifragility moderates the relationship between challenge stressors and challenge appraisal such that the relationship is stronger when antifragility is high as opposed to low.*

Hypothesis 15. *Antifragility moderates the relationship between hindrance stressors and hindrance appraisal such that the relationship is weaker when antifragility is high as opposed to low.*

Consequently, since an employee who is antifragile is more likely to appraise challenge job demands as even more challenging and hindrance job demands as less hindrance, then they are more likely to be motivated to engage in approach role and resource crafting to pursue such rewarding job demands and are less likely to engage in avoidance role and resource crafting. Antifragile employees tend to recognize opportunities in job demands to maximize their gains and minimize their losses, and as a result, they are more likely to translate such opportunities into reality through expanding their work activities to acquire useful resources and expanding their social network to receive feedback and enhance their knowledge (approach role crafting). Furthermore, antifragile employees are more likely to create plans and structure their work schedule, seek training on new technology related to the job demands, use their thoughts to put themselves in a good mood at work (approach resource crafting). On the other hand, employees who are antifragile are less likely to find others to take their place in meetings associated with the job demands (avoidance role crafting) or work in ways that allow them to avoid others at work (avoidance resource crafting). In sum, antifragile employees tend to craft and design their jobs to realize the recognized, hidden value behind the experienced job demands and create their own spiral of gain, whether the job demands are generally classified as challenging or hindering. Thus, I hypothesize the following:

Hypothesis 16. *The indirect effect of challenge stressors on (a) approach role crafting and (b) approach resource crafting through challenge appraisal is*

moderated by antifragility such that the effect is stronger when antifragility is high as opposed to low.

Hypothesis 17. *The indirect effect of hindrance stressors on (a) avoidance role crafting and (b) avoidance resource crafting through hindrance appraisal is moderated by antifragility such that the effect is weaker when antifragility is high as opposed to low.*

Methods

Participants and Procedures

According to Hair et al. (2018), the recommended minimum sample size for conducting multiple regression is 50 and preferably 100, with the preferred ratio of 15 observations for each variable. Moreover, to have a power of .80 (i.e., 1- β), resulting in limited a possibility of a type 2 error of .20 (i.e., β), with a medium to a large expected effect size at an α equal to 0.05, I collected 215 sample points adhering to the recommendation of Cohen (1992) and Hair et al. (2018). Furthermore, Podsakoff, Mackenzie, and Podsakoff (2012) recommends that researchers conduct a time-wave design in their study to minimize the bias associated with CMV. Accordingly, I utilized Qualtrics panels to collect data on the hypothesized model by temporarily separating the constructs of the model to reflect the changes occurring during the timeframe. Specifically, I collected data on challenge/hindrance stressors and antifragility at time 1, and after two weeks, I collected data on challenge/hindrance appraisals, approach role crafting, approach resource crafting, avoidance role crafting, and avoidance resource crafting at Time 2. Given that the attrition rate of Qualtrics is around 50%, 444 observations were collected at Time 1 to achieve the desired final sample size of 215.

Demographic responses indicate that sample was 54% female, with an average age of 42, had an average of 21 years of work experience, primarily had at least a bachelor's degree (67%), and mostly (72%) worked in the private sector.

Measures

Unless mentioned otherwise, as in the previous studies, the participants were instructed to assess on a Likert-type scale to which they agreed with each statement about themselves at work from 1 (strongly disagree) to 7 (strongly agree). Challenge and hindrance stressors were measured using the 20-item scale adapted by LePine et al. (2016) from previous validated measures (Cavanaugh et al., 2000; LePine, LePine, & Jackson, 2004). Example items of challenge and hindrance stressors include "having to complete a lot of work" and "conflicting instructions and expectations from your boss or bosses," respectively. Challenge and hindrance appraisals were measured using the 6-item measure adapted by LePine et al. (2016) from prior theory and research (Lazarus & Folkman, 1984; LePine et al., 2005). Example items of challenge and hindrance appraisals include "I feel the demands of my job challenge me to achieve personal goals and accomplishment" and "in general, I feel that my job hinders my personal accomplishment," respectively. Antifragility was measured using the final validated scale used in Study 3. Approach role crafting, approach resource crafting, avoidance role crafting, and avoidance resource crafting were measured using Bruning & Campion's (2018) 30-item job crafting scale; example items include "I expand my work activities to acquire resources that will help me do my job," "on my own, I seek training to improve my work," "I find ways to outsource my work to others outside my group, and "I work in ways that allows me to avoid interacting with people when working," respectively.

In order to test for the incremental validity (i.e., unique contribution) of the study variables in predicting job crafting, justified and relevant control variables were included in the prediction models as recommended by Atinc, Simmering, & Kroll (2012). Accordingly**,** proactive personality (e.g., "I am constantly on the lookout for new ways to improve my life;" Bateman & Crant, 1993), work experience (in years), age (in years), and gender (0 = male, 1 = female) were used as control variables based on the meta-analytic findings of Rudolph et al. (2017). Proactive personality is expected to positively predict approach job crafting forms and negatively predict avoidance job crafting forms due to the nature of proactive individuals to show high levels of initiative, perseverance, and willingness to implement change (Bakker, Tims, & Derks, 2012; Fuller et al., 2018). Age and work experience are expected to negatively predict all forms of job crafting as older or more experienced employees have most likely developed cognitive routines and social networks that might be minimize the need for any form of behavioral change like job crafting (Zacher, Hacker, & Frese, 2016). In terms of gender, although research has been somewhat equivocal, Rudolph et al. (2017) found a small, yet significant, positive population correlation between gender and structural and social job crafting such that women were found to engage in these forms of job crafting to a greater extent than men; therefore, gender is expected to have a similar pattern in terms of approach job crafting, but not necessarily avoidance job crafting. Attention checks were also collected as in the previous studies to eliminate careless responses (Meade & Craig, 2012).

Analysis

First, CFA was conducted to validate the measurement model of the constructs of interest using AMOS 26. Although I conducted a time-wave design to test the

hypothesized model, all the constructs were measured using self-report, which can increase susceptibility to common method variance (CMV; Donaldson & Grant-Vallone, 2002). Therefore, in order to check for such susceptibility, I conducted the CFA Marker Technique suggested by Williams, Hartman, & Cavazotte (2010) utilizing a variable that is theoretically unrelated to the constructs in the study (i.e., marker variable; Fuller, Simmering, Atinc, Atinc, & Babin, 2016; Podsakoff et al., 2012; Richardson, Simmering, & Sturman, 2009). The marker variable utilized was the 7-item scale developed by Miller and Simmering (2022) that measures the participant's attitudes towards the color blue (e.g., "I think blue is a pretty color"); it was measured by the same method as the variables of interest. The presence and influence of CMV was then assessed based on a series of nested CFA models. More specifically, five models were evaluated for every outcome: Initial Model, Baseline Model, Model C (Constrained), Model U (Unconstrained), and Model R (Restricted). The Initial Model includes the substantive variables of interest in a single model with the marker variable without any restrictions; the Baseline Model is the same as the Initial Model but with the marker variable's factor loadings restricted to those estimated in the Initial Model and its correlations with the substantive variables restricted to zero. In Models C and U, the substantive variables' items are linked to the marker latent variable with Model C fixing their loadings to be equal, and Model U allowing them to be freely estimated. Lastly, Model R is the same as Model U but with restricting the substantive variables' correlations to those estimated in the Baseline Model (see Williams et al., 2010 for a detailed explanation of the method).

Second, I ran correlation analysis to get an estimate of the relationships between the constructs of interest in which their means, standard deviations, and reliabilities were

calculated using SPSS 26. Third, I tested the mediation hypotheses by running a series of linear multiple hierarchical regressions by entering the variables of interest in steps of incremental validity. In the first step, I entered the respective control variables for the outcomes; in the second step, I entered the independent variables predicting the outcomes; and in the third step, I entered the mediator explaining the relationships of interest. Regarding the moderation and moderated mediation hypotheses, I utilized Model 1 and 7, respectively, in the PROCESS macro by Hayes (2013, 2017) to test for their significant effects while following the recommendations of Edwards & Lambert (2007) and Muller, Judd, and Yzerbyt (2005).

Results

Table 15 shows the means, standard deviations, reliabilities, and zero-order correlations between the constructs, factors, and demographic variables for Sample 5. The Cronbach's Alpha of all the scales were above .82 indicating their reliabilities as construct. Table 16 shows the comparisons among the CFA marker technique models for each hypothesized outcome in this study, thereby, evaluating whether (1) CMV exists in the hypothesized model (Baseline Model vs. Model C comparisons), (2) CMV exists equally across all substantive items (Model C vs. Model U comparisons), and (3) whether the study estimates were influenced to a meaningful degree by the existing CMV (Model U vs. Model R comparisons). In summary, according to the insignificant changes in chi-square values when comparing Models U and R for all outcomes, the study estimates were not influenced by CMV (see Table 16). In terms of correlations, as expected, challenge stressors were significantly and positively correlated with challenge appraisal, antifragility, approach role crafting, and approach resource crafting (r = 0.15, .35, .41,

.and .41, respectively). On the other hand, whereas hindrance stressors were positively and significantly and positively correlated with hindrance appraisal, avoidance role crafting, and avoidance resource crafting (r = 0.31, .40, and .30, respectively), it was not significantly correlated with antifragility (r = 0.10). Table 17 shows the CFA results for the four hypothesized models. All the models showed adequate fit with CFIs of .90 or above, SRMR and RMSEA of .07 or less, and χ^2/df of around 2.

Table 18 shows the hierarchical regression results for the models predicting challenge appraisal, approach role and resource crafting. The variance inflation factors (VIFs) for all the regression models were below 4 and had tolerance levels well above .20 (Bowerman & O'Connell, 1990). Challenge stressors did not significantly predict challenge appraisal (b = -.06); however, it significantly and positively predicted approach and resource job crafting (b = .15 and .17, p < .01, respectively). Challenge appraisal also positively predicted approach role and resource crafting (b = .20 and .17, p < .01, respectively).

Table 19 shows the hierarchical regression results for the models predicting hindrance appraisal, avoidance role and resource crafting. Hindrance stressors significantly predicted hindrance appraisal, avoidance role and resource job crafting (b = .39, .39, and .33, p < .01, respectively). Lastly, antifragility positively predicted challenge appraisal (b = .47, p < .01) and negatively predicted hindrance appraisal (b = -.58, p < 0.01) while its interaction with challenge stressors and hindrance stressors did not significantly predict challenge nor hindrance appraisal, respectively (b = .02 and -.01). Thus, Hypotheses 14 and 15 were not supported.

Table 15

Means, Standard Deviations, Reliabilities, and Correlations (Sample 5)

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Challenge Stressors (T1)	4.53	1.30	**.94**												
2. Hindrance Stressors (T1)	2.79	1.20	.53**	**.93**											
3. Antifragility (T1)	5.05	.98	.35**	.10	**.91**										
4. Challenge Appraisal (T2)	5.01	1.40	.15*	-.07	.49**	**.89**									
5. Hindrance Appraisal (T2)	3.57	1.62	.18**	.31**	-.04	-.11	**.86**								
6. Approach Role Crafting (T2)	4.88	1.26	.41**	.22**	.60**	.48**	.10	**.94**							
7. Approach Resource Crafting (T2)	4.99	1.15	.41**	.23**	.56**	.43**	.07	.80**	**.94**						
8. Avoidance Role Crafting (T2)	2.06	1.33	.23**	.40**	.10	.09	.49**	.15*	.16*	**.89**					
9. Avoidance Resource Crafting (T2)	2.91	1.40	.10	.30**	-.08	.05	.31**	-.10	.02	.61**	**.82**				
10. Proactive Personality (T1)	5.33	.92	.43**	.10	.80**	.46**	.10	.67**	.60**	.12†	-.07	**.92**			
11. Age	42.39	12.67	-.14*	-.18**	-.07	-.03	-.21**	.02	.02	-.25**	-.22**	-.08	—		
12. Gender	.54	.53	-.05	-.10	-.15*	-.05	.16*	-.16*	-.11	-.06	.06	-.12†	-.08	—	
13. Work Experience	20.95	12.00	-.14*	-.19**	-.10	-.03	-.22**	-.01	.04	-.27**	-.21**	-.11	.86**	.04	—

Note: *N* = 215; M = Mean; SD = Standard Deviation; Cronbach's Alpha in Bold; T1 = Time 1; T2 = Time 2; Gender (0 = Male, 1 = Female); Work Experience (in years).

