

**EXPLORING THE STRUCTURE OF FEARLESSNESS USING SELF-
REPORT MEASURES**

by

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A Thesis

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Master of Science



Department of Psychological Sciences

West Lafayette, Indiana

May 2022

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ACKNOWLEDGMENTS

I would like to sincerely thank my advisor, Dr. Donald Lynam, for all of the guidance and mentorship during this project. I also gratefully acknowledge the time and assistance provided by my committee, Dr. Susan South, and Dr. Douglas Samuel.

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ABSTRACT

Fearlessness is often discussed in relation to clinical and personality research (e.g., Davies & Craske, 2018; Lilienfeld & Widows, 2005). However, there is a paucity of research focusing on its empirical structure, in particular with from self-report measures. The present study examined the hierarchical structure of self-reported fearlessness and compared this structure to external criterion measures. Using a pre-registered analytical approach, we found evidence for the multidimensionality of fearlessness, and that a six-factor model fit the data best. Criterion variables measuring boldness, fear, anxiety, psychopathy, personality, and impulsivity, were correlated with the factor scores at each factor level of the model. The six-factor solution emerged as comprehensive and labeled Boldness, Anxiety, Surgency, Recklessness, Adventurousness, and Daring. The findings from this study elucidate how trait fearlessness unfolds at varying levels and how these factors relate to and diverge from various outcomes.

INTRODUCTION

Fear and fearlessness have been discussed in relation to psychopathology and personality for decades; they also appear in the criteria and descriptions for various maladaptive psychological syndromes including conduct disorders, suicidal behavior, risk taking, and impulsivity (Costello et al., 2018; Gauthier et al., 2018; Klingzell et al., 2016; Satchell et al., 2018). Fear has been examined in various ways, including as a trait or temperament, and as a state, with state fear being an emotional response to an imminent threat (i.e., a specific object, person, or situation) (Barker et al., 2011; Davies & Craske, 2018). Fear and fearlessness can be captured through the use of physiological measurements such fear-potentiated startle (FPS) and self-report measures of state or trait fear/fearlessness (e.g., Newman et al., 2010). Fear and fearlessness are experienced to varying degrees across the population; and are important to consider in the context of physical and psychological health (Kushner & Sher, 1989; Stafford et al., 2007).

Fear and Fearlessness in Psychopathology

Fear and fearlessness are particularly important in the context of understanding behaviors associated with certain forms of psychopathology, especially specific phobias, anxiety disorders, and PTSD (American Psychiatric Association, 2013). However, fear is also considered in research related to suicide, and psychopathy (e.g., Gauthier et al., 2018). In consideration of specific phobias, it is clinically important to understand what objects or situations trigger an individual's fear response. Phobias can manifest as state fear, in which an individual is reacting to a perceived, imminent danger, often characterized by avoidance or a desire to flee (e.g., an animal phobia; McNally & Steketee, 1985). Notably, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) describes phobias as “marked fear or anxiety” about a specific object or situation (p. 197). Although the DSM-5 criteria for phobias include either of these emotions, it is crucial to highlight the differences between fear and anxiety. In a clinical context, fear is typically defined as an emotional response to present danger, whereas anxiety is an emotional response to anticipated or potential threat (Davies & Craske, 2018). This definition is particularly useful when thinking about disorders such as posttraumatic stress disorder (PTSD), as trauma often comes from a situation of intense fear that one cannot easily escape, but can manifest

later as anxiety when an individual is in a situation where that danger is not present. Fear responses have been found to be especially persistent at high in levels of intensity for individuals with PTSD. This includes generalization in fear conditioning, such that fear is experienced when exposed to stimuli that are not directly related to the traumatic event (Thome et al., 2017; Lis et al., 2019).

The Interpersonal Psychological Theory of Suicide (IPTS) proposes that to attempt suicide one must not only desire death but also have the acquired capability to act on that desire (Joiner, 2005). The term “acquired capability” has been found to consist of reduced fear of suicide and heightened pain tolerance (Ribeiro et al., 2014). Fearlessness of suicide, but not fearlessness about death, has been associated with number of suicide attempts, number of methods, and number of violent methods (Gauthier et al., 2018). Thus, fearlessness could be a potential risk factor to be assessed when considering an individual’s risk of attempting suicide.

Differentiating Between Fear and Anxiety

The terms anxiety and fear are sometimes used interchangeably even though they’ve been shown to capture different states (Perusini & Fanselow, 2015). The Activity Preference Questionnaire (APQ; Lykken, Tellegen, & Katzenmeyer, 1973) even uses the word “fearful” when defining trait anxiety. Animal research has used neurobiological models to make distinctions between fear and anxiety. For example, predatory imminence theory differentiates behavior into pre-encounter (innate anxiety), post-encounter (fear and mode of defense), and circa-strike defense (unconditioned reaction to shock) (Fanselow & Lester, 1988; Perusini & Fanselow, 2015). Gray and McNaughton (2000) proposed that punishing stimuli used in animal research can be categorized one of two ways; those that require approach and those that require avoidance. In this conceptualization, those that require approach elicit anxiety, and those that elicit avoidance elicit fear. This expands on work by Blanchard and colleagues in 1997 who found that rodents who had been given drugs used to treat generalized anxiety disorder did not have all of their defensive behaviors affected to same degree. Specifically, it reduced those behaviors of approaching punishing stimuli, but not behaviors of avoidance.

Work differentiating fear and anxiety has also been done with humans. Perkins and colleagues (2007) analyzed associations between scores on questionnaires assessing fear and anxiety, finding that correlations between measures of fear and trait anxiety were significantly smaller than correlations between trait anxiety and neuroticism, which they argued provided

support for showing fear and anxiety are separable. In a subsequent study, they examined the relationships between fear and anxiety and performance in a military training setting. Their results from regression analyses showed fear captured significant amounts of variance in performance that was not shared with anxiety. Fear responses in humans have been categorized by avoidance and the fight, flight, freeze responses, whereas anxiety is conceptualized as an emotion that motivates hypervigilance and heightened sensitivity to stimuli during approach (Rhudy & Meagher, 2000; Sylvers et al., 2011).

Fearlessness in Psychopathy

The role of fearlessness in psychopathy can be traced back to Lykken (1957) with his proposed low-fear hypothesis. This hypothesis views low fear as the core trait and mechanism underlying psychopathy, and that individuals with psychopathic traits have a reduced ability to detect threats which leads to externalizing problems and antisocial behavior in childhood and adulthood. Since this hypothesis was proposed, there has been ongoing debate as to the role of fearlessness in psychopathy, with research calling into question if fearlessness is a core component of psychopathy (Newman & Brinkley, 1997). An example of this debate in more contemporary research is the role Fearless Dominance (FD) as defined by the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996) and PPI-R (Lilienfeld & Widows, 2005). Miller and Lynam (2012) did not find strong support for the convergent and criterion validity of the Fearless Dominance factor, arguing that Fearless Dominance is not a central or necessary component of psychopathy, instead arguing that psychopathy's core mechanism is explained by Antagonism. An article by South (2019) discussing Lilienfeld and colleagues (2019) proposal to view personality disorders as emergent interpersonal syndromes, notes that boldness does not appear to serve a direct function in the model; suggesting boldness could be better viewed as a means to accomplish the goals which motivate an individual who has high levels of antagonism and disinhibition.

Assessing Fear and Fearlessness

Many scales have been developed to measure fear and fearlessness, with some capturing total fear while others capture fear to specific objects or situations. Scales such as the Fearless-Dominance factor of the PPI-R, the Courage Measure (CM; Norton & Weiss, 2009), Acquired

Capability for Suicide Scale-Fearlessness about Death (ACSS-FAD; Ribeiro et al., 2014), the Fear Survey Schedule, Third Edition (FSS-III; Arrindell, Emmelkamp, & van der Ende, 1984), the harm avoidance subscale of the Temperamental Character Inventory (TCI; Cloninger, 1999), Boldness from the Triarchic Model of Psychopathy (TriPM; Patrick et al., 2009), and the Trait Fear Scale (Kramer et al., 2020) are all examples of measures that are purported to be measuring a component of fear. However, it can be argued that measures claiming to assess a component fear may also be measuring anxiety. For example, TCI harm avoidance also covers anticipatory worry and low mood, with items referring to becoming highly stressed or feeling apprehensive, in addition to items referring more directly to fear (“am afraid of many things”). BIS Anxiety scale also has an item “begin to panic when there is danger,” which may be better conceptualized as fear in that it represents a to a present danger. Thus, it is important to consider potential overlap across measures of trait anxiety and measures of trait fear. Harm avoidance itself is a term that has been used in both relation to trait anxiety and trait fear, which can lead to conceptual confusion regarding fear and anxiety and how they are measured (Sylvers et al., 2011).

Fearlessness is referred to using a multitude of labels, including risk-taking, bravery, dominance, and excitement-seeking (Sylvers et al., 2011; Tellegen, 1982). Furthermore, as discussed, fearlessness is measured various ways, spoken about in relation traits as well as states, and covers various domains and categories. A key example of this is Boldness as conceptualized by Patrick et al., which is defined as the nexus of dominance in social situations, emotional stability and resiliency, and adventurousness. They describe boldness as not a term that is necessarily interchangeable with fearlessness, but as one way trait Fearlessness can be outwardly expressed. This showcases an important conceptualization of Fearlessness in that it should be considered a multidimensional construct.