**$p < .01$; *$p < .05$; †$p < .10$., two-tailed.

Table 16

CFA Marker Technique Results (Sample 5)

Models	***df***	χ^2	χ^2/df	**CFI**	**SRMR**	**RMSEA**	$\Delta\chi^2$	Δdf
Initial Model with Marker (APROL)	681	1222	1.80	.92	.06	.06		
Baseline Model	699	1249	1.79	.92	.12	.06		
Model C	698	1222	1.75	.93	.06	.06	27*	1
Model U	667	1189	1.78	.93	.06	.06	33	31
Model R	677	1190	1.76	.93	.06	.06	1	10
Initial Model with Marker (APRES)	876	1583	1.81	.91	.07	.06		
Baseline Model	894	1613	1.80	.91	.12	.06		
Model C	893	1584	1.77	.91	.07	.06	29*	1
Model U	857	1543	1.80	.91	.06	.06	41	36
Model R	867	1545	1.78	.91	.07	.06	2	10
Initial Model with Marker (AVROL)	478	846	1.77	.93	.06	.06		
Baseline Model	496	875	1.76	.93	.10	.06		
Model C	495	857	1.73	.93	.07	.06	18*	1
Model U	470	817	1.74	.93	.05	.06	40*	25
Model R	480	819	1.71	.94	.05	.06	2	10
Initial Model with Marker (AVRES)	478	818	1.71	.93	.06	.06		
Baseline Model	496	848	1.71	.93	.10	.06		
Model C	495	826	1.67	.93	.07	.06	22*	1
Model U	470	788	1.68	.94	.05	.06	38*	25
Model R	480	790	1.65	.94	.05	.06	2	10

Note: N = 215; APROL = Approach Role Crafting; APRES = Approach Resource Crafting; AVROL = Avoidance Role Crafting; AVRES = Avoidance Resource Crafting; C = Constrained; U = Unconstrained; R = Restricted. The $\Delta\chi^2$ and Δdf are associated with the comparisons between the following models, respectively: Baseline Model vs. Model C, Model C vs. Model U, and Model U vs. Model R.

*$p < .05$.

Table 17

Confirmatory Factor Analysis Results (Sample 5)

Models	***df***	χ^2	χ^2/df	**CFI**	**SRMR**	**RMSEA**	**AIC**
Four-Factor Model (CS+CA+A+APROL)	448	880.06	1.96	.92	.07	.07	1104.06
Four-Factor Model (CS+CA+A+APRES)	608	1224.27	2.01	.90	.07	.07	1488.27
Four-Factor Model (HS+HA+A+AVROL)	287	571.62	2.00	.92	.06	.07	751.62
Four-Factor Model (HS+HA+A+AVRES)	287	544.377	1.90	.93	.07	.07	724.38

Note: $N = 215$; CS = Challenge Stressors; CA = Challenge Appraisal; HS = Hindrance Stressors; HA = Hindrance Appraisal; A = Antifragility; APROL = Approach Role Crafting; APRES = Approach Resource Crafting; AVROL = Avoidance Role Crafting; AVRES = Avoidance Resource Crafting.
$^{**}p < .01$; $^{*}p < .05$.

Table 18

Challenge Appraisal and Approach Job Crafting Regression Results (Unstandardized Coefficients)

	Challenge Appraisal			**Approach Role Crafting**			**Approach Resource Crafting**		
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	1.22†	1.33†	3.09**	.04	-.27	-.54	1.03*	.69	.47
Age	-.00	-.00	-.00	.00	.01	.01	-.01	-.01	-.01
Gender	.04	.04	.07	-.16	-.15	-.16	-.06	-.06	-.06
Work Experience	.01	.01	.01	.00	.00	.00	.02†	.02†	.02
Proactive Personality	.71**	.74**	.35*	.91**	.82**	.67**	.76**	.66**	.54**
Challenge Stressors		-.06	-.06		.15**	.17**		.17**	.18**
Challenge Appraisal						.20**			.17**
Antifragility			.47**						
A*CA			.02						
R^2	.21	.22	.26	.46	.48	.52	.38	.41	.44
ΔR^2	.21	.01	.04	.46	.02	.04	.38	.03	.03
F	14.31**	11.54**	10.19**	45.30**	39.16**	38.23**	31.50**	28.47**	26.91**
df	210	209	207	210	209	208	210	209	208

Note: *N* = 215; Gender (0 = Male, 1 = Female); Work Experience (in years); A*CA = the interaction term of Antifragility and Challenge Appraisal.
$^{**}p < .01$; $^{*}p < .05$; $^{\dagger}p < .10$., two-tailed.

Table 19

Hindrance Appraisal and Avoidance Job Crafting Regression Results (Unstandardized Coefficients)

	Hindrance Appraisal			**Avoidance Role Crafting**			**Avoidance Resource Crafting**		
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	2.80**	1.54†	.10	2.50**	1.23†	.73	4.40**	3.32**	3.03**
Age	-.01	-.01	-.01	-.01	-.00	-.00	-.01	-.01	-.01
Gender	.45*	.54**	.50*	-.18	-.09	-.27†	.05	.13	.02
Work Experience	-.01	-.01	-.01	-.02	-.02	-.02	-.01	-.01	-.01
Proactive Personality	.18	.14	.63**	.12	.09	.04	-.13	-.16	-.19*
Hindrance Stressors		.39**	.40**		.39**	.26**		.33**	.25**
Hindrance Appraisal						.33**			.19**
Antifragility			-.58**						
A*HA			-.01						
R^2	.08	.15	.20	.09	.20	.34	.06	.13	.18
ΔR^2	.08	.08	.05	.09	.12	.14	.06	.08	.04
F	4.26**	7.54**	7.25**	5.12**	10.67**	17.81**	3.24*	6.44**	7.36**
df	210	209	207	210	209	208	210	209	208

Note: *N* = 215; Gender (0 = Male, 1 = Female); Work Experience (in years); A*HA = the interaction term of Antifragility and Hindrance Appraisal.
**$p < .01$; *$p < .05$; †$p < .10$., two-tailed.

Table 20 and 21 show the indirect effect of challenge stressors on approach role and resource crafting, respectively, through challenge appraisal. Contrary to expectations, the indirect effect was insignificant for both outcomes such that challenge appraisal did not mediate the relationship (*b* = -.01, *SE* = .02, 95% BCa CI [-.04, .02]; *b* = -.01, *SE* = .01, 95% BCa CI [-.04, .02]). Therefore, Hypotheses 12a and 12b were not supported. Table 22 and 23 show the indirect effect of hindrance stressors on avoidance role and resource crafting, respectively, through hindrance appraisal. As expected, the indirect effect was significant for both outcomes such that hindrance appraisal partially mediated the relationship (*b* = .13, *SE* = .04, 95% BCA CI [.06, .20]; *b* = .07, *SE* = .03, 95% BCA CI [.02, .13]). Therefore, Hypotheses 13a and 13b were supported.

Table 20

Bootstrap Analysis Results for The Indirect Effect of Challenge Stressors on Approach Role Crafting Through Challenge Appraisal (Unstandardized Coefficients)

Relationship	**Effect**	**Standard Error**	**LLCI**	**ULCI**
CS → APROL (Total)	.15**	.05	.05	.26
CS → APROL (Direct)	.16**	.05	.06	.27
Indirect Effect through CA	**Effect**	**B Standard Error**	**BLLCI**	**BULCI**
	-.01	.02	-.04	.02

Note: *N* = 215; CI = 95% Confidence Interval (two-tailed); CS = Challenge Stressors; APROL = Approach Role Crafting; CA = Challenge Appraisal; LL = Lower Level; UL = Upper Level; B = Bootstrap; Bootstrap sample size = 5,000; ***p* < .01; **p* < .05; †*p* < .10.

Table 21

Bootstrap Analysis Results for The Indirect Effect of Challenge Stressors on Approach Resource Crafting Through Challenge Appraisal (Unstandardized Coefficients)

Relationship	**Effect**	**Standard Error**	**LLCI**	**ULCI**
CS → APRES (Total)	.17**	.05	.07	.27
CS → APRES (Direct)	.18**	.05	.08	.28
Indirect Effect through CA	**Effect**	**B Standard Error**	**BLLCI**	**BULCI**
	-.01	.01	-.04	.02

Note: *N* = 215; CI = 95% Confidence Interval (two-tailed); CS = Challenge Stressors; APRES = Approach Resource Crafting; CA = Challenge Appraisal; LL = Lower Level; UL = Upper Level; B = Bootstrap; Bootstrap sample size = 5,000; ***p* < .01; **p* < .05; †*p* < .10.

Table 22

Bootstrap Analysis Results for The Indirect Effect of Hindrance Stressors on Avoidance Role Crafting Through Hindrance Appraisal (Unstandardized Coefficients)

Relationship	**Effect**	**Standard Error**	**LLCI**	**ULCI**
HS → AVROL (Total)	.36**	.07	.25	.52
HS → AVROL (Direct)	.26**	.07	.13	.39
Indirect Effect through HA	**Effect**	**B Standard Error**	**BLLCI**	**BULCI**
	.13	.04	.06	.20

Note: *N* = 215; CI = 95% Confidence Interval (two-tailed); HS = Hindrance Stressors; AVROL; Avoidance Role Crafting; HA Hindrance Appraisal; LL = Lower Level; UL = Upper Level; B = Bootstrap; Bootstrap sample size = 5,000; ***p* < .01; **p* < .05; †*p* < .10.

Table 23

Bootstrap Analysis Results for The Indirect Effect of Hindrance Stressors on Avoidance Resource Crafting Through Hindrance Appraisal (Unstandardized Coefficients)

Relationship	**Effect**	**Standard Error**	**LLCI**	**ULCI**
HS → AVRES (Total)	.33**	.08	.18	.48
HS → AVRES (Direct)	.25**	.08	.10	.41
Indirect Effect through HA	**Effect**	**B Standard Error**	**BLLCI**	**BULCI**
	.07	.03	.02	.13

Note: *N* = 215; CI = 95% Confidence Interval (two-tailed); HS = Hindrance Stressors; AVRES; Avoidance Resource Crafting; HA Hindrance Appraisal; LL = Lower Level; UL = Upper Level; B = Bootstrap; Bootstrap sample size = 5,000; ***p* < .01; **p* < .05; †*p* < .10.

Table 24 and 25 show the bootstrap analysis results for the conditional indirect effect of challenge stressors on approach role and resource crafting, respectively, through challenge appraisal. The moderated mediation index for both models were insignificant, thereby, not supporting Hypotheses 16a and 16b (*index* = .00, *SE* = .01, 95% BCa CI [-.02, .03]; *index* = .00, *SE* = .01, 95% BCa CI [-.02, .02]). Table 26 and 27 show the bootstrap analysis results for the conditional indirect effect of hindrance stressors on avoidance role and resource crafting, respectively, through hindrance appraisal. The moderated mediation index for both models were insignificant, thereby, not supporting Hypotheses 17a and 17b (*index* = -.00, *SE* = .03, 95% BCa CI [-.07, .05]; *index* = -.00, *SE* = .02, 95% BCa CI [-.04, .03]).

Table 24

Bootstrap Analysis Results for The Conditional Indirect Effect of Challenge Stressors on Approach Role Crafting Through Challenge Appraisal (Unstandardized Coefficients)

Antifragility	**Indirect Effect**	**Standard Error**	**LLCI**	**ULCI**
1 SD below the mean (-.98)	-.01	.02	-.05	.03
Mean (0)	-.01	.02	-.04	.02
1 SD above the mean (.98)	-.01	.02	-.05	.03
Moderated Mediation Index	**Index**	**B Standard Error**	**BLLCI**	**BULCI**
	.00	.01	-.02	.03

Note: *N* = 215; CI = 95% Bootstrap Confidence Interval (two-tailed); LL = Lower Level; UL = Upper Level; B = Bootstrap; Bootstrap sample size = 5,000.

Table 25

Bootstrap Analysis Results for The Conditional Indirect Effect of Challenge Stressors on Approach Resource Crafting Through Challenge Appraisal (Unstandardized Coefficients)

Antifragility	**Indirect Effect**	**Standard Error**	**LLCI**	**ULCI**
1 SD below the mean (-.98)	-.01	.02	-.04	.02
Mean (0)	-.01	.01	-.03	.02
1 SD above the mean (.98)	-.01	.02	-.04	.03
Moderated Mediation Index	**Index**	**B Standard Error**	**BLLCI**	**BULCI**
	.00	.01	-.02	.02

Note: *N* = 215; CI = 95% Bootstrap Confidence Interval (two-tailed); LL = Lower Level; UL = Upper Level; B = Bootstrap; Bootstrap sample size = 5,000.

Table 26

Bootstrap Analysis Results for The Conditional Indirect Effect of Hindrance Stressors on Avoidance Role Crafting Through Hindrance Appraisal (Unstandardized Coefficients)

Antifragility	**Indirect Effect**	**Standard Error**	**LLCI**	**ULCI**
1 SD below the mean (-.98)	.14	.05	.05	.23
Mean (0)	.13	.04	.07	.20
1 SD above the mean (.98)	.13	.05	.03	.21
Moderated Mediation Index	**Index**	**Standard Error**	**LLCI**	**ULCI**
	-.00	.03	-.07	.05

Note: *N* = 215; CI = 95% Bootstrap Confidence Interval (two-tailed); LL = Lower Level; UL = Upper Level; Bootstrap sample size = 5,000.

Table 27

Bootstrap Analysis Results for The Conditional Indirect Effect of Hindrance Stressors on Avoidance Resource Crafting Through Hindrance Appraisal (Unstandardized Coefficients)

Antifragility	**Indirect Effect**	**Standard Error**	**LLCI**	**ULCI**
1 SD below the mean (-.98)	.08	.03	.02	.15
Mean (0)	.08	.03	.02	.13
1 SD above the mean (.98)	.07	.03	.01	.14
Moderated Mediation Index	**Index**	**Standard Error**	**LLCI**	**ULCI**
	-.00	.02	-.04	.03

Note: *N* = 215; CI = 95% Bootstrap Confidence Interval (two-tailed); LL = Lower Level; UL = Upper Level; Bootstrap sample size = 5,000.

CHAPTER 6

GENERAL DISCUSSION

The findings of the content validity analysis and EFA from Study 1 suggests that the 10 items that represent the construct of antifragility are better represented as two factors with five items each. As apriori suggested, antifragility is represented by a loop between optionality to gain and disorder embracement. Therefore, these two factors have been named as such. Furthermore, the items in each factor were originally written to represent their intended factor, which was supported by the factor structure suggested by the EFA. Similarly, the analysis also supports the apriori suggested factor structure for fragility as two factors (limited optionality to adapt and disorder aversion) with six items in each factor. On the other hand, all the nine items of resilience loaded on a single factor. More specifically, items representing the factor of disorder neutrality did not perform well and, thus, were removed; such findings can be attributed to the neutral nature of the conceptual factor. That being said, the remaining items support the consistency and validity of the other factor discussed apriori: optionality to adapt. Thus, resilience was found to be empirically unidimensional.

The findings of the CFA from Study 2 and 3 support the convergent and discriminant validity of the triad such that each construct is correlated, yet distinct from each other, as expected. Furthermore, the findings suggest that the resilience measure developed in this study and Luthans et al.'s (2007) resilience measure suffer from

discriminant validity issues among each other, which is expected given that they are measuring the same concept albeit the different measures. On the other hand, antifragility as a construct held its convergent and discriminant validity when it was in the factor structure, further supporting the theoretical framework surrounding the triad. The comparison between the two resilience measures shows that the resilience measure developed in this paper outperforms that of Luthans et al. (2007) in every area, which adds to its reliability and validity as a measure. Lastly, the developed resilience measure explained variance above and beyond that of Luthans et al.'s (2007) when predicting thriving at work, learning, and vitality to the point of replacing it, indicating construct redundancy. Similarly, antifragility demonstrated incremental validity above both the resilience measures, indicating its utility as a psychological resource in predicting positive individual outcomes. It is also worth to mention that resilience remained significant in predicting vitality even after accounting for antifragility, which further supports their discriminant validity as constructs.

The findings of the nomological network from Study 3 supports the criterion validity of antifragility and, thus, supports its impact as a psychological capacity. As expected, those with a proactive personality, learning goal orientation, and positive CSE tend to be antifragile. Furthermore, being antifragile tend to enhance one's willing to take risks and engagement in innovative behaviors such as intrapreneurship in addition to experiencing decreased levels of burnout. In terms of the gain/loss from disorder continuum, although the direction of the correlations between the triad is as expected, the magnitude is not; in other words, it did not fully follow a quasi-simplex pattern. However, this does not necessarily refute the proposed continuum structure nor the

circumplex. One justification for such finding can be deduced from Taleb's (2012) discussion regarding a second, very rare type of fragility: a type where both negative and positive outcomes are plausible. For instance, such fragile type can achieve initial antifragility without necessarily going through the resilience stage. This can be rationalized through the fourth principal in the conservation of resources theory (Hobfoll et al., 2018), which states that when "resources are outstretched or exhausted, individuals enter a defensive mode to preserve the self that is often aggressive and may become irrational" (106). Such mode resembles Taleb's (2012) second fragility type where positive outcomes can be possible because of that defensive mode as a last effort to preserve the self. In that mode individuals initiate a last attempt to deal with the stressors to minimize the resource loss and maximize the gains or allow for the creative emergence of a new coping strategy (Hobfoll et al., 2018). Only then is a fragile individual able to become antifragile in relatively short time, yet not necessarily lasting. Whereas such individual might gain from the stressors for the time being, the lack of experiences, resources, and habits of antifragile individuals can leave them fragile from within, unless they act on their current breakthrough and keep the momentum. Therefore, such individuals might perceive themselves as antifragile, but they are simultaneously still struggling to maximize their gains and minimize their losses, hence, their coincident, perceived fragility.

Study 4 examined the hypothesized model of antifragility as a psychological capacity that influences one's job crafting behaviors through altering the appraisal of experienced stressors at work. Interestingly, challenge stressors did not significantly predict challenge appraisal, which immediately refuted the indirect relationships between

challenge stressors and both approach job crafting forms. A potential explanation for this finding is that although support has been found for the challenge-hindrance framework and the categorization of stressors as challenge and hindrance (Cavanaugh et al., 2000; Crawford et al., 2010; LePine et al., 2005), they tend to provide only a rough prediction of the potential appraisal of stressors and that additional variables, such as occupational sector, need to be accounted for to obtain a more accurate prediction (Bakker & Sanz-Vergel, 2013; Searle & Auton, 2015; Stiglbauer & Zuber, 2019). On the other hand, hindrance stressors did directly predict hindrance appraisal and indirectly predict both avoidance job crafting forms through hindrance appraisal. This provides additional insight into the challenge-hindrance framework such that the appraisal of hindrance stressors as hindering is more common than challenge stressors being appraised as challenging. This is further supported by the results of Webster et al. (2011) which suggest that although workload is presumed to be a challenge stressor, it was appraised as a hindrance stressor in addition to being challenging; On the other hand, role ambiguity and role conflict, presumed hindrance stressors, were strongly appraised as hindrance with a slight challenge appraisal. In sum, based on prior literature and the findings of Study 4, appraising challenge stressor as challenging seems to be more dependent on other factors than appraising hindrance stressors as hindering. Thus, future research is better off investigating stressors and their appraisal individually rather than pooling the stressors under the categories of challenge or hindrance, especially for the presumed challenge stressors.

In terms of moderation, antifragility was not found to be a significant moderator of the relationship between challenge/hindrance stressors and challenge/hindrance

appraisal, respectively, which, subsequently, does not provide support for the proposed moderated mediation models. That being said, antifragility positively predicted challenge appraisal and negatively predicted hindrance appraisal, indicating its usefulness as a direct predictor rather than a moderator; more importantly, it makes challenge stressors insignificant when predicting challenge appraisal. A potential explanation for this is that antifragility is a very strong predictor of whether an employee appraises a stressor as a challenge regardless of what the experienced stressor is. A similar pattern can be noticed when proactive personality is used as a control variable; however, when both proactive personality and antifragility were removed from the model, challenge stressors, then, significantly predicted challenge appraisal. Simply put, your psychological resources matter more in your capacity to perceive an opportunity of gain or growth from a stressor than the stressor itself. On the other hand, hindrance stressors still significantly predicted hindrance appraisal even after accounting for proactive personality and antifragility, indicating that hindrance stressors still have some hindering aspect to them regardless of your psychological resources. It is worthy to note though that antifragility significantly and negatively predicted hindrance appraisal; in other words, antifragile individuals are less likely to perceive stressors in general as hindering than those who are less antifragile, most likely due to their capacity to minimize the losses associated with the stressors.

Implications

This dissertation offers multiple theoretical implications. First, it introduces a new avenue for research as it sheds light on the importance of antifragility as a psychological capacity that can go above and beyond the concept of resilience (Luthans et al., 2015; Masten et al., 2009). Whereas the benefits of resilience have been addressed in the

literature (Luthans et al., 2015), little research has attempted to explore other psychological capacities that can introduce unique and, at times, more beneficial outcomes (e.g., antifragility). Second, this dissertation sheds light on the differences in the core conceptual meanings behind resilience by establishing antifragility and resilience as two unique psychological capacities (Hartmann, Weiss, Newman, & Hoegl, 2020). Whereas resilience specializes in loss minimization, antifragility goes beyond this to maximize gains; thus, almost every antifragile individual is resilient, but not vice versa. Third, this dissertation introduces cross-validated, reliable, and distinct measures of antifragility, resilience, and fragility as well as a continuum and circumplex, which can benefit further research on the topic.

Fourth, this dissertation provides empirical support for some relevant antecedents and beneficial outcomes of antifragility. Individuals who are antifragile tend to be proactive, have a learning goal orientation, and of high core self-evaluation; furthermore, they tend to thrive at work, be willing to take risks, engage in intrapreneurial behaviors, and have a challenge appraisal of stressors, while being less susceptible to burnout and hindrance appraisal of stressors. Fifth, the findings emphasize the importance of stressor appraisal (Lazarus & Folkman, 1984), especially for stressors that are categorized as challenging (Cavanaugh et al., 2000), and the significant role our psychological resources play into that appraisal. Whereas challenge appraisal did not mediate the direct relationship between challenge stressors and approach role and resource crafting, due to its potential dependence on other factors not accounted for, hindrance appraisal partially mediated the relationship between hindrance stressors and avoidance role and resource crafting, emphasizing its role as an explanatory mechanism within the challenge-

hindrance framework in predicting relevant individual outcomes (Crane & Searle, 2016; O'Brien & Beehr, 2019; Zhang & Parker, 2019).

This dissertation also offers multiple practical implications for employees, leaders, and organizations, especially those in dynamic and uncertain industries, given the potential benefits of antifragility. First, to develop antifragility, employees need to constantly initiate and embrace new job opportunities and challenges and expand beyond their comfort zone even if it results in short-term losses; only then can employees achieve exponential gain through experiential learning for the long-term. More specifically, employees can initially develop their optionality to gain through (1) enhancing their relevant work knowledge by reading and attending training programs and/or seminars, (2) enhancing their technical work skills through experiential learning and participating in novel projects, and (3) expanding their social network to include potential connections that can assist them in their future endeavors by attending networking events and staying in contact with co-workers, clients, and managers on a regular basis. Similarly, employees can initially develop their disorder embracement through mastering how to constantly alter their perspective on disorder and the associated job demands to filter in the potential, exponential benefits of the situation and filter out the negative emotions (e.g., mindfulness, self-compassion, meaningfulness training programs; Bartlett et al., 2019; Kotera & Van Gordon, 2021; Thory, 2016). Accordingly, when such employees are faced with their job demands, they are better able to find ways to extract gains and alleviate losses – whether emotional, financial, cognitive, or social – as they tend to have the necessary knowledge as well as the skill to effectively/efficiently overcome the job demands, are better able to derive meaning and have a positive outlook on the potential

benefits of overcoming such demands, and/or seek assistance from someone in their social network who can guide them in overcoming them. This initial development of antifragility is essential as it sets the cycle of gain in motion as the more job demands the employees overcome or face, the further their antifragility is built (i.e., optionality to gain and disorder embracement).