Fearlessness covers a broad range of descriptions in the measures mentioned, therefore, examining the empirical structure of this domain would provide a clearer way to differentiate between its categories. When investigating measures of fearlessness that have been shown to be associated with aversive startle potentiation (ASP), Kramer and Patrick (2012) conducted a series of structural modeling to develop a bifactor model of these scales. This structure revealed an overarching Fearlessness domain, and subfactors titled “distress”, “stimulation seeking”, and “sociability” accounting for the additional variance among specific measures. However, there are several ways this study can be expanded. Notably, their model was created at the scale level, which

assumes that the chosen scales are homogenous, however, scales may be measuring multiple processes. Item level analysis thus gives an advantage due to not grouping specific items together in the model based on their scale.

Due to the many terms that fall under the Fearlessness umbrella, it is also possible Fearlessness could succumb to the jingle and jangle fallacies. The jingle fallacy is when the same term is used to refer to different constructs, and the jangle fallacy is when different terms refer to the same construct (Block, 1995). Some concepts within Fearlessness may therefore run the risk of being used interchangeably if there is not an empirically clear distinction. Although Fearlessness is measured in several different ways, further empirical analysis is needed to identify the various facets underlying it in order to distinguish between its various components.

A method that would be effective in elucidating an empirical structure Fearlessness is an adaptation of Goldberg's (2006) "Bass-Ackwards" approach. This approach consists of factor analyses to extract from one-to-many factors while saving the factor scores from each analysis. The relationships among these factor scores from each level reveals the overall structure of the domain. This approach allows for a map of the factor emergence for each level of Fearlessness from broadest to most specific. Moreover, this analysis been used to uncover the structure of narcissism, Agreeableness, and Antagonism (Crowe, Lynam, Campbell, & Miller, 2019; Crowe, Lynam, & Miller, 2018; Sleep et al., 2021).

The Current Study

The purpose of the present study is to describe empirically meaningful levels of Fearlessness using the previously described Goldberg's (2006) "Bass-Ackwards" approach. For this study, fearlessness is defined as the propensity to experience the emotion of fear and will be examined at the trait level. Furthermore, it is bipolar, such that fearlessness and fear fall on opposite sides of the same dimension. Items from measures of fearlessness from the International Personality Item Pool (IPIP; Goldberg et al., 2006) will be used in bass-ackwards analysis. The IPIP is a freely available domain that contains a large pool of personality items that have been used to proxy many different scales, including those related to fear and fearlessness. The purpose of utilizing the IPIP fear and fearlessness scales for this study is that we are examining fearlessness from the trait level, and therefore it is necessary to work at the level of personality rather than a diagnostic level, which is where many other of the previously discussed fearlessness measures

operate. Additionally, because the IPIP items come from the same item pool, we are able to have items that are scored on the same dimension that cover a wide range of fearlessness facets. Therefore, this also defines fearlessness as that which is being measured by the fearlessness scale items. We hypothesized that this analysis would yield multiple categories of fearlessness, such as boldness, dominance, and risk-taking. We also predicted that a specific anxiety factor would emerge throughout the factor analyses. Then, the factors that were identified from this approach were correlated with several external criterion variables (e.g., the Big Five, psychopathy, boldness, etc.). All study procedures, including hypotheses, design plan, and planned analyses were preregistered. The preregistered protocol can be found here: <https://osf.io/j6895>

METHOD

Participants and Procedure

A total of 742 participants completed the study for credit in the introductory psychology course at a large midwestern university. Participants completed the study measures and then forwarded a survey on to three friends who would serve as informants. Informants completed a brief survey about the target participant for a chance to win a gift card. The data were examined for invalid responding using attention check items (e.g., “please select Sometimes”) and the Infrequency and Too Good to Be True validity scales of the Elemental Psychopathy Assessment (EPA; Lynam et al., 2013). Failure of two or more of the four attention check items or a score of four or higher on the Infrequency or Too Good to Be True scales resulted in that individual’s data being excluded from analyses. Additionally, as the study took approximately 45-60 minutes to complete, participants who completed the study within 10 minutes or less were also excluded from analysis. Finally, failure of a “botcha” also resulted in data being excluded from analyses. The botcha consisted of a sentence being presented to the participants backwards (e.g., “fun are trucks red”) and participants were asked to type the sentence in reverse order (e.g., “red trucks are fun”). Failure of attention check items resulted in the exclusion of 68 participants, 37 were excluded for failing the botcha, and an additional 18 were excluded for scoring four or higher on the validity scales. Thus, a total of 123 participants were excluded, resulting in the final sample of $N = 619$. The majority of the final sample was White with U.S. or recent European background (71.6%), and the average age was 18.67 years old ($SD = 1.14$). The sample was 47% male.

The informants completed a brief survey comprised of external criterion measures. A total of 623 informants completed this survey. These data were examined for invalid responding in which individuals who failed three or more of six randomly chosen items from the EPA validity scales were not included in further analyses. Additionally, those who completed less than 75% of the survey items were excluded from analyses. This left 562 valid informant responses. These were matched up to the target participants using a de-identified ID number, which resulted in informant data for 298 of the target study participants. When there were two or more informants for one target participant, the average score for each measure was used. The informant sample was

majority male (51.5%) and White with U.S. or recent European background (68.2%), and the average age was 20.84 ($SD = 8.13$).

Measures

International Personality Item Pool (IPIP) Fear/Fearlessness Items

The author reviewed the scales available broadly related to fear and fearlessness and selected these scales to be included in the study. The current study will use items from the following IPIP constructs: Adventurousness, Anxiety, Bravery/Courage/Valor, Cautiousness, Dominance, Excitement-Seeking, Fearfulness, Harm Avoidance, Public Self-Consciousness, Provocativeness, Recklessness, Risk-Avoidance, Risk-taking/Sensation Seeking/Thrill, Social Boldness, Social-confidence, Social-discomfort, and Timidity. Due to overlaps of some items across scales, only unique items were presented to participants. Across scales, there were 340 items. After removing repeated items across scales, 226 items were presented to participants. The full details of the individual IPIP scales can be found in Table 1.

External Criteria

The factors resulting from the bass-ackwards analysis were correlated with a variety of external criteria. External criteria was collected from a mix of both self- and informant-report.

Triarchic Psychopathy Measure (TriPM) Boldness Scale. The TriPM Boldness Scale (Patrick et al., 2009) is a 19-item scale developed to measure boldness in the realms of interpersonal behavior, emotional experience, and venturesomeness. The internal consistency of the TriPM Boldness scale was adequate ($\omega = .84$).

Table 1. IPIP Scales Selected for Bass-Ackward Analysis

IPIP Scale	Scale Derived From	Number of Items	Internal Consistency (McDonald's Omega or Chronbach Alpha)
IPIP-NEO Openness facet:	FFM Openness facet Adventurousness	10	$\omega = .74$
Adventurousness (IPIP-NEO O4)	Social Presence facet of the CPI		
IPIP California Psychological Inventory:	(Gough, 1957)	10	$\omega = .58$
Adventurousness (IPIP-CPI			
Adventurousness)			
IPIP Six Factor Personality Questionnaire:	6FPQ lower-level construct Change		
Adventurousness (IPIP-6FPQ	scale (Jackson et al., 1996)	10	$\omega = .73$
Adventurousness)			
IPIP Oregon Vocational Interest Scales:	Created for the IPIP domain of scales	10	$\omega = .83$
Adventure (IPIP-ORVIS Adventure)			
IPIP Computerized Adaptive Assessment of	CAT-PD anxious apprehension candidate		
Personality Disorder: Anxiousness (IPIP-	trait (Simms et al., 2011)	7	$\omega = .91$
CATPD Anxiousness)			
IPIP-NEO Neuroticism facet: Anxiety (IPIP-	FFM Neuroticism facet Anxiety	10	$\omega = .87$
NEO N1)			
IPIP Jackson Personality Inventory: Anxiety	Anxiety from the JPI (Jackson, 1994)	10	$\omega = .85$
(IPIP-JPI Anxiety)			
IPIP 16 Personality Factor Questionnaire:	Apprehension domain 16PF questionnaire		
Anxiety (IPIP-16PF Anxiety)	(Cattell, 2001)	10	$\omega = .84$
IPIP HEXACO Personality Inventory:	HEXACO-PI Anxiety (Lee & Ashton,		
Anxiety (IPIP-HEXACO E: Anxiety)	2004)	10	$\omega = .87$