Therefore, leaders and organizations need to invest in their employees' development in the aforementioned areas to build their antifragility, at least initially, by guiding them through the process, providing them with the necessary resources (e.g., financial, emotional, social, cognitive) to go through the process, and providing them with the necessary feedback or corrective action if needed. Second, in addition to directly developing the employees' antifragility, leaders and organizations need to create a culture that emphasizes and rewards certain characteristics that can facilitate the development of antifragility. More specifically, encouraging proactivity, learning goal orientation, and high core self-evaluation should incentivize the employees to proactively approach and initiate new challenges to grow from as they are more likely to appreciate the value of the growth involved and believe in their capability to overcome these challenges. More recent efforts by Williams (2020) also suggest six guiding heuristics, known as the ROBUST principles, that can assist in developing antifragility in both employees and leaders.

Limitations

As with any research, this paper has limitations. First, given the nature of the constructs developed in this paper, concerns regarding CMV can arise (Podsakoff et al., 2012). However, (1) the EFA and CFA results across all the samples supported the

convergent and discriminant validity of the triad, (2) the VIFs and the tolerance levels were within the acceptable ranges (Kock, 2015), (3) the CFA marker technique results for Study 4 suggests that the findings were not influenced by CMV, and (4) a time-wave design was implemented for Study 4. Therefore, concerns related to CMV were alleviated. This is also supported by the findings of Fuller et al. (2016) that single source studies do not necessarily result in influential CMV such that CMV can exist in high levels before it becomes influential. Second, online panel data (OPD) from Qualtrics were used to conduct all the studies, which could raise some concerns regarding to the legitimacy of the results. However, a review by Porter et al. (2019) suggests that OPD has been largely embraced by management scholars regardless of the unwillingness, objections, and underestimation of online panel data by some scholars. The authors argue in favor of the use of OPD, albeit, with specific recommendations that should mitigate any theoretical, methodological, or analytical issues from unfolding. The following are few of the recommendations I implemented based on their suggestions: (1) making sure that the samples were representative of the population of interest, (2) generally describing the research tasks at the beginning of the survey to the participants, (3) temporally separating the independent variables and dependent variables when appropriate, (4) implementing attention checks and examining the participants' completion rate and response time for outliers (Porter et al., 2019).

Fourth, all the data used in this dissertation were collected during the times of COVID-19, mostly during 2020 and early 2021. As a result, COVID-19 could have played an influential role in shifting the results of the studies, and therefore, future research should replicate the conducted studies under non-COVID-19 circumstances to

explore whether the context of increased stress, uncertainty, and sudden change had any impact on the findings of this dissertation (American Psychological Association, 2020; Gallup, 2021). Fifth, given that this paper is introducing the concept of antifragility to the field of management and psychology, prior research on the topic within these fields is scarce if any and, thus, most of the arguments in this paper rely on theory, Taleb's (2012) conceptualization of the triad, and the resilience literature. As more research examines and explores the topic of antifragility, such limitation will be mitigated.

Future Directions

Theoretical Advancement of the Triad

This paper offers the first step to a thorough conceptualization of the constructs of adversity and growth. Therefore, future research should build upon the findings presented here to better understand the capacity/rigidities of individuals to cope with disorder. One research avenue involves conducting a time-wave or longitudinal type study to test the malleability of the triad based on the gain/loss from disorder continuum (Ployhart & Vandenberg, 2010). For instance, research can examine potential factors that might assist a fragile employee to develop resilience or antifragility (e.g., the availability of challenge stressors, empowering leadership, organizational failure embracement, compensation). In addition, factors that might lead to one's fragility is also invaluable to pursue (e.g., abusive supervision, hinderance stressors). Another research avenue can include examining more specific aspects of antifragility (e.g., emotional antifragility, financial antifragility), and how each aspect can have different effects on one's outcomes; even more, research can examine antifragility in other contexts besides employees in the workplace. For instance, antifragility can be explored in the context of serial

entrepreneurship, which refers to habitual entrepreneurs who sequentially run multiple businesses (Plehn-Dujowich, 2010). Antifragile individuals are constantly on the lookout for ways to maximize their gains and minimize their losses, which can translate to divesting their current business for starting more promising ones. Other future research avenues can include exploring the other two unexamined quadrants in the approach-avoidance gain-loss circumplex of disorder receptivity; whereas one quadrant emphasizes the capacity of an individual to gain from avoiding disorder, the other emphasizes losing from approaching disorder.

Antifragility as a Double-Edged Sword

Given the constant need of antifragile individuals to grow and develop, the dark side of antifragility relevant to organizations can also be an interesting avenue to pursue. More specifically, research can examine some unwanted outcomes of antifragile individuals, such as workplace deviance, decreased organizational commitment, and turnover intentions if no growth or gain opportunities were to be available in the organization; furthermore, how such negative outcomes can be mitigated through factors, such as organizational identification, is also as important to pursue. Issues pertaining to fit among group members or supervisors and followers (Kristof-Brown et al., 2005) with different levels of antifragility and fragility should also be pursued. For instance, having a group that consist of both antifragile and fragile members can be detrimental to the cohesion of the group in terms of risk taking, innovation, and growth. Similarly, having an antifragile leader supervise a fragile follower can strain the follower with constant exposure to challenging stressors and disorder if not managed and paced carefully, as they have yet to develop resilience, let alone antifragility.

Goal Setting and Motivation

Exploring the triad in terms of goal preference and motivation is another direction future research can take. Based on whether an individual is antifragile, resilient, or fragile, s/he is more likely to be motivated to pursue different goals to satisfy different needs. For instance, according to regulatory focus theory, individuals differ based on whether they embrace a promotion-focus orientation or vs. prevention-focus orientation (Higgins, 1997; Higgins & Spiegel, 2004). Individuals who embrace a promotion-focus orientation tend to be motivated by goals that provide them with pleasure, achievement, growth, and life accomplishment; on the other hand, those who embrace prevention-focus orientation tend to be motivated by goals that provide them with security, safety, and protection of negative outcomes. Although two individuals can have the same goal, their regulatory orientation towards what that goal means or provides can differ, and such orientation has been linked to many relevant work behaviors and attitudes (Lanaj et al., 2012). Whereas antifragile individuals are more likely to embrace a promotion-focus orientation due to their emphasis on achieving gain and growth, fragile individuals are more likely to embrace a prevention-focus orientation due to their emphasis on avoiding losses; on the other hand, resilient individuals may embrace a mix of both orientations due to their neutral nature towards disorder. Therefore, understanding an individual's capacities/rigidities can be an interesting avenue that sheds light on how to motivate them to achieve their goals in the workplace.

Conclusion

Antifragility is a new and important construct in the study of management. Evidence exists that antifragility is distinct from the concepts of resilience and fragility.

Further, antifragility is part of a nomological network driven by traits such as proactive personality, learning goal orientation, and core self-evaluations that can result in valuable outcomes like increased willingness to take risks, intrapreneurship, and challenge appraisal of stressors as well as reduced hindrance appraisal of stressors and susceptibility to burnout.

REFERENCES

American Psychological Association (2020). *Stress in America 2020: A National Mental Health Crisis.* https://www.apa.org/news/press/releases/stress/2020/report-october

Anderson, C. R. (1976). Coping behaviors as intervening mechanisms in the inverted-U stress-performance relationship. *Journal of Applied Psychology, 61*(1), 30-34.

Anderson, J. C., & Gerbing, D. W. (1991). Predicting the performance of measures in a confirmatory factor analysis with a pretest assessment of their substantive validities. *Journal of Applied Psychology, 76*(5), 732–740.

Atinc, G., Simmering, M. J., & Kroll, M. J. (2012). Control variable use and reporting in macro and micro management research. *Organizational Research Methods*, *15*(1), 57-74.

Avolio, B. J., & Luthans, F. (2006). *The high impact leader*. New York, NY: McGraw-Hill.

Bajaba, S., Fuller, B., Marler, L., & Bajaba, A. (2021). Does mindfulness enhance the beneficial outcomes that accrue to employees with proactive personalities? *Current Psychology*, *40*, 475-484.

Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: taking stock and looking forward. *Journal of Occupational Health Psychology*, *22*(3), 273-285.

Bakker, A. B., Demerouti, E., De Boer, E., & Schaufeli, W. B. (2003). Job demands and job resources as predictors of absence duration and frequency. *Journal of Vocational Behavior*, *62*(2), 341-356.

Bakker, A. B., Demerouti, E., & Euwema, M. C. (2005). Job resources buffer the impact of job demands on burnout. *Journal of Occupational Health Psychology*, *10*(2), 170-180.

Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2014). Burnout and work engagement: The JD-R approach. *Annual Review of Organizational Psychology and Organizational Behavior, 1*, 389–411.

Bakker, A. B., Demerouti, E., & Verbeke, W. (2004). Using the job demands-resources model to predict burnout and performance. *Human Resource Management, 43,* 83-104.

Bakker, A. B., Hakanen, J. J., Demerouti, E., & Xanthopoulou, D. (2007). Job resources boost work engagement, particularly when job demands are high. *Journal of Educational Psychology, 99*(2), 274-284.

Bakker, A. B., & Sanz-Vergel, A. I. (2013). Weekly work engagement and flourishing: The role of hindrance and challenge job demands. *Journal of Vocational Behavior, 83*(3), 397-409.

Bakker, A. B., Tims, M., & Derks, D. (2012). Proactive personality and job performance: The role of job crafting and work engagement. *Human Relations, 65*(10), 1359-1378.

Bakker, A. B., van Veldhoven, M., & Xanthopoulou, D. (2010). Beyond the demand-control model. *Journal of Personnel Psychology, 9*, 3-16.

Bateman, T. S., & Crant, J. M. (1993). The proactive component of organizational behavior: A measure and correlates. *Journal of Organizational Behavior, 14*(2), 103-118.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99-120.

Bartlett, L., Martin, A., Neil, A. L., Memish, K., Otahal, P., Kilpatrick, M., & Sanderson, K. (2019). A systematic review and meta-analysis of workplace mindfulness training randomized controlled trials. *Journal of Occupational Health Psychology, 24*(1), 108-126.

Belousova, O., & Gailly, B. (2013). Corporate entrepreneurship in a dispersed setting: actors, behaviors, and process. *International Entrepreneurship and Management Journal, 9*(3), 361-377.

Bipp, T., & Demerouti, E. (2015). Which employees craft their jobs and how? Basic dimensions of personality and employees' job crafting behaviour. *Journal of Occupational and Organizational Psychology, 88*(4), 631-655.

Bliese, P. D., Edwards, J. R., & Sonnentag, S. (2017). Stress and well-being at work: A century of empirical trends reflecting theoretical and societal influences. *Journal of Applied Psychology, 102*(3), 389-402.

Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist, 59*, 20-28.

Bouffard, T., Boisvert, J., Vezeau, C., & Larouche, C. (1995). The impact of goal orientation on self-regulation and performance among college students. *British Journal of Educational Psychology, 65*(3), 317-329.

Bowerman, B. L., and O'Connell, R. T. (1990). *Linear Statistical Models: An Applied Approach*. Boston, MA: Brooks/Cole.

Bradburn, N. M., Sudman, S., & Wansink, B. (2004). *Asking questions: The definitive guide to questionnaire design--for market research, political polls, and social and health questionnaires*. John Wiley & Sons.

Breevaart, K., Bakker, A. B., Demerouti, E., & Derks, D. (2016). Who takes the lead? A multi-source diary study on leadership, work engagement, and job performance. *Journal of Organizational Behavior, 37*(3), 309-325.

Britt, T. W., Shen, W., Sinclair, R. R., Grossman, M. R., & Klieger, D. M. (2016). How much do we really know about employee resilience? *Industrial and Organizational Psychology, 9*(2), 378-404.

Bruning, P. F., & Campion, M. A. (2018). A role–resource approach–avoidance model of job crafting: A multimethod integration and extension of job crafting theory. *Academy of Management Journal, 61*(2), 499-522.

Bruning, P. F., & Campion, M. A. (2019). Exploring job crafting: Diagnosing and responding to the ways employees adjust their jobs. *Business Horizons, 62*(5), 625-635.

Cavanaugh, M. A., Boswell, W. R., Roehling, M. V. & Boudreau, J. W. (1998). *"Challenge" and "hindrance" related stress among U.S. managers* (CAHRS Working Paper #98-13). Ithaca, NY: Cornell University, School of Industrial and Labor Relations, Center for Advanced Human Resource Studies. Retrieved from http://digitalcommons.ilr.cornell.edu/cahrswp/126.

Cavanaugh, M. A., Boswell, W. R., Roehling, M. V., & Boudreau, J. W. (2000). An empirical examination of self-reported work stress among US managers. *Journal of Applied Psychology, 85*(1), 65-74.

Cellar, D. F., Stuhlmacher, A. F., Young, S. K., Fisher, D. M., Adair, C. K., Haynes, S., Twichell, E., Arnold, K. A., Royer, K., Denning, B., & Riester, D. (2011). Trait goal orientation, self-regulation, and performance: A meta-analysis. *Journal of Business and Psychology, 26*(4), 467-483.

Chang, C. H., Ferris, D. L., Johnson, R. E., Rosen, C. C., & Tan, J. A. (2012). Core self-evaluations: A review and evaluation of the literature. *Journal of Management, 38*(1), 81-128.

Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organizational Research Methods, 4*(1), 62-83.

Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment, 7*(3), 309-319.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155–159.

Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISc). *Depression and Anxiety*, *18*(2), 76-82.

Conway, J. M., & Huffcutt, A. I. (2003). A review and evaluation of exploratory factor analysis practices in organizational research. *Organizational Research Methods*, *6*(2), 147-168.

Crane, M. F., & Searle, B. J. (2016). Building resilience through exposure to stressors: The effects of challenges versus hindrances. *Journal of Occupational Health Psychology*, *21*(4), 468-479.

Crawford, E. R., LePine, J. A., & Rich, B. L. (2010). Linking job demands and resources to employee engagement and burnout: a theoretical extension and meta-analytic test. *Journal of Applied Psychology*, *95*(5), 834-848.

Credé, M., Tynan, M. C., & Harms, P. D. (2017). Much ado about grit: A meta-analytic synthesis of the grit literature. *Journal of Personality and Social Psychology*, *113*(3), 492-511.

Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin, 52*(4), 281-302.

Dawkins, S., Martin, A., Scott, J., & Sanderson, K. (2013). Building on the positives: A psychometric review and critical analysis of the construct of Psychological Capital. *Journal of Occupational and Organizational Psychology*, *86*(3), 348-370.

Delahaij, R., & van Dam, K. (2016). Coping style development: The role of learning goal orientation and metacognitive awareness. *Personality and Individual Differences*, *92*, 57-62.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied psychology*, *86*(3), 499-512.

Derbyshire, J., & Wright, G. (2014). Preparing for the future: development of an 'antifragile' methodology that complements scenario planning by omitting causation. *Technological Forecasting and Social Change*, *82*, 215-225.

DeVellis, R. F. (2017) *Scale development: Theory and applications.* London: Sage.

De Vente, W., Olff, M., Van Amsterdam, J. G. C., Kamphuis, J. H., & Emmelkamp, P. M. G. (2003). Physiological differences between burnout patients and healthy controls: blood pressure, heart rate, and cortisol responses. *Occupational and Environmental Medicine, 60*(1), 54-61.

Dewe, P. J., O'Driscoll, M. P., & Cooper, C. (2010). *Coping with work stress: A review and critique*. John Wiley & Sons.

Dewett, T. (2006). Exploring the role of risk in employee creativity. *The Journal of Creative Behavior*, *40*(1), 27-45.

Donaldson, S. I., & Grant-Vallone, E. J. (2002). Understanding self-report bias in organizational behavior research. *Journal of Business and Psychology, 17*(2), 245-260.

Edwards, J. R. (2003). Construct validation in organizational behavior research. In J. Greenberg (Ed.), *Organizational behavior: The state of the science* (pp. 327–37(1). Lawrence Erlbaum Associates Publishers.

Edwards, J. R., & Lambert, L. S. (2007). Methods for integrating moderation and mediation: a general analytical framework using moderated path analysis. *Psychological Methods*, *12*(1), 1-22.

Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist*, *34*, 169-189.

Eysenck, H. J. (1990). Biological dimensions of personality. In Pervin, L., A. (Ed.), *Handbook of Personality: Theory and Research:* 244-276. New York: Guilford.

Fikretoglu, D., & McCreary, D. R. (2012). *Psychological resilience: A brief review of definitions, and key theoretical, conceptual, and methodological issues* (Technical Report 2012-012). Toronto, Ontario, Canada: Defense R&D.

Ford, J. K., MacCallum, R. C., & Tait, M. (1986). The application of exploratory factor analysis in applied psychology: A critical review and analysis. *Personnel Psychology*, *39*(2), 291-314.

Fuller, B., & Marler, L. E. (2009). Change driven by nature: A meta-analytic review of the proactive personality literature. *Journal of Vocational Behavior*, *75*(3), 329-345.

Fuller, B., Marler, L. E., Bajaba, S., & Lovett, D. M. (2018). Deconstructing the proactive personality construct: Exploring a change-control circumplex model. In *Academy of Management Proceedings* (Vol. 2018, No. 1, p. 13504). Briarcliff Manor, NY 10510: Academy of Management.

Fuller, C. M., Simmering, M. J., Atinc, G., Atinc, Y., & Babin, B. J. (2016). Common methods variance detection in business research. *Journal of Business Research*, *69*(8), 3192-3198.

Frazier, P., Tennen, H., Gavian, M., Park, C., Tomich, P., & Tashiro, T. (2009). Does self-reported posttraumatic growth reflect genuine positive change? *Psychological Science*, *20*(7), 912-919.

Gallup. (2021). *State of the Global Workplace 2021 Report*. https://www.gallup.com/workplace/349484/state-of-the-global-workplace.aspx

Gawke, J. C., Gorgievski, M. J., & Bakker, A. B. (2019). measuring intrapreneurship at the individual level: Development and validation of the employee intrapreneurship scale (EIS). *European Management Journal*, *37*(6), 806-817.

Gerbing, D. W., & Anderson, J. C. (1988). An updated paradigm for scale development incorporating unidimensionality and its assessment. *Journal of Marketing Research*, *25*(2), 186-192.

Ghodrat, M., Naji, A., Komaie-Moghaddam, H., & Podgornik, R. (2015). Ion-mediated interactions between net-neutral slabs: Weak and strong disorder effects. *The Journal of Chemical Physics*, *143*(23), 234701.

Globocnik, D., & Salomo, S. (2015). Do formal management practices impact the emergence of bootlegging behavior? *Journal of Product Innovation Management*, *32*(4), 505-521.

Grant, S., & Langan-Fox, J. (2007). Personality and the occupational stressor-strain relationship: The role of the Big Five. *Journal of Occupational Health Psychology*, *12*(1), 20-33.

Grebner, S., Elfering, A., & Semmer, N. K. (2010). The success resource model of job stress. In P. L. Perrewé & D. C. Ganster (Eds.), *Research in occupational stress and well-being: Vol. 8. New developments in theoretical and conceptual approaches to job stress* (pp. 61–108).

Grube, M., Muggia, L., & Gostinčar, C. (2013). Niches and adaptations of polyextremotolerant black fungi. In Seckbach, J., Oren, A., & Stan-Lotter, H. *Polyextremophiles* (pp. 551-566). Springer, Dordrecht.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2018). *Multivariate data analysis*. Upper Saddle River: Prentice Hall.

Hakanen, J. J., Bakker, A. B., & Demerouti, E. (2005). How dentists cope with their job demands and stay engaged: The moderating role of job resources. *European Journal of Oral Sciences, 113*(6), 479-487.

Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The Job Demands-Resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress, 22*(3), 224-241.

Halbesleben, J. R. B. (2010). A meta-analysis of work engagement: Relationships with burnout, demands, resources and consequences. In A. B. Bakker & M. P. Leiter (Eds.), *Work engagement: A handbook of essential theory and research*. New York, NY: Psychology Press.

Halbesleben, J. R., Neveu, J. P., Paustian-Underdahl, S. C., & Westman, M. (201(4). Getting to the "COR" understanding the role of resources in conservation of resources theory. *Journal of Management, 40*(5), 1334-1364.

Hall, J., Roman, M. W., Thomas, S. P., Brown Travi, C., Powell, J., Tennison, C., Moyers, K., Shoffner, D. H., Broyles, T., Martin, T., & McArthur, P. M. (2009). Thriving as becoming resolute in narrative of women surviving childhood maltreatment. *American Journal of Orthopsychiatry, 79*, 375-386.

Hartmann, S., Weiss, M., Newman, A., & Hoegl, M. (2020). Resilience in the workplace: A multilevel review and synthesis. *Applied Psychology, 69*(3), 913-959.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: Guilford Press.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: Guilford Press.

Higgins, E. T., Shah, J., & Friedman, R. (1997). Emotional responses to goal attainment: Strength of regulatory focus as moderator. *Journal of Personality and Social Psychology, 72*, 515-525.

Higgins, E. T., & Spiegel, S. (2004). Promotion and prevention strategies for self-regulation: A motivated cognition perspective. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 171-187). New York, NY: Guilford Press.

Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods, 1*(1), 104-121.

Hirst, G., Van Knippenberg, D., & Zhou, J. (2009). A cross-level perspective on employee creativity: Goal orientation, team learning behavior, and individual creativity. *Academy of Management Journal*, *52*(2), 280-293.

Hobfoll, S. E. (1988). *The ecology of stress*. New York: Hemisphere.

Hobfoll, S. E. (2001). The influence of culture, community, and the nested-self in the stress process: advancing conservation of resources theory. *Applied Psychology*, *50*(3), 337-421.

Howard, J. L., Gagné, M., & Bureau, J. S. (2017). Testing a continuum structure of self-determined motivation: A meta-analysis. *Psychological Bulletin*, *143*1(2), 1346-1377.

Huang, L., & Luthans, F. (2015). Toward better understanding of the learning goal orientation–creativity relationship: The role of positive psychological capital. *Applied Psychology*, *64*(2), 444-472.

Hülsheger, U. R., Alberts, H. J., Feinholdt, A., & Lang, J. W. (2013). Benefits of mindfulness at work: the role of mindfulness in emotion regulation, emotional exhaustion, and job satisfaction. *Journal of Applied Psychology*, *98*(2), 310-325.

Hunsley, J., & Meyer, G. J. (2003). The incremental validity of psychological testing and assessment: conceptual, methodological, and statistical issues. *Psychological Assessment*, 15(4), 446-455.

Hutcheson, G. D., & Sofroniou, N. (1999). *The multivariate social scientist: Introductory statistics using generalized linear models*. Sage.

Ireland, R. D., Hitt, M. A., & Sirmon, D. G. (2003). A model of strategic entrepreneurship: The construct and its dimensions. *Journal of Management, 29*(6), 963-989.

Janssen, O., & Prins, J. (2007). Goal orientations and the seeking of different types of feedback information. *Journal of Occupational and Organizational Psychology*, *80*(2), 235-249.

Jex, S. M. (1998). *Stress and job performance: Theory, research, and implications for managerial practice*. Thousand Oaks, CA: Sage.

Judge, T. A., & Bono, J. E. (2001). Relationship of core self-evaluations traits—self-esteem, generalized self-efficacy, locus of control, and emotional stability—with job satisfaction and job performance: A meta-analysis. *Journal of Applied Psychology*, *86*(1), 80-92.

Judge, T. A., Erez, A., & Bono, J. E. (1998). The power of being positive: The relation between positive self-concept and job performance. *Human Performance*, *11*(2/3), 167-187.

Judge, T. A., Erez, A., Bono, J. E., & Thoresen, C. J. (2003). The core self-evaluations scale: Development of a measure. *Personnel psychology*, *56*(2), 303-331.

Judge T., A., Locke E., A., & Durham, C. C. (1997). The Dispositional Causes of Job Satisfaction: A Core Evaluations Approach. *Research in Organizational Behavior*, *19*, 151-188.

Judge, T. A., Locke, E. A., Durham, C. C., & Kluger, A. N. (1998). Dispositional effects on job and life satisfaction: The role of core evaluations. *Journal of Applied Psychology*, *83*(1), 17-34

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

Kessler, R. C., Turner, J. B., & House, J. S. (1988). Effects of unemployment on health in a community survey: Main, modifying, and mediating effects. *Journal of Social Issues*, *44*(4), 69-85.

Kleine, A. K., Rudolph, C. W., & Zacher, H. (2019). Thriving at work: A meta-analysis. *Journal of Organizational Behavior*, *40*(9-10), 973-999.