Table 1 continued

IPIP Scale	Scale Derived From	Number of Items	Internal Consistency (McDonald's Omega or Chronbach Alpha)
IPIP Behavioral Inhibition: Anxiety (IPIP-BIS Anxiety)	Behavioral Inhibition and Activation Systems (BIS/BAS; Carver & White, 1994)	10	$\omega = .88$
IPIP Big Five Aspects Scale: Withdrawal (IPIP-BFAS Withdrawal)	BFAS (Deyoung et al., 2007)	10	$\omega = .83$
IPIP Values in Action: Bravery (IPIP-VIA Bravery)	VIA Valor (Peterson & Seligman, 2004)	10	$\omega = .82$
IPIP Abridged Big Five Dimensional Circumplex Facets: Cautiousness (IPIP-AB5C Cautiousness)	AB5C (Hofstee et al., 1992)	11	$\omega = .81$
IPIP-NEO Conscientiousness facet: Cautiousness (IPIP-NEO C6)	FFM Conscientiousness facet Cautiousness	10	$\omega = .87$
IPIP Computerized Adaptive Assessment of Personality Disorder: Domineering (IPIP-CATPD Domineering)	CAT-PD domineering candidate trait (Simms et al., 2011)	6	$\omega = .88$
IPIP California Psychological Inventory: Dominance (IPIP-CPI-Dominance)	CPI Narcissism (Gough, 1957)	11	$\omega = .81$
IPIP Interpersonal Circumplex: Assured Dominant (IPIP-IPIC Assured Dominant)	Interpersonal Circumplex (Leary, 1957)	4	$\omega = .78$
IPIP-NEO Extraversion Facet: Excitement Seeking (IPIP-NEO E5)	FFM Extraversion facet Excitement Seeking	10	$\omega = .82$
IPIP HEXACO Personality Inventory: Fearfulness (IPIP-HEXACO E: Fear)	HEXACO-PI Fear (Lee & Ashton, 2004)	10	$\omega = .84$

Table 1 continued

IPIP Scale	Scale Derived From	Number of Items	Internal Consistency (McDonald's Omega or Chronbach Alpha)
IPIP Temperament and Character Inventory: Harm Avoidance (IPIP-TCI-HA)	TCI (Cloniger, 1999)	10	$\omega = .82$
IPIP Abridged Big Five Dimensional Circumplex Facets:Provocativeness (IPIP- AB5C Provocativeness)	AB5C (Hofstee et al., 1992)	11	$\omega = .73$
IPIP Public Self-Consciousness	Self-Consciousness: Public (Buss, 1980)	12	$\omega = .82$
IPIP Temperament and Character Inventory: Recklessness (IPIP-TCI-Recklessness)	TCI (Cloniger, 1999)	10	$\omega = .82$
IPIP Multidimensional Personality Questionnaire: Risk Avoidance (IPIP-MPQ Risk Avoidance)	MPQ Harm Avoidance (Tellegen & Waller, 2008)	10	$\omega = .83$
IPIP Computerized Adaptive Assessment of Personality Disorder: Risk-Taking (IPIP- CATPD Risk-Taking)	CAT-PD Risk-taking/Recklessness candidate trait (Simms et al., 2011)	5	$\omega = .83$
IPIP Jackson Personality Inventory: Risk- Taking (IPIP-JPI Risk-Taking)	Risk-taking from the JPI (Jackson, 1994)	10	$\omega = .79$
IPIP Hogan Personality Inventory: Thrill- Seeking (IPIP-HPI Thrill-Seeking)	HPI (Hogan & Hogan, 2002)	7	$\omega = .76$
IPIP Sensation Seeking: Dangerous Thrill- Seeking (IPIP-Dangerous Thrill-Seeking)	Sensation-Seeking facets: Dangerous Thrill-Seeking (Hoyle et al., 2002)	10	$\omega = .86$
IPIP Sensation Seeking: Impulsive Thrill- Seeking (IPIP-Impulsive Thrill-Seeking)	Sensation-Seeking facets: Impulsive Thrill-Seeking (Hoyle et al., 2002)	10	$\omega = .88$

Table 1 continued

IPIP Scale	Scale Derived From	Number of Items	Internal Consistency (McDonald's Omega or Chronbach Alpha)
IPIP Sensation Seeking: Calculated Thrill-Seeking (IPIP-Calculated Thrill-Seeking)	Sensation-Seeking facets: Calculated Thrill-Seeking	10	$\omega = .74$
IPIP Behavioral Activation: Fun-Seeking (IPIP-BAS Fun-Seeking)	Behavioral Inhibition and Activation Systems (BIS/BAS; Carver & White, 1994)	10	$\omega = .83$
IPIP HEXACO Personality Inventory: Social Boldness (IPIP-HEXACO X: Social Boldness)	HEXACO-PI Social Boldness (Lee & Ashton, 2004)	10	$\omega = .86$
IPIP Jackson Personality Inventory: Social-Confidence (IPIP-JPI Social Confidence)	Social Confidence from the JPI (Jackson, 1994)	10	$\omega = .83$
IPIP Hogan Personality Inventory: No Social Anxiety (IPIP-HPI No Social Anxiety)	HPI (Hogan & Hogan, 2002)	6	$\omega = .77$
IPIP Temperament and Character Inventory: Social Discomfort (IPIP-TCI Social Discomfort)	TCI (Cloniger, 1999)	10	$\omega = .85$
IPIP California Psychological Inventory: Timidity (IPIP-CPI Timidity)	CPI Femininity (Gough, 1957)	10	$\omega = .82$

Note. FFM = Five Factor Model; HEXACO: Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, Openness to Experience.

Big Five Inventory-2 (BFI-2). The BFI-2 (Soto & John, 2017) is a 60-item scale developed to measure the Big Five domains of general personality of Agreeableness, Conscientiousness, Extraversion, Negative Emotionality, and Open-Mindedness. This scale also measures 15 facets of the Big Five: Sociability, Assertiveness, Energy Level, Compassion, Respectfulness, Trust, Organization, Productiveness, Responsibility, Anxiety, Depression, Emotional Volatility, Intellectual Curiosity, Aesthetic Sensitivity, and Creative Imagination. The internal consistencies of the domain scales were adequate to high (Agreeableness $\omega = .77$, Conscientiousness $\omega = .85$, Extraversion $\omega = .85$, Negative Emotionality $\omega = .88$, Open-Mindedness $\omega = .77$). The internal consistencies of the facet scales ranged from $\omega = .47$ to $.84$, with a median of $.68$.

UPPS-P Impulsive Behavior Scale. The UPPS-P (Lynam et al., 2006) is a 59-item questionnaire made up of subscales that examines traits of impulsivity. The subscales are Negative Urgency (tendency to act rashly under extreme negative emotions), Lack of Premeditation (tendency to act without thinking), lack of perseverance (inability to remain focused on a task), Sensation Seeking (tendency to seek out novel and thrilling experiences), Positive Urgency (tendency to act rashly under extreme positive conditions). The internal consistencies of subscales were high (range $\omega = .82$ to $.94$).

Super Short Form of the Elemental Psychopathy Assessment (EPA-SSF). The EPA-SSF (Collision et al., 2016) is an 18-item measure developed out of the original EPA (Lynam et al., 2013) and it includes a total score as well as three subscale scores of Antagonism, Emotional Stability, and Disinhibition. The internal consistencies of the subscales were in the adequate range ($\omega = .56$ to $.70$) in addition to the total score ($\omega = .75$).

Crime and Analogous Behavior Scale (CAB). The CAB (Miller & Lynam, 2003) is a 39-item self-report measure that contains five subscales related to antisocial and externalizing behaviors. This measure yields scores on subscales of Substance Use, Antisocial Behavior, Violent Delinquency, Non-Violent Delinquency, and Gambling. The range of internal consistencies of these scales was $\omega = .29$ to $.61$.

Fear Survey Schedule, Third Edition (FSS-III). The FSS-III (Arrindell et al., 1984; Wolpe & Lang, 1964) is a 52-item questionnaire that contains five subscales social fears, agoraphobia fears, injury fears, sex aggression fears, fear of harmless animals) and an overall

general fear score. The internal consistency of the total score was good ($\omega = .94$) in addition to the subscales ($\omega = .73$ to $.92$, median = $.82$).

Fear Questionnaire (FQ). The FQ (Marks & Matthews, 1975) is a 15-item self-report questionnaire that yields a total phobia score as well as three subscale phobia scores (agoraphobia, blood injury phobia, and social phobia). The range of internal consistencies for the subscales was adequate ($\omega = .63$ to $.68$), and the internal consistency for the total score was high ($\omega = .86$).

The Patient-Reported Outcomes Measurement Information System Anxiety (PROMIS-A) and PROMIS Depression (PROMIS-D). These two scales (Cella et al., 2010) comprise seven and eight items, respectively. The internal consistency of the PROMIS-A scale was high ($\omega = .93$) as was the internal consistency of the PROMIS-D scale ($\omega = .95$).

Informant Measures

The 19-item TriPM Boldness scale was administered to informants in which they were instructed to respond to the questions as though they were describing their friend. The internal consistency for this scale was good ($\omega = .79$). The EPA-SSF was also given to informants to complete regarding the target participant, with internal consistencies in the adequate range for the subscale scores ($\omega = .63$ to $.73$) and for the total score ($\omega = .70$).

The Mini-IPIP FFM. The mini-IPIP FFM (Donnellan et al., 2006) is a 20-item freely available measure that captures the five domains of the FFM. The internal consistencies of each domain were as follows: Extraversion $\omega = .78$, Agreeableness $\omega = .78$, Conscientiousness $\omega = .74$, Neuroticism $\omega = .65$, Intellect/Imagination $\omega = .66$.

Data Analysis

All fearlessness items were correlated with one another in order to identify duplicate items or excessively overlapping items. For item pairs identified with correlations greater than $.65$, one of those items was randomly removed from the pool. After this was completed, 185 items remained. Then, using a principal axis factoring method, a single unrotated factor was extracted, items with factor loadings of $.32$ or less were removed to ensure those included in the analyses have shared content. After this was completed, the final pool consisted of 119 items.