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration (ijec)*, *11*(4), 1-10.

Kotera, Y., & Van Gordon, W. (2021). Effects of self-compassion training on work-related well-being: A systematic review. *Frontiers in Psychology*, *12*, 1142.

Kristof-Brown, A. L., Zimmerman, R. D., & Johnson, E. C. (2005). Consequences of Individuals' fit at work: A meta-analysis of person–job, person–organization, person–group, and person–supervisor fit. *Personnel Psychology*, *58*(2), 281-342.

Lambert, L. S., & Newman, D. A. (2019). Construct development and validation in three practical steps: Recommendations. In *Proceedings of Southern Management Association*. Norfolk, VA.

Lanaj, K., Chang, C. H., & Johnson, R. E. (2012). Regulatory focus and work-related outcomes: a review and meta-analysis. *Psychological Bulletin*, *138*(5), 998-1034.

Lazarus, R. F., & Folkman, S. (1984). *Stress, appraisal and coping*. Springer.

LePine, J. A., LePine, M. A., & Jackson, C. L. (2004). Challenge and hindrance stress: relationships with exhaustion, motivation to learn, and learning performance. *Journal of Applied Psychology, 89*(5), 883-891.

LePine, J. A., Podsakoff, N. P., & LePine, M. A. (2005). A meta-analytic test of the challenge stressor–hindrance stressor framework: An explanation for inconsistent relationships among stressors and performance. *Academy of Management Journal*, *48*(5), 764-775.

LePine, M. A., Zhang, Y., Crawford, E. R., & Rich, B. L. (2016). Turning their pain to gain: Charismatic leader influence on follower stress appraisal and job performance. *Academy of Management Journal*, *59*(3), 1036-1059.

Leung, K., Chen, T., & Chen, G. (2014). Learning goal orientation and creative performance: The differential mediating roles of challenge and enjoyment intrinsic motivations. *Asia Pacific Journal of Management*, *31*(3), 811-834.

Levin, J. S., Brodfuehrer, S. P., & Kroshl, W. M. (2014). Detecting antifragile decisions and models lessons from a conceptual analysis model of service life extension of aging vehicles. In *IEEE International Systems Conference Proceedings* (pp. 285-29(2).

Lichtman, M., Vondal, M. T., Clancy, T. C., & Reed, J. H. (2016). Antifragile communications. *IEEE Systems Journal*, *12*(1), 659-670.

Long, J. S. (1983). *Confirmatory factor analysis: A preface to LISREL*. Sage Publications.

Lu, L., Lin, X., & Leung, K. (2012). Goal orientation and innovative performance: The mediating roles of knowledge sharing and perceived autonomy. *Journal of Applied Social Psychology*, *42*, 180-197.

Luthans, F. (2002). The need for and meaning of positive organizational behavior. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, *23*(6), 695-706.

Luthans, F., Avey, J. B., Avolio, B. J., Norman, S. M., & Combs, G. M. (2006). Psychological capital development: toward a micro-intervention. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, *27*(3), 387-393.

Luthans, F., Avey, J. B., Avolio, B. J., & Peterson, S. J. (2010). The development and resulting performance impact of positive psychological capital. *Human Resource Development Quarterly*, *21*(1), 41-67.

Luthans, F., Avey, J. B., & Patera, J. L. (2008). Experimental analysis of a web-based training intervention to develop positive psychological capital. *Academy of Management Learning & Education, 7*(2), 209-221.

Luthans, B. C., Luthans, K. W., & Avey, J. B. (2014). Building the leaders of tomorrow: The development of academic psychological capital. *Journal of Leadership & Organizational Studies, 21*(2), 191-199.

Luthans, F., Youssef, C. M., & Avolio, B. J. (2007). *Psychological capital: Developing the human competitive edge*. Oxford: Oxford Press.

Luthans, F., Youssef-Morgan, C. M., & Avolio, B. J. (2015). *Psychological capital and beyond*. Oxford University Press, USA.

MacKenzie, S. B., Podsakoff, P. M., & Fetter, R. (1991). Organizational citizenship behavior and objective productivity as determinants of managerial evaluations of salespersons' performance. *Organizational Behavior and Human Decision Processes, 50*(1), 123-150.

MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly, 35*(2), 293-334.

Maguen, S., Vogt, D. S., King, L. A., King, D. W., & Litz, B. T. (2006). Posttraumatic growth among Gulf War I veterans: The predictive role of deployment-related experiences and background characteristics. *Journal of Loss and Trauma, 11*(5), 373-388.

Masten, A. S., Cutuli, J. J., Herbers, J. E., & Reed, M. G. (2009). Resilience in development. In Lopez, S. J., & Snyder, C. R. (Eds.), *Oxford handbook of positive psychology* (pp. 117-13(1). New York, NY: Oxford University Press.

Masten, A. S., & Narayan, A. J. (2012). Child development in the context of disaster, war, and terrorism: Pathways of risk and resilience. *Annual Reviews of Psychology, 63*, 227-257.

Matos, P. S., Neushotz, L. A., Griffin, M. Q., & Fitzpatrick, J. J. (2010). An exploratory study of resilience and job satisfaction among psychiatric nurses working in inpatient units. *International Journal of Mental Health Nursing, 19*(5), 307-312.

Matsuo, M. (2019). Effect of learning goal orientation on work engagement through job crafting. *Personnel Review, 48*(1), 220-233.

Maynes, T. D., & Podsakoff, P. M. (2014). Speaking more broadly: An examination of the nature, antecedents, and consequences of an expanded set of employee voice behaviors. *Journal of Applied Psychology, 99*(1), 87-112.

Mazzola, J. J., & Disselhorst, R. (2019). Should we be "challenging" employees?: A critical review and meta-analysis of the challenge-hindrance model of stress. *Journal of Organizational Behavior*, *40*(8), 949-961.

Meade, A. W., & Craig, S. B. (201(2). Identifying careless responses in survey data. *Psychological Methods*, *17*(3), 437-455.

Melamed, S., Shirom, A., Toker, S., Berliner, S., & Shapira, I. (2006). Burnout and risk of cardiovascular disease: Evidence, possible causal paths, and promising research directions. *Psychological Bulletin*, *132*(3), 327-353.

Middleton, E. D., Walker, D. O., & Reichard, R. J. (2019). Developmental trajectories of leader identity: role of learning goal orientation. *Journal of Leadership & Organizational Studies*, *26*(4), 495-509.

Messick, S. (1995). Standards of validity and the validity of standards in performance assessment. *Educational Measurement: Issues and practice*, *14*(4), 5-8.

Miller, B. K., & Simmering, M. (2022). Attitude toward the color blue: An ideal marker variable. *Organizational Research Methods*. Retrieved from https://doi.org/10.1177/10944281221075361.

Monperrus, M. (2017). Principles of antifragile software. In Sartor, J. B., *Companion to the first International Conference on the Art, Science and Engineering of Programming* (pp. 1-4).

Morris, M. H., Webb, J. W., & Franklin, R. J. (2011). Understanding the manifestation of entrepreneurial orientation in the nonprofit context. *Entrepreneurship Theory and Practice*, *35*(5), 947-971.

Muller, D., Judd, C. M., & Yzerbyt, V. Y. (2005). When moderation is mediated and mediation is moderated. *Journal of Personality and Social Psychology*, *89*(6), 852-863.

Mygatt, E., Steele, R., & Voloshchuk, M. (2020, June 22). Organizing for the future: Why now? McKinsey & Company. https://www.mckinsey.com/business-functions/people-and-organizational-performance/our-insights/the-organization-blog/organizing-for-the-future-why-now.

Nahrgang, J. D., Morgeson, F. P., & Hofmann, D. A. (2011). Safety at work: a meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology*, *96*(1), 71-94.

Nunnally, J. C. (1978). Psychometric theory. New York: McGraw-Hill.

O'Brien, K. E., & Beehr, T. A. (2019). So far, so good: Up to now, the challenge–hindrance framework describes a practical and accurate distinction. *Journal of Organizational Behavior*, *40*(8), 962-972.

Ong, A. D., Bergeman, C. S., Bisconti, T. L., & Wallace, K. A. (2006). Psychological resilience, positive emotions, and successful adaptation to stress in later life. *Journal of Personality and Social Psychology*, *91*(4), 730-749.

Park, C. L., Cohen, L. H., & Murch, R. L. (1996). Assessment and prediction of stress-related growth. *Journal of Personality*, *64*(1), 71-105.

Parker, S. K., & Collins, C. G. (2010). Taking stock: Integrating and differentiating multiple proactive behaviors. *Journal of Management*, *36*(3), 633-662.

Payne, S. C., Youngcourt, S. S., & Beaubien, J. M. (2007). A meta-analytic examination of the goal orientation nomological net. *Journal of Applied Psychology*, *92*(1), 128-150.

Piccolo, R. F., & Colquitt, J. A. (2006). Transformational leadership and job behaviors: The mediating role of core job characteristics. *Academy of Management Journal*, *49*(2), 327-340.

Plehn-Dujowich, J. (2010). A theory of serial entrepreneurship. *Small Business Economics*, *35*(4), 377-398.

Ployhart, R. E., & Vandenberg, R. J. (2010). Longitudinal research: The theory, design, and analysis of change. *Journal of Management*, *36*(1), 94-120.

Podsakoff, N. P., LePine, J. A., & LePine, M. A. (2007). Differential challenge stressor-hindrance stressor relationships with job attitudes, turnover intentions, turnover, and withdrawal behavior: a meta-analysis. *Journal of Applied Psychology*, *92*(2), 438-454.

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, *63*, 539-569.

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2016). Recommendations for creating better concept definitions in the organizational, behavioral, and social sciences. *Organizational Research Methods*, *19*(2), 159-203.

Porath, C., Spreitzer, G., Gibson, C., & Garnett, F. G. (2012). Thriving at work: Toward its measurement, construct validation, and theoretical refinement. *Journal of Organizational Behavior*, *33*(2), 250-275.

Porter, C. O., Outlaw, R., Gale, J. P., & Cho, T. S. (2019). The use of online panel data in management research: A review and recommendations. *Journal of Management*, *45*(1), 319-344.

Rich, B. L., Lepine, J. A., & Crawford, E. R. (2010). Job engagement: Antecedents and effects on job performance. *Academy of Management Journal*, *53*(3), 617-635.

Richardson, H. A., Simmering, M. J., & Sturman, M. C. (2009). A tale of three perspectives: Examining post hoc statistical techniques for detection and correction of common method variance. *Organizational Research Methods*, *12*(4), 762-800.

Rodell, J. B., & Judge, T. A. (2009). Can "good" stressors spark "bad" behaviors? The mediating role of emotions in links of challenge and hindrance stressors with citizenship and counterproductive behaviors. *Journal of Applied Psychology*, *94*(6), 1438-1451.

Rosenberg, M. (1965). Rosenberg self-esteem scale (RSE). *Acceptance and Commitment Therapy, Measures Package*, *61*.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied*, *80*(1), 1-28.

Rudolph, C. W., Katz, I. M., Lavigne, K. N., & Zacher, H. (2017). Job crafting: A meta-analysis of relationships with individual differences, job characteristics, and work outcomes. *Journal of Vocational Behavior*, *102*, 112-138.

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, *57*(5), 749-761.

Schriesheim, C. A., Powers, K. J., Scandura, T. A., Gardiner, C. C., & Lankau, M. J. (1993). Improving construct measurement in management research: Comments and a quantitative approach for assessing the theoretical content adequacy of paper-and-pencil survey-type instruments. *Journal of Management*, *19*(2), 385-417.

Schwab, D. P. (1980). Construct validity in organizational behavior. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (pp. 3-43). Greenwich, CT: JAI Press.

Schwarzer, R. (1998). Stress and coping resources: Theory and review. *Advances in Health Psychology Research*, 1-24.

Scott, B. A., & Judge, T. A. (2009). The popularity contest at work: Who wins, why, and what do they receive? *Journal of Applied Psychology*, *94*(1), 20-33.

Searle, B. J., & Auton, J. C. (2015). The merits of measuring challenge and hindrance appraisals. *Anxiety, Stress, & Coping*, *28*(2), 121-143.

Seery, M. D., Holman, E. A., & Silver, R. C. (2010). Whatever does not kill us: cumulative lifetime adversity, vulnerability, and resilience. *Journal of Personality and Social Psychology*, *99*(6), 1025-1041.