Goldberg's (2006) "Bass-Ackwards" approach was used for further analyses. Using principal axis factoring, a single unrotated factor was extracted. Then, rotated solutions using Promax rotation of successively more factors were extracted until one of the factors was no longer meaningful or interpretable. This was determined by assessing at which level factors had no primary item loadings and examining the narrowness of the factors. The factor scores were saved at each step, and factor solutions from different levels were correlated and compared. The identified factors were then correlated with the self-and informant-report criterion variables.

RESULTS

The first unrotated factor accounted for 20% of the total variance. After the single-factor analysis, subsequent larger factor solutions were examined. We employed several approaches to identifying the ideal number of factors. A scree plot and parallel analysis (Horn, 1965) suggested 11 factors. Although not pre-registered, Velicer's minimum average partial (MAP) test was also used, which suggested eight factors. In line with our pre-registration and previous approaches (e.g., Sleep et al., 2021) factor analysis occurred until no items had their highest loading on a factor, and the solution before that was considered as the maximum factors to be considered for further evaluation. In the eight-factor solution, none of the items had their highest loading on the eighth factor, thus the seven-factor solution was considered as the maximum number of factors. The items in each factor solution were examined to evaluate if any factors were too specific to be meaningful. The six- and seven-factor solution each provided good fit indices (e.g., RMSEA index = .039 and .037, TLI = .79 and .81, BICs = -28199.45 and -28459.36 respectively). The seven-factor solution however, provided a narrow Dislike of Change factor, further splitting off from an adventurousness factor, but it only included five items (i.e., items with loadings .32 and greater). The seven-factor solution also only provided 1% increment of variance beyond the six-factor solution, so the six-factor model was believed to provide for the overall best fit of the fearlessness data. This model accounted for 39% of the variance in Fearlessness scores.

Hierarchical Structure of Fearlessness

The hierarchical structure of the Fearlessness factors can be found in Figure 1. Example items that loaded highly onto the six-factor solution can be found in Table 2. At each level, factor loadings were saved and correlated with each of the IPIP scales used and the external criterion variables (see Tables 3 and 4). Similarity indices for the correlational profiles of each factor within level of the hierarchy as well as across respective levels, were calculated using double-entry intraclass correlations (ICCs), and can be found at the bottom of the tables.

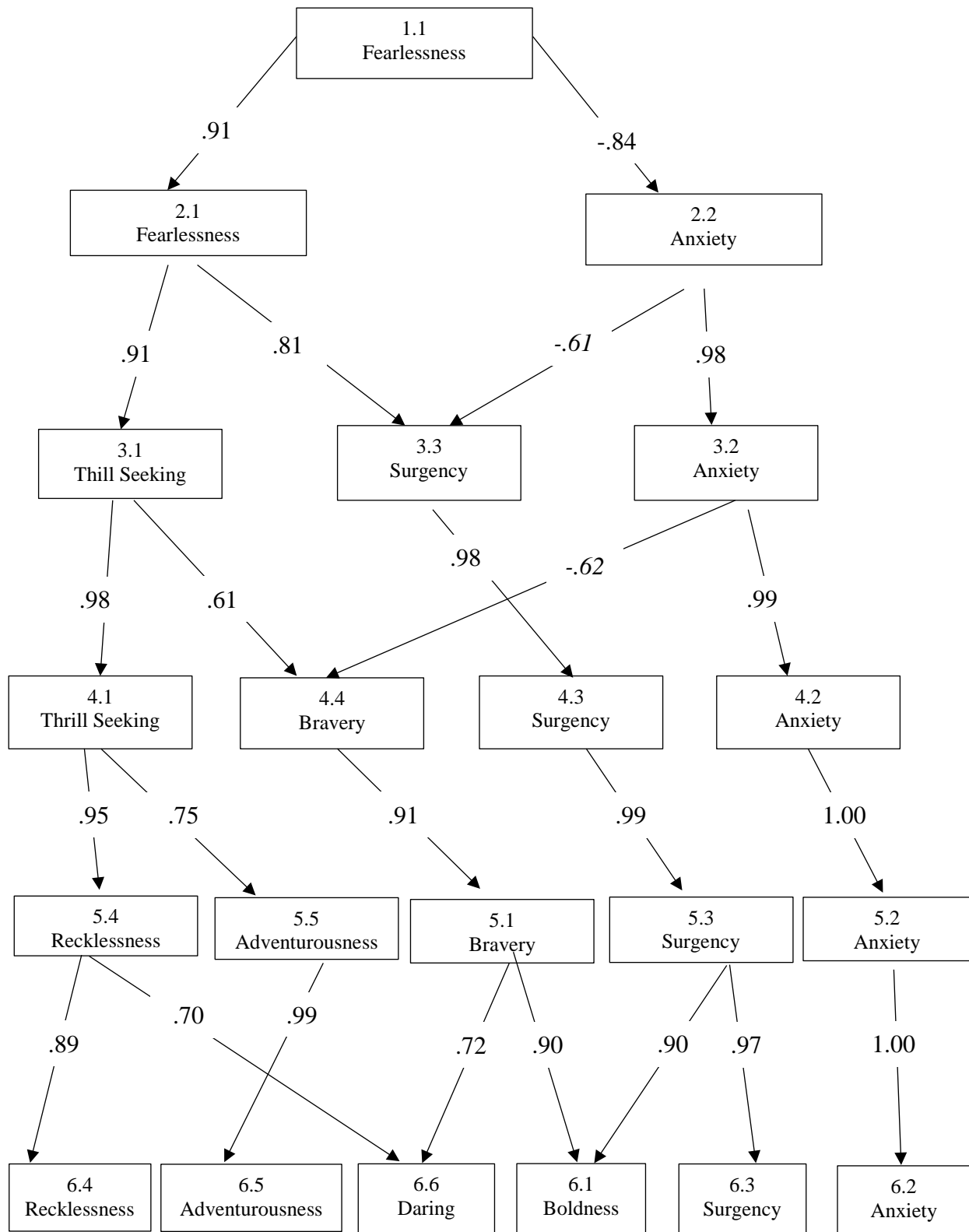


Figure 1. Hierarchical structure of fearlessness. Only correlations from each level are included.

Table 2. Example Item Content and Loadings for the Final Six-Factor Solution

Scale	Item	<u>Bold</u>	<u>Anx.</u>	<u>Surg.</u>	<u>Reck.</u>	<u>Adven.</u>	<u>Daring</u>
		F6.1	F6.2	F6.3	F6.4	F6.5	F6.6
VIA-Bravery	Don't hesitate to express an unpopular opinion.	.67*	.07	.13	.06	.09	.04
VIA-Bravery	Have taken frequent stands in the face of strong opposition.	.60*	.21	.13	.00	.03	.04
CPI-Dominance	Challenge others' point of view.	.58*	.01	.02	.04	.02	.03
VIA-Bravery	Speak up in protest when I hear someone say mean things.	.54*	.14	.18	.01	.08	.12
VIA-Bravery	Call for action while others talk.	.54*	.12	.15	.00	.04	.02
BIS-Anxiety	Am always worried about something.	.15	.84*	.02	.07	.07	.03
CATPD-Anxious	Feel that my worry and anxiety is out of control.	.10	.81*	.02	.00	.03	.12
NEO_N-Anxiety	Get caught up in my problems.	.11	.78*	.01	.00	.09	.03
NEO_N-Anxiety	Worry about things.	.03	.75*	.03	.20	.17	.02
BIS-Anxiety	Become overwhelmed by events.	.02	.75*	.02	.02	.08	.03
TCI-Social Dis.	Talk to a lot of different people at parties.	.04	.05	.69*	.15	.00	.01
JPI-Social Conf.	Feel comfortable around people.	.03	.06	.58*	.09	.16	.17
HPI-No Social Anx.	Am skilled in handling social situations.	.18	.03	.56*	.00	.09	.09
JPI-Social Conf	Express myself easily.	.14	.02	.55*	.05	.01	.15
TCI-Social Dis.	Am not bothered by difficult social situations.	.08	.09	.53*	.08	.03	.04
CPI-Timidity	Enjoy being reckless.	.09	.02	.15	.66*	.02	.20
BAS-Fun Seeking	Like to behave spontaneously.	.08	.01	.12	.66*	.22	.02
AB5C-Cautious	Do crazy things.	.00	.05	.18	.61*	.09	.07
NEO_C-Cautious	Like to act on a whim.	.07	.03	.03	.59*	.22	.08
CPI-Timidity	Break rules.	.15	.16	.07	.57*	.09	.09
Calculated Thrill	Am open to new experiences.	.08	.03	.08	.16	.66*	.38
6FPQ Adventure	Seek adventure.	.04	.13	.04	.20	.59*	.45

Table 2 continued

Scale	Item	<u>Bold</u>	<u>Anx.</u>	<u>Surg.</u>	<u>Reck.</u>	<u>Adven.</u>	<u>Daring</u>
		F6.1	F6.2	F6.3	F6.4	F6.5	F6.6
CPI-Adventure	Try out new things.	.03	.01	.08	.07	.57*	.49
Calculated Thrill	Would love to explore strange places.	.05	.14	.13	.24	.56*	.55
CPI-Adventure	Am open to change.	.01	.12	.01	.00	.54*	.32
Dangerous Thrill	Would enjoy being out on a sailboat during a storm.	.10	.06	.02	.17	.05	.56*
CATPD Risk-Taking	Get a thrill out of doing things that might kill me.	.00	.16	.06	.36	.05	.53*
Calculate Thrill	Face danger confidently.	.26	.09	.07	.05	.10	.50*
Dangerous Thrill	Prefer fear to boredom.	.05	.03	.03	.32	.09	.50*
Dangerous Thrill	Might enjoy a free fall from an airplane.	.13	.03	.04	.11	.36	.48*

Note. All factor loadings are in absolute values. * = highest positive loadings for that factor.

Table 3. Factor Score Correlations With Fearlessness Scales

	F1.1	F2.1	F2.2	F3.1	F3.2	F3.3	F4.1	F4.2	F4.3	F4.4	F5.1	F5.2	F5.3	F5.4	F5.5	F6.1	F6.2	F6.3	F6.4	F6.5	F6.6
NEO O Adv	<u>.58</u>	<u>.54</u>	-.47	.49	-.44	.47	<u>.50</u>	-.46	.44	.25	.29	-.43	.37	.34	<u>.69</u>	.24	-.41	.42	.21	.70	.40
CPI Adv	<u>.57</u>	<u>.55</u>	-.44	.46	-.39	<u>.55</u>	.48	-.40	<u>.55</u>	.22	.27	-.37	.48	.32	<u>.66</u>	.35	-.38	.48	.30	<u>.66</u>	.23
6FPQ Adv	<u>.60</u>	<u>.60</u>	-.43	<u>.58</u>	-.40	.46	<u>.59</u>	-.41	.42	.30	.34	-.38	.33	.42	.76	.27	-.35	.39	.27	.78	.48
ORVIS Adv	<u>.61</u>	<u>.58</u>	-.48	<u>.62</u>	-.49	.37	<u>.53</u>	-.43	.25	<u>.66</u>	<u>.63</u>	-.42	.26	<u>.55</u>	.35	<u>.54</u>	-.42	.25	.33	.30	<u>.66</u>
CAT-PD Anx	<u>-.61</u>	-.31	.83	-.27	.85	-.34	-.23	.87	-.30	-.37	-.38	.87	-.27	-.18	-.28	-.31	.87	-.33	-.01	-.29	-.37
NEO N Anx	<u>-.68</u>	-.39	.87	-.37	.90	-.36	-.33	.92	-.30	-.43	-.44	.92	-.26	-.28	-.35	-.37	.92	-.31	-.10	-.35	-.44
16PF Anx	<u>-.61</u>	-.35	.77	-.31	.79	-.35	-.27	.80	-.30	-.40	-.41	.80	-.27	-.22	-.30	-.37	.81	-.31	-.08	-.30	-.36
HEXACO E:Anx	<u>-.65</u>	-.34	.87	-.31	.89	-.34	-.27	.91	-.29	-.41	-.42	.91	-.27	-.24	-.26	-.35	.92	-.32	-.07	-.26	-.41
BIS Anx	<u>-.69</u>	-.38	.90	-.34	.93	-.38	-.27	.92	-.31	-.52	<u>-.51</u>	.93	-.30	-.27	-.23	-.41	.93	-.37	-.04	-.23	<u>-.51</u>
BFAS Withdrawal	-.70	-.39	.91	-.31	.91	-.46	-.25	.91	-.41	-.47	-.50	.91	-.37	-.19	-.35	-.44	.92	-.43	-.01	-.36	-.41
VIA Bravery	<u>.66</u>	<u>.63</u>	<u>-.51</u>	.46	-.42	.74	.35	-.34	<u>.66</u>	.71	.73	-.33	<u>.63</u>	.29	.41	.83	-.36	<u>.60</u>	.21	.40	.37
AB5C Cautious	-.35	<u>-.54</u>	.03	<u>-.54</u>	-.01	-.35	<u>-.63</u>	.02	-.36	.03	.06	-.01	-.38	<u>-.60</u>	-.44	-.11	.00	-.31	-.71	-.37	-.14
NEO C Cautious	-.33	<u>-.52</u>	.00	<u>-.58</u>	-.01	-.24	<u>-.66</u>	.01	-.23	-.02	.04	-.01	-.26	<u>-.68</u>	-.34	-.10	-.01	-.19	-.77	<u>-.25</u>	-.21
CAT-PD Dom	.19	.26	-.04	.22	-.01	.23	.20	.01	.21	.19	.16	.02	.24	.25	.03	.23	.01	.21	.26	-.01	.14
CPI Dom	.38	.37	-.24	.35	-.22	.30	.28	-.17	.22	.44	.41	-.17	.24	.33	.11	.45	-.19	.20	.27	.06	.30
IPC Assured Dom	.26	.35	-.07	.23	.01	.43	.25	.01	.45	.07	.06	.02	<u>.50</u>	.27	.11	.21	.008	.46	.34	.09	.04
NEO E Excite	.63	.80	-.24	.80	-.20	<u>.54</u>	.85	-.21	<u>.50</u>	.25	.23	-.17	.49	.77	<u>.68</u>	.33	-.17	.44	.78	<u>.61</u>	.43
HEXACO E Fear	-.78	-.74	<u>.63</u>	-.77	.63	-.49	<u>-.67</u>	<u>.57</u>	-.34	-.78	-.77	<u>.56</u>	-.28	<u>-.64</u>	<u>-.57</u>	<u>-.61</u>	<u>.54</u>	-.35	-.33	<u>-.53</u>	-.86
TCI Harm Avoid	-.70	-.80	.31	-.88	.31	-.43	-.87	.29	-.33	-.47	-.41	.27	-.33	-.88	<u>-.56</u>	-.41	.25	-.32	-.75	-.47	<u>-.68</u>
AB5C Provocative	<u>.63</u>	<u>.66</u>	-.42	<u>.60</u>	-.37	<u>.56</u>	<u>.53</u>	-.32	.47	.59	.56	-.31	.49	<u>.57</u>	.30	<u>.63</u>	-.34	.46	.49	.23	.48
Public Self-Consci	<u>-.63</u>	-.36	.82	-.30	.83	-.39	-.22	.81	-.31	<u>-.54</u>	<u>-.55</u>	.82	-.29	-.20	-.23	-.47	.83	-.34	.004	-.24	-.45
TCI Reckless	<u>.58</u>	<u>.63</u>	-.35	<u>.59</u>	-.31	<u>.50</u>	<u>.60</u>	-.32	.48	.27	.31	-.28	.39	.42	.79	.34	-.27	.39	.36	.78	.35

Table 3 continued

[illegible]

Table 3 continued

	F1.1	F2.1	F2.2	F3.1	F3.2	F3.3	F4.1	F4.2	F4.3	F4.4	F5.1	F5.2	F5.3	F5.4	F5.5	F6.1	F6.2	F6.3	F6.4	F6.5	F6.6
F5.1							.76			1.00		-.91	.82	.75	.82						
F5.2								1.00					-.76	-.63	-.79						
F5.3									1.00					.72	.83						
F5.4										.79					.90					.99	
F6.1											.98						-.87	.76	.69	.85	.85
F6.2												1.00						-.75	-.46	-.80	-.74
F6.3													.74						.57	.71	.63
F6.4														.96						.79	.78
F6.5															.99						.84

Note. All correlations greater than or equal to $|r| = .13$ are significant at $p < .01$; *rs* between .50 and .69 are underlined, *rs* between .70 and .89 are bolded; *rs* above .90 are bolded and underlined. Profile similarities are calculated from double-entry correlations.