Seibert, S. E., Crant, J. M., & Kraimer, M. L. (1999). Proactive personality and career success. *Journal of Applied Psychology*, *84*(3), 416-427.

Shirom, A. (1989). Burnout in work organizations. In Cooper, C. L., & Robertson, I. T. (Eds.), *International review of industrial and organizational psychology* (pp. 25-48). New York: Wiley.

Shirom, A., & Melamed, S. (2006). A comparison of the construct validity of two burnout measures in two groups of professionals. *International Journal of Stress Management*, *13*(2), 176-200.

Shirom, A., Melamed, S., Toker, S., Berliner, S., & Shapira, I. (2005). Burnout and health review: current knowledge and future research directions. *International Review of Industrial and Organizational Psychology*, *20*(1), 269-308.

Sinclair, R. R., Waitsman, M. C., Oliver, C. M., & Deese, M. N. (2013). Personality and psychological resilience in military personnel. In Sinclair, R. R., & Britt, T. W. *Building psychological resilience in military personnel: Theory and practice* (pp. 21-46). American Psychological Association.

Spector, P. E. (2019). Introduction: The challenge–hindrance stressor model. *Journal of Organizational Behavior*, *8*(40), 947-948.

Spreitzer, G., Sutcliffe, K., Dutton, J., Sonenshein, S., & Grant, A. M. (2005). A socially embedded model of thriving at work. *Organization Science*, *16*(5), 537-549.

Smircich, L., & Morgan, G. (1982). Leadership: The management of meaning. *The Journal of Applied Behavioral Science*, *18*(3), 257-273.

Snyder, C. R. (1999) *Coping: The psychology of what works*. New York: Oxford University Press.

Stiglbauer, B., & Zuber, J. (2018). Challenge and hindrance stress among schoolteachers. *Psychology in The Schools*, *55*(6), 707-721.

Straub, D., Boudreau, M. C., & Gefen, D. (2004). Validation guidelines for IS positivist research. *Communications of the Association for Information systems*, *13*(1), 380-427.

Tadić, M., Bakker, A. B., & Oerlemans, W. G. (2015). Challenge versus hindrance job demands and well-being: A diary study on the moderating role of job resources. *Journal of Occupational and Organizational Psychology*, *88*(4), 702-725.

Taleb, N. N. (2012). *Antifragile: Things that gain from disorder* (Vol. 3). Random House Incorporated.

Thory, K. (2016). Developing meaningfulness at work through emotional intelligence training. *International Journal of Training and Development*, *20*(1), 58-77.

Tims, M., Bakker, A. B., & Derks, D. (2012). Development and validation of the job crafting scale. *Journal of Vocational Behavior*, *80*(1), 173-186.

Tims, M., Bakker, A. B., & Derks, D. (2013). The impact of job crafting on job demands, job resources, and well-being. *Journal of Occupational Health Psychology*, *18*(2), 230-240.

Toker, S., Melamed, S., Berliner, S., Zeltser, D., & Shapira, I. (2012). Burnout and risk of coronary heart disease: a prospective study of 8838 employees. *Psychosomatic Medicine*, *74*(8), 840-847.

Tourangeau, R., Rips, L. J., & Rasinski, K. (2000). *The psychology of survey response*. Cambridge University Press.

VandeWalle, D. (1997). Development and validation of a work domain goal orientation instrument. *Educational and Psychological Measurement*, *57*(6), 995-1015.

Vroom, V. H. (1964). Work and motivation. New York: Wiley.

Wallace, J. C., Edwards, B. D., Arnold, T., Frazier, M. L., & Finch, D. M. (2009). Work stressors, role-based performance, and the moderating influence of organizational support. *Journal of Applied Psychology*, *94*(1), 254-262.

Wang, H., Demerouti, E., & Bakker, A. B. (2017). A review of job-crafting research: The role of leader behaviors in cultivating successful job crafters. In Parker, S., & Bindl, U. *Proactivity at work* (pp. 95-12(2). Routledge.

Waters, L., Cameron, K., Nelson-Coffey, S. K., Crone, D. L., Kern, M. L., Lomas, T., ... & Williams, P. (2021). Collective wellbeing and posttraumatic growth during COVID-19: How positive psychology can help families, schools, workplaces and marginalized communities. *The Journal of Positive Psychology*, 1-29.

Webster, J. R., Beehr, T. A., & Love, K. (2011). Extending the challenge-hindrance model of occupational stress: The role of appraisal. *Journal of Vocational Behavior*, *79*(2), 505-516.

Williams, P. (2020). *Becoming antifragile: Learning to thrive through disruption, challenge and change*. Hambone Publishing.

Williams, L. J., Hartman, N., & Cavazotte, F. (2010). Method variance and marker variables: A review and comprehensive CFA marker technique. *Organizational Research Methods*, *13*(3), 477-514.

Winwood, P. C., Colon, R., & McEwen, K. (2013). A practical measure of workplace resilience: Developing the Resilience at Work Scale. *Journal of Occupational and Environmental Medicine*, *55*(10), 1205-1212.

Wrzesniewski, A., & Dutton, J. E. (2001). Crafting a job: Revisioning employees as active crafters of their work. *Academy of Management Review*, *26*(2), 179-201.

Youssef, C. M., & Luthans, F. (2005). Resiliency development of organizations, leaders and employees: Multi-level theory building for sustained performance. In Gardner W., Avolio, B., & Walumbwa, F. (Eds.), *Authentic leadership theory and practice: Origins, effects and development* (pp. 303-343). Oxford, UK: Elsevier.

Youssef-Morgan, C. M. (2014). Advancing OB research: An illustration using psychological capital. *Journal of Leadership & Organizational Studies*, *21*(2), 130-140.

Zacher, H., Hacker, W., & Frese, M. (2016). Action regulation across the adult lifespan (ARAL): A metatheory of work and aging. *Work, Aging and Retirement*, *2*(3), 286-306.

Zhang, Y., LePine, J. A., Buckman, B. R., & Wei, F. (2014). It's not fair… or is it? The role of justice and leadership in explaining work stressor–job performance relationships. *Academy of Management Journal*, *57*(3), 675-697.

Zhang, F., & Parker, S. K. (2019). Reorienting job crafting research: A hierarchical structure of job crafting concepts and integrative review. *Journal of Organizational Behavior*, *40*(2), 126-146.

APPENDIX A

SURVEY INSTRUMENTS

Resilience (Luthans, Youssef, Avolio, 2007):

1. When I have a setback at work, I have trouble recovering from it, moving on. (R)
2. Item 2...
3. I can be "on my own," so to speak, at work if I have to.
4. I usually take stressful things at work in stride.
5. Item 5...
6. Item 6...

Thriving at Work (Porath, Spreitzer, Gibson, & Garnett, 2012):

Learning

1. I find myself learning often
2. I continue to learn more and more as time goes by
3. I see myself continually improving
4. I am not learning (R)
5. I have developed a lot as a person

Vitality

6. I feel alive and vital
7. I have energy and spirit
8. I do not feel very energetic (R)
9. I feel alert and awake
10. I am looking forward to each new day

Proactive Personality (Bateman & Crant, 1993):

1. Wherever I have been, I have been a powerful force for constructive change.
2. I am constantly on the lookout for new ways to improve my life.
3. If I see something I don't like, I fix it.
4. I am always looking for better ways to do things.
5. No matter what the odds, if I believe in something, I will make it happen.
6. Nothing is more exciting than seeing my ideas turn into reality.
7. I love being a champion for my ideas, even against others opposition.
8. I excel at identifying opportunities.
9. If I believe in an idea, no obstacle will prevent me from making it happen.
10. I can spot a good opportunity long before others can.

Learning Goal Orientation (VandeWalle, 1997):

1. I often read materials related to my work to improve my ability.
2. I am willing to select a challenging work assignment that I can learn a lot from.
3. I often look for opportunities to develop new skills and knowledge.
4. I enjoy challenging and difficult tasks at work where I'll learn new skills.
5. For me, development of my work ability is important enough to take risks.
6. I prefer to work in situations that require a high level of ability and talent.

Core Self-Evaluation (Judge et al., 2003):

1. I am confident 1 get the success I deserve in life.
2. Sometimes I feel depressed (R).
3. When I try, I generally succeed.
4. Sometimes when I fail, I feel worthless (R).
5. I complete tasks successfully.
6. Sometimes, I do not feel in control of my work (R).
7. Overall, I am satisfied with myself.
8. I am filled with doubts about my competence (R).
9. I determine what will happen in my life.
10. I do not feel in control of my success in my career (R).
11. I am capable of coping with most of my problems.
12. There are times when things look pretty bleak and hopeless to me (R).

Willingness to Take Risks (Dewett, 2006):

1. When I think of a good way to improve the way I accomplish my work, I will risk potential failure to try it out.
2. I will take a risk and try something new if I have an idea that might improve my work, regardless of how I might be evaluated.
3. I will take informed risks at work in order to get the best results, even though my efforts might fail.
4. I am willing to go out on a limb at work and risk failure when I have a good idea that could help me become more successful.
5. I don't think twice about taking calculated risks in my job if I think they will make me more productive, regardless of whether or not my efforts will be successful.
6. Even if failure is a possibility, I will take informed risks on the job if I think they will help me reach my goals.
7. When I think of a way to increase the quality of my work, I will take a risk and pursue the idea even though it might not pan out.
8. In an effort to improve my performance, I am willing to take calculated risks with my work, even if they may not prove successful.

Intrapreneurial Behavior (Gawke, Gorgievski, & Bakker, 2019):

Strategic Renewal Behavior:

1. I undertake activities to realize change in my organization
2. I undertake activities to change the current products/services of my organization.
3. I contribute ideas for strategic renewal for my organization.
4. I conceptualize new ways of working for my organization.

Venture Behavior:

5. I undertake activities to set up new business units.
6. I undertake activities to reach new market or communities for my organization.
7. I undertake activities that result in new departments outside of my organization.
8. I actively establish new collaborations with experts outside of my own profession.

Burnout (Toker et al., 2012):

Physical Exhaustion

1. I feel tired.
2. I have no energy for going to work in the morning.
3. I feel physically drained.
4. I feel fed up.
5. I feel like my ‘‘batteries’’ are ‘‘dead.’’
6. I feel burned out.

Cognitive Weariness

7. My thinking process is slow.
8. I have difficulty concentrating.
9. I feel I am not thinking clearly.
10. I feel I am not focused on my thinking.
11. I have difficulty thinking about complex things.

Emotional Exhaustion

12. I feel I am unable to be sensitive to the needs of my coworkers
13. I feel I am not capable of investing emotionally in my coworkers
14. I feel I am not capable of being sympathetic to my coworkers

Challenge Stressors Scale (Lepine, Zhang, Crawford, & Rich, 2016):

1. Having to complete a lot of work.
2. Having to work very hard.
3. Time pressure.
4. Having to work at a rapid pace to complete all of my tasks.
5. Performing complex tasks.
6. Having to use a broad set of skills and abilities.
7. Having to balance several projects at once.
8. Having to multitask your assigned projects.
9. Having high levels of responsibility.
10. A high level of accountability for your work.

Hindrance Stressors Scale (Lepine, Zhang, Crawford, & Rich, 2016):

1. Administrative hassles.
2. Bureaucratic constraints to completing work (red tape).
3. Conflicting instructions and expectations from your boss or bosses.
4. Unclear job tasks.
5. Conflicting requests from your supervisor(s).
6. Inadequate resources to accomplish tasks.
7. Conflict with peers.
8. Disputes with coworkers.
9. Office politics.

10. Coworkers receiving undeserved rewards/promotions.

Challenge Appraisal Scale (LePine et al., 2016):

1. Working to fulfill the demands of my job helps to improve my personal growth and well-being.
2. I feel the demands of my job challenge me to achieve personal goals and accomplishment.
3. In general, I feel that my job promotes my personal accomplishment.

Hindrance Appraisal Scale (LePine et al., 2016):

1. Working to fulfill the demands of my job thwarts my personal growth and well-being.
2. I feel the demands of my job constrain my achievement of personal goals and development.
3. In general, I feel that my job hinders my personal accomplishment.

Approach Role Crafting Scale (Burning & Campion, 2018):

Work Role Expansion

1. Expand my role by providing opinions on important issues.
2. Expand my work activities to make sure I take care of myself.
3. Expand my work activities to acquire resources that will help me do my job.
4. Expand my work by adding activities to my job that ensure the quality of my deliverables.
5. Expand my work by adding activities to my job that enhance safety or security.

Social Expansion

6. Actively initiate positive interactions with others at work.
7. Actively work to improve my communication quality with others at work.
8. Actively develop my professional network at my job.
9. Actively work to improve the quality of group interactions.

Avoidance Role Crafting (Bruning & Campion, 2018):

Work Role Reduction

1. Find ways to get others to take my place in meetings.
2. Find ways to outsource my work to others outside my group.
3. Find ways to reduce the time I spend in meetings.
4. Find ways to bypass time-consuming tasks.

Approach Resource Crafting Scale (Bruning & Campion, 2018):

Work Organization

1. Create structure in my work processes.
2. Create organization in my work environment.
3. Create structure in my work schedule.
4. Create plans and prioritize my work in an organized manner.

Adoption

5. Use new knowledge or technology to enhance communication.
6. On my own, seek training on new technology.
7. On my own, seek training to improve my work.
8. Use new knowledge or technology to automate tasks.
9. Use new knowledge or technology to structure my work.

Metacognition

10. Use my thoughts to put myself into a good mood at work.
11. Use my thoughts to get me out of a bad mood at work.
12. Use my thoughts to help me focus and be engaged at work.
13. Use my thoughts to create a personal mental approach to work.
14. Use my thoughts to help me prepare for future work I will be doing.

Avoidance Resource Crafting (Bruning & Campion, 2018):

Withdrawal

1. Work in a way that allows me to avoid others at work.
2. Work in a way that allows me to avoid interacting with people when working.
3. Work in a way that allows me to avoid bothersome tasks involved in my work.

Attitudes Towards The Color Blue (Miller & Simmering, 2022):

1. Blue is a beautiful color.
2. Blue is a lovely color.
3. Blue is a pleasant color.
4. The color blue is wonderful.
5. Blue is a nice color.
6. I think blue is a pretty color.
7. I like the color blue.

APPENDIX B

HUMAN USE APPROVAL LETTER

LOUISIANA TECH
UNIVERSITY

OFFICE OF SPONSORED PROJECTS

MEMORANDUM

TO: Dr. Marcia Dickerson, Mr. Abdulah Bajaba

FROM: Dr. Richard Kordal, Director of Intellectual Property & Commercialization (OIPC)
rkordal@latech.edu

SUBJECT: HUMAN USE COMMITTEE REVIEW

DATE: December 10, 2020

In order to facilitate your project, an EXPEDITED REVIEW has been done for your proposed study entitled:

HUC 21-047

"Antifragility: Disorder as the Wind that Energizes the Fire within Us"

The proposed study's revised procedures were found to provide reasonable and adequate safeguards against possible risks involving human subjects. The information to be collected may be personal in nature or implication. Therefore, diligent care needs to be taken to protect the privacy of the participants and to assure that the data are kept confidential. Informed consent is a critical part of the research process. The subjects must be informed that their participation is voluntary. It is important that consent materials be presented in a language understandable to every participant. If you have participants in your study whose first language is not English, be sure that informed consent materials are adequately explained or translated. Since your reviewed project appears to do no damage to the participants, the Human Use Committee grants approval of the involvement of human subjects as outlined.

Projects should be renewed annually. ***This approval was finalized on December 10, 2020 and this project will need to receive a continuation review by the IRB if the project continues beyond December 10, 2021.*** **ANY CHANGES** to your protocol procedures, including minor changes, should be reported immediately to the IRB for approval before implementation. Projects involving NIH funds require annual education training to be documented. For more information regarding this, contact the Office of Sponsored Projects.

You are requested to maintain written records of your procedures, data collected, and subjects involved. These records will need to be available upon request during the conduct of the study and retained by the university for three years after the conclusion of the study. If changes occur in recruiting of subjects, informed consent process or in your research protocol, or if unanticipated problems should arise it is the Researchers responsibility to notify the Office of Sponsored Projects or IRB in writing. The project should be discontinued until modifications can be reviewed and approved.

APPENDIX C

ITEM POOLS FOR ANTIFRAGILITY, RESILIENCE, AND FRAGILITY SCALES

Initial Item Pool for Antifragility Scale:

Optionality to Gain *(one's ability to recognize and choose opportunities of not only minimum losses but also maximum gains in times of asymmetry)*

1. I can adjust how much exposure I have to stressful situations at work so that I can maximize my personal growth.
2. I can recognize alternative ways of dealing with work challenges to maximize my gains and minimize my losses.
3. I can recognize opportunities for growth through stressful situations at work.
4. At work, I handle stressful situations in alternative ways to maximize gains and minimize my losses.
5. I am able to create alternative ways of handling rapid change at work to maximize my gains and minimize my losses.
6. I am able to use randomness or uncertainty in the workplace as growth opportunities.
7. I am particularly good at recognizing growth opportunities within rapidly changing work roles.
8. I am particularly good at recognizing growth opportunities within uncertain work projects.
9. During disorder at work, it is clear to me how to maximize my gains and minimize my losses.
10. I am able to use my past experience to grow from disorder at work.
11. I am able to use my past errors to maximize my gains in future endeavors at work.
12. Stressors at work allow me to take advantage of opportunities to maximize my gains and minimize my losses.
13. At work, I am able to take advantage of challenging tasks to maximize my learning or personal growth.
14. I am able to use challenging tasks to advance my knowledge at work.
15. Every time I make an error at work, I use the knowledge from it to grow.
16. I not only recover from stressful situations at work, but also grow from them.
17. I can find meaning in stressful situations at work.
18. I grow from past experience to meet the challenges of today's work.
19. My past experience helps me recognize opportunities for growth when dealing with work challenges.
20. My past experience helps me choose opportunities for growth when dealing with work challenges.

Disorder Embracement *(one's positive attitude towards disorder and its forms that is exemplified in excitement, thrill, and enjoyment)*

21. I enjoy challenging myself at work so that I can grow.
22. I seek out challenges at work to grow.
23. Challenging situations at work bring out the best in me.
24. It is exciting to try out new roles, tasks, or positions at work.
25. I embrace change at work due to the personal growth it provides.
26. I enjoy some randomness or small variations in work-related tasks and roles.
27. I can try out new roles at work.
28. I am willing to start new projects at work.
29. Trying out rapidly changing roles at work is thrilling.
30. I enjoy starting a new project at work.
31. I like to experiment with new work-related tasks regardless of the outcome to maximize my growth.
32. I try to put myself in uncertain situations at work to grow.
33. I prefer to work in an environment that is dynamic and changing.
34. I tend to see errors at work as sources of information rather than stressful incidents.
35. I see challenging or demanding tasks as opportunities for personal growth.
36. It is thrilling to experience uncertainties at work.
37. I embrace my imperfection at work.
38. It is okay to make mistakes at work.

Initial Item Pool for Resilience Scale:

Optionality to Adapt *(one's ability to recognize and choose opportunities of minimum losses in times of asymmetry)*

1. I am able to maintain stable functioning during times of disorder at work.
2. I can recover from a stressful situation at work.
3. I find it relatively easy to bounce back to normal functioning after stressful situations at work.
4. I can recognize opportunities to minimize losses associated with trying out new roles or projects at work.
5. In a new role or project, I can usually tell when I can do it without my performance suffering.
6. In a new role or project, I can usually tell when I can do it without feeling excess stress.
7. I have ways to reduce the stress associated with uncertainty at work.

8. When there is a lot of information or tasks at work, I find ways to reduce the stress that comes from them.
9. I am able to quickly get over work situations that require a lot of energy and effort.
10. I usually overcome pressure resulting from complex job roles.
11. I tend to pull through times of constant stress that results from uncertainty or randomness at work without my job performance suffering.
12. I can reduce my stress even in times of uncertainty or randomness at work.
13. I am able to efficiently use my energy during times of disorder at work so that I do not wear out.
14. I am able to recognize alternative ways of doing things at work to save my energy.
15. I can psychologically recover from a project at work that requires a lot of effort and energy.
16. Rapid change at work rarely wears me out.
17. I can minimize losses in my job performance that result from uncertainty at work.
18. I am able to cope with losses associated with risky projects.
19. I seldom get affected by stressful situations at work.
20. I do not get overwhelmed by disorder at work in a way that makes my job performance worse.
21. I can mentally reduce the pressure resulting from stressful or challenging situations at work.

Disorder Neutrality *(one's neutral attitude towards disorder and its forms that is exemplified in indifference, disengagement, and impassivity)*

22. I neither like nor dislike disorder at work.
23. I am indifferent regarding challenging situations at work.
24. I do not mind changes to my work schedule, but don't necessarily seek them.
25. It is okay for me to deviate from common practices if it is required by my job.
26. I would be open to participating in new projects if needed.
27. I feel indifferent towards uncertainty at work.
28. I am willing to try out new roles or tasks, but only if they are suggested to me.
29. I welcome some uncertainty at work, but do not necessarily seek it.
30. Having some change at work is neither good nor bad.
31. I feel somewhat disengaged when faced with disorder at work.
32. Disorder at work is neither a winning nor a losing situation.
33. Mistakes at work are just sources of information.

34. I do not mind taking on complex tasks at work if the situation requires it.
35. I have a neutral attitude towards disorder at work.

Initial Item Pool for Fragility Scale:

Limited Optionality to Adapt *(one's limitation or lack of ability to recognize and choose opportunities with minimum losses in times of asymmetry)*

1. I find it hard to recover from stressful situations at work.
2. I find it difficult to handle the stress associated with trying out new roles at work.
3. It takes me a long time to recover from a stressful situation at work.
4. At work, I find it hard to recognize alternative ways of doing things.
5. At work, I find it difficult to utilize alternative ways of doing things.
6. It is hard for me to cope with the stress associated with uncertainty at work.
7. I find it difficult to recover from the stress associated with rapid changes at work.
8. I find it difficult to avoid unnecessary performance problems when there is disorder at work.
9. I find it difficult to avoid stress when there is disorder at work.
10. It is hard for me to apply what I learned from prior experience at work.
11. I tend to have performance problems when I try out new tasks or roles.
12. I tend to have stress when I try out new tasks or roles.
13. It is difficult to prevent my performance from dropping when there is uncertainty at work.
14. It is difficult to reduce my stress when there is uncertainty at work.
15. It is difficult to prevent my performance from dropping when there is rapid change at work.
16. It is difficult to reduce my stress when there is rapid change at work.
17. It's so hard for me to reduce my stress when work is difficult, that I cannot recognize growth opportunities.
18. It is not easy for me to adapt to uncertain roles or tasks at work.
19. I rarely recognize ways to reduce my stress when starting a new work project.
20. I rarely recognize ways to maintain high job performance when starting a new work project.
21. It is hard to cope with the stress that comes from rapid change at work.

Disorder Aversion *(one's negative attitude towards disorder and its forms that is exemplified in anxiety, distress, and displeasure)*

22. It is stressful for me to do my job differently because it brings uncertainty.

23. I don’t like doing my job differently because it makes me feel stress.
24. I prefer to rely on one way of doing things at work.
25. Uncertainty causes me distress.
26. Rapid change at work makes me anxious.
27. I do not like following a changing work plan because of the uncertainty it brings.
28. It is stressful to work in an environment that is challenging.
29. It is worrisome to work in an environment that is uncertain.
30. I don’t like work environments that do not have much structure.
31. Uncertainty in the workplace negatively affects me.
32. It is hard for me to embrace mistakes at work due to the personal harm they cause me.
33. It is stressful to try out new tasks at work.
34. I usually don’t leave my comfort zone at work so I can avoid any stress from uncertainty.
35. It is easy for me to feel nervous about uncertainty in the workplace.
36. I find it hard to embrace risky situations at work due to the potential harm they may inflict on me.
37. I dislike work roles with risky outcomes.
38. I like it when my work is predictable.
39. Stressful situations at work do me more harm than good.
40. Uncertainty at work does me more harm than good.
41. When I make errors at work, it causes me stress.
42. It is hard for me to enjoy constant work role changes.
43. When faced with uncertain situations at work, I find it hard not to feel stressed out.
44. It is hard for me to take my mistakes at work in stride.
45. I dislike when there are imperfections in my work.