Table 4. Factor Score Correlations With External Criterion Scales

	F1.1	F2.1	F2.2	F3.1	F3.2	F3.3	F4.1	F4.2	F4.3	F4.4	F5.1	F5.2	F5.3	F5.4	F5.5	F6.1	F6.2	F6.3	F6.4	F6.5	F6.6
BFI Agreeableness	-.01	-.03	-.01	-.11	.02	.11	-.09	-.002	.15	-.13	-.07	.009	.11	-.19	.17	-.05	.009	.12	-.16	.21	-.15
BFI Compassion	-.03	.008	.07	-.07	.11	.12	-.04	.11	.15	-.11	-.07	.12	.13	-.12	.12	-.007	.11	.12	-.05	.15	-.16
BFI Respectfulness	-.12	-.17	.03	-.20	.03	-.07	-.20	.02	-.03	-.13	-.07	.02	-.09	-.30	.1	-.1	.02	-.07	-.29	.16	-.17
BFI Trust	-.13	.09	-.14	.007	-.11	.2	.03	-.13	.24	-.06	-.02	-.12	.22	-.05	.19	-.01	-.11	.25	-.05	.22	-.03
BFI Conscientiousness	-.02	-.12	-.12	-.23	-.08	.1	-.28	-.06	.12	.07	.14	-.07	.07	-.37	.04	.14	-.08	-.08	-.37	.1	-.15
BFI Organization	-.09	-.15	-.01	-.22	.006	.006	-.25	.02	.02	-.005	.04	.02	-.01	-.31	-.01	.06	.001	-.02	-.29	.03	-.17
BFI Productiveness	.14	.05	-.23	-.07	-.18	.24	-.11	-.17	.24	.16	.22	-.16	.2	-.20	.13	.23	-.18	.21	-.22	.18	-.03
BFI Responsibility	-.10	-.21	-.06	-.30	-.04	.02	-.35	-.02	.03	.03	.1	-.02	-.02	-.43	-.02	.08	-.03	.002	-.44	.04	-.18
BFI Extraversion	<u>.62</u>	<u>.6</u>	-.46	.36	-.34	.82	.34	-.33	.83	.34	.38	-.31	.83	.26	.42	.51	-.32	.83	.26	.43	.2
BFI Assertiveness	<u>.55</u>	<u>.50</u>	-.45	.30	-.35	<u>.69</u>	.23	-.31	<u>.66</u>	.48	<u>.51</u>	-.30	<u>.66</u>	.18	.3	<u>.58</u>	-.32	<u>.66</u>	.11	.31	.26
BFI Energy Level	.44	.44	-.33	.29	-.25	<u>.56</u>	.29	-.26	<u>.57</u>	.18	.21	-.23	<u>.55</u>	.20	.4	.33	-.25	<u>.53</u>	.22	.41	.1
BFI Sociability	<u>.52</u>	<u>.53</u>	-.36	.31	-.24	.74	.32	-.25	.77	.19	.22	-.23	.79	.26	.34	.35	-.24	.8	.27	.35	.14
BFI Negative Emotionality	<u>-.63</u>	-.36	.81	-.29	.81	-.42	-.25	.82	-.38	-.37	-.4	.82	-.34	-.17	-.37	-.36	.83	-.39	-.03	-.39	-.34
BFI Anxiety	<u>-.63</u>	-.40	.76	-.37	.78	-.36	-.34	.79	-.31	-.39	-.39	.79	-.3	-.31	-.3	-.33	.79	-.35	-.15	-.29	-.43
BFI Depression	<u>-.52</u>	-.30	<u>.67</u>	-.20	<u>.65</u>	-.42	-.18	<u>.67</u>	-.41	-.25	-.29	.67	-.37	-.09	-.34	-.31	<u>.68</u>	-.4	-.03	-.36	-.18
BFI Emotional Volatility	-.46	-.22	<u>.65</u>	-.17	<u>.65</u>	-.29	-.12	<u>.66</u>	-.25	-.32	-.37	<u>.65</u>	-.19	-.03	-.31	-.29	<u>.67</u>	-.25	.12	-.35	-.27
BFI Open-Mindedness	.15	.20	-.04	.13	.001	.25	.12	.02	.24	.15	.2	.04	.19	.01	.32	.22	.03	.18	.004	.33	.05
BFI Aesthetic Sensitivity	-.07	.02	.16	-.02	.19	.06	-.02	.20	.08	-.04	-.02	.21	.05	-.07	.11	.009	.21	.04	-.04	.12	-.08
BFI Creative Imagination	.25	.25	-.18	.17	-.14	.3	.14	-.11	.28	.23	.27	-.10	.23	.04	.32	.3	-.11	.22	.02	.33	.1
BFI Intellectual Curiosity	.26	.28	-.17	.23	-.13	.29	.20	-.11	.26	.24	.28	-.09	.2	.09	.38	.29	-.09	.2	.04	.39	.16
CAB Antisocial Behavior	-.20	-.21	.13	-.26	.15	-.07	-.23	.13	-.01	-.23	-.2	.12	-.01	-.27	-.09	-.18	.12	-.007	-.20	-.05	-.25
CAB Gambling	-.21	-.18	.19	-.19	.20	-.12	-.17	.19	-.08	-.18	-.17	.19	-.08	-.17	-.12	-.14	.18	-.09	-.10	-.11	-.21

Table 4 continued

	F1.1	F2.1	F2.2	F3.1	F3.2	F3.3	F4.1	F4.2	F4.3	F4.4	F5.1	F5.2	F5.3	F5.4	F5.5	F6.1	F6.2	F6.3	F6.4	F6.5	F6.6
CAB Nonviolent Del.	-.06	-.07	.04	-.12	.05	.02	-.11	.04	.04	-.09	-.07	.05	.04	-.13	-.02	-.06	.05	.05	-.12	.009	-.1
CAB Substance Use	-.15	-.22	.02	-.24	.01	-.12	-.25	.01	-.1	-.09	-.06	.002	-.12	-.27	-.11	-.08	-.003	-.11	-.26	-.08	-.16
CAB Violent Del.	-.27	-.26	.21	-.29	.22	-.14	-.25	.19	-.08	-.3	-.28	.19	-.07	-.26	-.15	-.26	.19	-.07	-.19	-.11	-.28
EPA Total	<u>.52</u>	<u>.52</u>	-.38	<u>.56</u>	-.38	.32	<u>.53</u>	-.37	.25	.39	.34	-.36	.28	<u>.59</u>	.23	.35	-.36	.27	<u>.50</u>	.15	.47
EPA Antagonism	.07	.09	-.03	.19	-.08	-.1	.18	-.07	-.15	.12	.05	-.08	-.1	.29	-.12	.02	-.07	-.11	.24	-.18	.22
EPA Disinhibition	.36	<u>.51</u>	-.08	<u>.58</u>	-.08	.22	<u>.59</u>	-.07	.15	.26	.19	-.06	.19	<u>.66</u>	.22	.26	-.06	.13	<u>.65</u>	.13	.36
EPA Emotional Stability	.74	<u>.55</u>	-.78	.42	-.73	<u>.65</u>	.36	-.72	<u>.61</u>	.49	<u>.52</u>	-.71	.58	.29	.44	.52	-.72	<u>.62</u>	.14	.45	.42
FQ Total Phobia	<u>-.51</u>	-.36	<u>.56</u>	-.30	<u>.54</u>	-.38	-.24	<u>.52</u>	-.33	-.43	-.45	<u>.52</u>	-.29	-.20	-.28	-.36	<u>.51</u>	-.36	-.01	-.3	-.42
FQ Agoraphobia	<u>.50</u>	-.37	<u>.52</u>	-.28	.49	-.44	-.22	.47	-.4	-.42	-.44	.46	-.38	-.19	-.25	-.37	.46	-.44	-.03	-.27	-.38
FQ Blood Injury	-.43	-.30	.48	-.28	.49	-.27	-.24	.47	-.21	-.36	-.37	.47	-.18	-.19	-.28	-.27	.46	-.24	-.02	-.29	-.39
FQ Social Phobia	-.42	-.29	.48	-.25	.47	-.3	-.19	.45	-.25	-.37	-.39	.45	-.22	-.15	-.23	-.31	.44	-.28	.006	-.25	-.35
FSS Total	<u>-.51</u>	-.34	<u>.59</u>	-.31	<u>.59</u>	-.33	-.23	<u>.56</u>	-.25	-.49	<u>-.5</u>	<u>.56</u>	-.22	-.21	-.24	-.39	<u>.56</u>	-.29	-.002	-.24	-.46
FSS Agoraphobia Fears	-.46	-.33	.49	-.31	.49	-.3	-.26	.48	-.25	-.35	-.37	.48	-.22	-.21	-.31	-.29	.47	-.27	-.05	-.32	-.38
FSS Animals	-.27	-.18	.30	-.21	.32	-.1	-.15	.29	-.03	-.36	-.36	.29	-.0006	-.14	-.14	-.25	.28	-.05	.02	-.14	-.35
FSS Injury	-.27	-.19	.31	-.18	.32	-.15	-.12	.29	-.1	-.33	-.33	.29	-.06	-.10	-.16	-.23	.28	-.11	.06	-.17	-.32
FSS Sex Aggression	-.29	-.20	.34	-.18	.34	-.18	-.13	.31	-.13	-.32	-.33	.32	-.11	-.12	-.13	-.26	.31	-.14	.01	-.14	-.29
FSS Social	<u>-.57</u>	-.36	<u>.68</u>	-.29	<u>.67</u>	-.41	-.21	<u>.65</u>	-.35	-.49	-.49	<u>.65</u>	-.35	-.22	-.17	-.43	<u>.66</u>	-.4	-.03	-.17	-.42
PROMIS Anxiety	-.49	-.24	<u>.69</u>	-.23	.71	-.24	-.20	.74	-.2	-.28	-.29	.74	-.18	-.17	-.21	-.22	.74	-.23	-.03	-.22	-.32
PROMIS Depression	-.35	-.12	<u>.55</u>	-.07	<u>.55</u>	-.22	-.06	<u>.58</u>	-.22	-.12	-.15	<u>.58</u>	-.2	-.003	-.16	-.13	<u>.58</u>	-.24	.07	-.19	-.12
TriPM Boldness	.82	.70	<u>-.69</u>	<u>.59</u>	<u>-.63</u>	.72	<u>.51</u>	<u>-.59</u>	<u>.64</u>	<u>.63</u>	<u>.66</u>	<u>-.57</u>	<u>.6</u>	.40	<u>.53</u>	<u>.69</u>	<u>-.58</u>	<u>.59</u>	.27	<u>.51</u>	<u>.5</u>
UPPS Lack of Persev.	-.20	-.1	.27	.01	.23	-.27	.07	.20	-.26	-.23	-.29	.2	-.2	.16	-.2	-.29	.21	-.21	.21	-.24	-.02
UPPS Lack of Premed.	.32	.40	-.14	.44	-.14	.2	.47	-.15	.18	.12	.06	-.14	.23	<u>.54</u>	.13	.07	-.13	.23	.50	.07	.34

Table 4 continued

[illegible]

Table 4 continued

	F1.1	F2.1	F2.2	F3.1	F3.2	F3.3	F4.1	F4.2	F4.3	F4.4	F5.1	F5.2	F5.3	F5.4	F5.5	F6.1	F6.2	F6.3	F6.4	F6.5	F6.6
F4.3						.99				.81											
F5.1							.73			.99		-.87	.81	.60	.87						
F5.2								.95					-.80	-.53	-.80						
F5.3									.99					.58	.88						
F5.4										.68					.61				.93		
F6.1											.98						-.88	.90	.40	.89	.87
F6.2												.95						-.86	-.28	-.83	-.82
F6.3													.99						.38	.88	.73
F6.4														.93						.27	.60
F6.5															.99						.74

Note. All correlations greater than or equal to $|r| = .13$ are significant at $p < .01$ for target participant scores, and $|r|$ greater than or equal to .18 are significant at $p < .01$ for informant scores; r s between .50 and .69 are underlined, r s between .70 and .89 are bolded; r s above .90 are bolded and underlined. Profile similarities are calculated from double-entry correlations.

The broadest factor (F1.1) labeled Fearlessness, overall had moderate to strong relationships with most of the IPIP scales, with r s ranging from .19 for CATPD domineering and -.33 for NEO_C Cautious to .75 for Calculated Thrill-Seeking and -.78 for HEXACO E: Fear, and an absolute value median of .63. All correlations were significant at a level of $p < .01$.

At the second level, the two factors accounted for 27% of the variance. The first factor, still called Fearlessness (F2.1), was made up of items describing a desire to seek out or participate in a variety of novel or risky experiences. This factor had a moderate to strong relationship with most of the the IPIP scales; r s ranged from .26 (CATPD Domineering) to .82 (BAS Fun-Seeking and HPI Thrill-Seeking) and .83 (JPI Risk-Taking), with an absolute value median of .62. Notably, this factor had a weaker relationship with the anxiety scales, with r s ranging from -.30 (JPI Anxiety) to -.39 (NEO_N1 Anxiety and BFAS Withdrawal). The second factor at this level (F2.2), called Anxiety, was made up of items describing worry, uneasiness, or a desire to withdrawal from a situation. Anxiety's relations with the IPIP scales had a wider range than Fearlessness, with r s ranging from virtually zero for NEO C6 ($r = -.002$) and AB5C Cautiousness ($r = .03$) to almost unity with BFAS Withdrawal ($r = .92$), with an absolute value median of .44. As expected, the Anxiety factor elicited strong relationships with scales designed to directly measure anxiety (e.g., BIS Anxiety, HEXACO:E Anxiety, CATPD Anxiousness).

At the third level, 32% of the variance was accounted for by the three factors. The Anxiety factor (3.2) yielded a nearly identical profile ($icc = .99$) with Anxiety (F2.2) across IPIP scales. From the Fearlessness factor (F2.1), two new factors appeared. Thrill-Seeking (F3.1) had very similar profile to Fearlessness across criteria ($icc = .98$; F2.1 and F3.1 $r = .94$) but was composed of items more specifically related to seeking out risky or exciting opportunities. Thrill-Seeking correlated most highly with scales related to excitement seeking, risk taking, and adventurousness (e.g., HPI Thrill-Seeking, CATPD Risk-Taking, BAS Fun-Seeking). The third factor (F3.3), called Surgency, included highly loading items related to extraversion, social boldness, and provocativeness. In terms of the IPIP scales, r s ranged from .23 (CATPD Domineering) to .89 (HEXACO Social Boldness), with an absolute value median of .46.

In the four factor solution, 35% of the variance was accounted for by the four factors. Thrill-Seeking (F4.1), Anxiety (F4.2), and Surgency (F4.3) remained consistent with their counterparts in the three factor solution, with identical profile similarities ($iccs = 1.00$) with F3.1, F3.2, and F3.3, respectively. Items from Thrill Seeking and Anxiety combined to form a fourth factor, Bravery (F4.4). Bravery was made up items describing a range of courageous actions, including saving others from physical danger, standing up to opposition, and being able to face one's fears. This factor had strong relationships with VIA Valor ($r = .71$), HEXACO E:Fear ($r = -.78$), and ORVIS Adventurousness ($r = .66$), and weak relationships with NEO_C Cautious ($r = -.02$) and AB5C Cautious ($r = .03$).

In the fifth level of analysis, the factors accounted for 37% of the variance. Bravery (F5.1), Anxiety (F5.2), and Surgency (5.3) were isomorphic with the previous level, as seen in the similarity of their profiles ($iccs = 1.00$) with each of their respective counterparts at the previous level. Thrill-Seeking (F4.1) spilt into factors Recklessness (F5.4) and Adventurousness (F5.5). Recklessness was composed of items describing the act of doing dangerous things, spontaneity, and excitement seeking without regards for the rules or risk. This factor manifested relationships

with IPIP scales that ranged from $r = -.15$ (JPI Anxiety) to $r = .87$ (CATPD Risk-Taking) and to $r = -.88$ (TCI Harm Avoidance), with an absolute value median of .38. Adventurousness was made up of items related to openness and a desire to explore. This factor's relationship with IPIP scales ranged from $r = .03$ (CATPD Domineering) to $r = .79$ (TCI Recklessness), and had a median absolute value of .44.

At the sixth factor level, the factors accounted for 39% of the variance. Anxiety (F6.2), Recklessness (F6.4), and Adventurousness (F6.5) remained consistent with the previous level, with profile similarity scores of $icc = 1.00$, .96, and .99, respectively, with their fifth-level counterparts. Surgency (5.3) and Bravery (5.1) both shed items to form Boldness (F6.1); whereas items from Recklessness (5.4) and Bravery (5.1) contributed items to form Daring (F6.6). Recklessness and Surgency retained their basic form from the previous level, and Bravery (5.1) became Daring (F6.6) and Boldness (F6.1). Boldness consisted of highly loading items describing fearlessness in social situations, such as challenging other people's viewpoints, expressing unpopular opinions, and calling for action in the face of opposition. The relationships between this factor and the IPIP scales ranged from $r = -.10$ (NEO_C6) to .83 (VIA Valor), with an absolute value median of .25. Daring was made up of items specifically related to seeking danger and a desire to engage in frightening activities. Correlations of the IPIP scales to this factor ranged from $r = .04$ (IPC Assured Dominance) to $r = -.86$ (HEXACO E: Fear), with an absolute value median of .42.

Factor Relations to the External Criterion

To evaluate the differential relations among the factors at each level of the Fearlessness hierarchy, the factor scores were correlated with the external criterion measures (see Table 4). Similarity coefficients in the form of double-entry ICCs were also examined for these correlational profiles.

Across the hierarchy, Anxiety, which emerged at the two-factor level, had its strongest correlations with EPA-SSF Emotional Stability (-), the PROMIS scales (+), TriPM Boldness (-), and both fear scales (+). It also had moderate to strong negative associations with UPPS-P Sensation-Seeking (-) and the EPA-SSF total score (-). Anxiety was only slightly negatively related to the CAB. Informant report measures of EPA-SSF Emotional Stability(-) and TriPM Boldness (-), as well as Mini-FFM Neuroticism (+) had moderate with the Anxiety factors. Surgency, which first emerged at the three-factor level, was strongly positively related to Extraversion across the hierarchy, in addition to EPA-SSF Emotional Stability and TriPM Boldness. This was similar to informant-report, which yielded moderate associations with TriPM Boldness, Mini-FFM Extraversion, and EPA-SSF Emotional Stability. Surgency was consistently positively related to the UPPS-P Sensation-Seeking. In general, it bore small to moderate negative relations to fear as assessed by the FQ and FSS. Bravery, from the four-factor level, was most strongly positively related to TriPM Boldness, EPA-SSF Emotional Stability, BFI Assertiveness, and UPPS-P Sensation-Seeking. A similar pattern of associations was also seen with the informant measures, in which Bravery had moderate relationships with informant TriPM Boldness and EPA-SSF Emotional Stability. Bravery's strongest negative relations were with the fear scales (FQ and FSS), and was also negatively related to several forms of antisocial behavior from the CAB.

Adventurousness, emerging at the five-factor level, had its strongest positive relationships with TriPM Boldness, UPPS-P Sensation-Seeking, EPA-SSF Emotional Stability, BFI Assertiveness, and BFI Openness and its facets. Adventurousness had moderate positive relationships with informant-reported TriPM Boldness, EPA-SSF Emotional Stability, and Mini-FFM Extraversion, and a moderate negative relationship to Mini-FFM Neuroticism. Adventurousness was generally moderately negatively correlated with the fear scales and mostly unrelated to the CAB. Finally, Daring which emerged at the six-factor level had its largest positive correlations with UPPS-P Sensation-Seeking and TriPM Boldness. It has moderate to strong relations with the EPA-SSF subscales and total score. For the informant reports, Daring was moderately positively related to TriPM Boldness, EPA-SFF Emotional Stability and EPA-SSF total score. It's largest negative associations occur with fear and anxiety (BFI Anxiety, BFI Negative Emotionality, PROMIS-Anxiety, and the FQ and FSS scales).

The Fearlessness factor at the second level split off into multiple other factors and narrowed across the different factor solutions ending in Recklessness (F6.4). Specifically at the two-factor level, Fearlessness had its strongest positive relationships with UPPS-P Sensation-Seeing, TriPM Boldness, BFI Extraversion and Sociability, and all the EPA-SSF scales except Antagonism. Second-level Fearlessness had moderate correlations with informant TriPM Boldness, Mini-FFM Extraversion, and EPA-SSF Emotional Stability. Broadly, it had moderate negative relationships with fear and anxiety scales (PROMIS-Anxiety, FQ, and FSS), and its strongest negative correlation with BFI Anxiety. At the last level, Recklessness (F6.4) was a more specific construct measuring primarily poor impulse control; it was strongly related to EPA-SSF Disinhibition and total score, and most of the UPPS-P scales. It also had moderately positive associations with informant EPA-SSF Disinhibition. This factor also had strong negative relationships with BFI Conscientiousness and its facet of Responsibility. Despite the increase in specificity across levels of the hierarchy from F2.1 to F6.4, the correlational profile remained highly similar (*ICCs* moving from 2.1 to 6.4 = .96, 1.00, .99, .93, respectively).

DISCUSSION

Although fearlessness (and fear) are often discussed in relation to clinical and personality based research, little work has been done specifically focusing on its structure from self-report measures. Due to the reliance on self-report assessments both clinically and in personality research, the purpose of the present study was to use the backward factor analysis approach proposed by Goldberg to examine the hierarchical structure of fearlessness.

At the first level, also the broadest level, this unrotated factor represents the items characterized by either emotional responses to present or potential danger or threat, and/or a desire to seek out potentially dangerous or risky situations and activities. At the second level of analysis, there is a split between Fearlessness (F2.1) and Anxiety (F2.2). Differentiating between fear and anxiety is, in particular, of vital interest in clinical research. In humans, fear is defined as being different from anxiety in that it is characterized by the present likelihood of a threat, rather than the potential of a threat, depending on the situation (e.g., some people feel experience in social situations, and it is classified as anxiety because they are not in objective danger) (Davies & Craske, 2018; Ohman, 2008). This initial factor split was in line with our predictions, as was robustness of the Anxiety factor all the way down the hierarchy. Items of scales specifically claiming to measure anxiety broadly continued to hang together, whereas other categories of items that do not load as highly onto Anxiety captured nuances within a broad Fearlessness factor (F2.1).

The third level of the analyses is when Surgency (F3.3) splits off from both Fearlessness (F2.1) and Anxiety (F2.2). This is a notable factor in that it is characterized by extraversion and a comfortability in social situations. This level is also when a more specific Thrill-Seeking factor (F3.1) emerges, narrowing in on a desire to engage in risky behaviors in addition to general openness and adventurousness. This continues on to the fourth level, in which Bravery (4.4) emerges from Thrill-Seeking (F3.1) and Anxiety (F3.2). This factor consists of items characterized by facing fears, seeking adventure, and more calculated or planned thrill-seeking. This allows for a differentiation between dangerous or more impulsive risk taking to more planned excitement seeking and facing one's fears in a variety of situations.

The fifth level continues to support this factor narrowing related to thrill-seeking, as specific Recklessness (F5.4) and Adventurousness (F5.5) factors emerge from Thrill-Seeking (F4.1). These factors relate to the more impulsive risk-taking versus the openness and desire to explore and seek adventure, respectively. Finally, the sixth factor solution creates two new factors, Boldness (F6.1) and Daring (F6.6). Boldness relates to specific manners of social interaction, beyond general extraversion by going out of one's way to challenge others, call for action, and speak up in protest for what one believes is right. Daring, splitting off from Bravery (F5.1) and Recklessness (5.4) is a factor capturing a desire to experience physical danger and seek out experiences that put one in imminent danger.

In comparison to the notable study by Kramer and Patrick (2012), which used a bifactor model to examine self-report measures of fear and fearlessness in relation to ASP, some similarities emerge. Broadly, the robustness of a social factor (Sociability in Kramer and Patrick) was also apparent in our model, as well as a factor related to thrill-seeking (Stimulation Seeking

in Kramer and Patrick). However, the current study's use of the bass-ackward method of factor analysis rather than a bifactor model, and conducting analyses at the item level rather than scale level, allow for a more comprehensive hierarchical structure of self-report fearlessness to emerge. This structure could allow for the potential of increasing specificity in how different types of fearlessness or fear are captured through self-report measures. This was particularly relevant for items loading on thrill-seeking factors, increasing in specificity but still interpretable through the sixth level.

It is important to note that the identified structure in this study is based on the items chosen to represent Fearlessness. Because of this, items that did not load at .32 or higher onto the overall Fearlessness factor were not included in subsequent analyses. The limitation of this is that if a component of fearlessness was not represented by several items in the inclusion pool, it is likely it did not emerge as a factor. However, this exclusion criterion has been used across a multitude of studies utilizing the bass-ackwards approach (e.g., Crowe et al., 2018; Sleep et al., 2020) and the final structure showcased an expected range of strength of relationships with external criterion.

When considering the emergent factors relationships with external criterion measures, some divergence was observed based on the strength of those relationships. For example, Extraversion and Negative Emotionality had significant associations with nearly every factor and each level, whereas Agreeableness and Open-Mindedness were more specifically related to Adventurousness. Externalizing behaviors captured by the CAB showed associations with Fearlessness, Recklessness, and Daring. Perhaps not surprisingly, impulsivity subscales were also most strongly related to these three factors, as well as the Thrill-Seeking factors. Of note, UPPS-P lack of premeditation subscale had smaller relationships with Adventurousness (F5.5 and F6.5) with $r_s = .13$ and $.07$, respectively, whereas this subscale was more strongly related to Recklessness (F5.4 and F6.4; $r_s = .54$ and $.50$, respectively). This is notable in its shows divergence between more calculated risk-taking and openness (e.g., Adventurousness) and impulsive and more risky actions (e.g., Daring). This is an important distinction in that some individuals may put more thought into engaging in a potentially risky activity whereas others may choose to engage right away with less consideration of potential outcomes (Gilbertson & Ewert, 2015; Lee & Tseng, 2015).

As expected, the specific fear measures showed statistically significant associations across levels of the Fearlessness hierarchy. Interestingly, the Recklessness factor at the sixth level (F6.4) did not yield a significant association with the total scores or subscales of either of the fear measures. This may be due to many of the highest loading items on this factor relating to spontaneity, unpredictability, and acting on a whim. The Anxiety factors yielded their strongest relationship with the Negative Emotionality and Neuroticism scales, as well as the PROMIS-Anxiety and Depression measures. Consistent with shown in the Fearlessness hierarchy, as Anxiety splits off from the main factor and remains consistent throughout the structure.

Psychopathy, as measured in this study using the EPA-SSF total score, was significantly associated with each factor at each level of the hierarchy. However, the associations are visibly smaller between the factors and EPA-SSF's measure of antagonism. As found in Sleep et al.'s (2021) analysis of Antagonism's hierarchical structure, thrill-seeking or risk-taking were not the main components of Antagonism, and the reverse appears to have been shown here in that

antagonism is not strongly related to the Thrill-Seeking factors of the Fearlessness hierarchy. The Emotional Stability subscale of the EPA-SSF appears strongly negatively related to Anxiety (F2.2-F6.2) factors, and positively related to Surgency (F3.3-F6.3) factors. The EPA-SSF's disinhibition scale showed strong positive relations with Thrill-Seeking factors (F3.1 and F4.1) and the more specific Recklessness factors (F5.4 and F6.4). The core components of psychopathy are still debated across researchers, with some arguing fearlessness or boldness as a necessary piece in the formulation of psychopathy, whereas others propose it is antagonism that is the core of psychopathy (Berg et al., 2017; Lynam & Miller, 2019). Important to note that while individuals with psychopathic traits may differ with regards to other domains of general personality (e.g., extraversion), research has consistently found antagonism to be the necessary component of psychopathy (Jones et al., 2011; Miller & Lynam, 2015). Related to the results of this study, it appears that disinhibition as conceptualized by the EPA relates to the components of Fearlessness characterized by risky and reckless behaviors, which are not necessarily and of themselves antisocial behaviors. Thus, highlighting that although Fearlessness may likely be correlated to psychopathic traits, it is not necessarily a core of psychopathy without the presence of antagonism.

The current investigation has several strengths, including an item level examination using a multitude of IPIP scales capturing a diverse array of components related to Fearlessness, and the use of informant-report within the external criterion measures. However, the study also had its limitations. First, this sample was composed of an undergraduate sample and is limited in terms of demographic diversity. In addition, the inclusion of external criterion had to be reasonably limited due to the inclusion of hundreds of Fearlessness items. Future work could benefit from a more diverse sample, including a clinical sample, with the use of additional external criterion measures, including those utilized more frequently in clinical settings. Although this study did use informant-report data, the use of other methodologies in addition to self and informant-report in the future would be of great benefit to replicate and validate the current hierarchy (e.g., using laboratory measures of fearlessness).

The current study shows the hierarchical structure of fearlessness derived from self-report items. This build upon previous research related to the different types of fearlessness and how it is differentiated from anxiety. Additionally, analyzing the relationship between external criterion adds to research exploring the role of fearlessness in areas such as psychopathy, although further work is still needed. Included in next steps, it may be useful to use these factors and items to create a standalone, free IPIP measure of Fearlessness to specifically capture the overall domain and specific subscales.

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