The Role of Hardiness in First Year AROTC and University Students: Examining Changes and Related Performance

by

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Abstract

The Big Five has dominated personality-performance literature, but within the overarching Five Factor Theory characteristic adaptations can be more contextually specific and better predictors of performance. Hardiness, defined as a worldview, is one such characteristic that has shown utility predicting performance when measured in addition to and independent of the Big Five particularly within military personnel. Higher hardiness is linked to reducing ill-effects of stress, health maintenance, and better performance (Meredith et al., 2011), but, like the Big Five, has rarely been evaluated over time and unexamined in Reserve Officer Training Corps (ROTC). This study assessed changes in personality (hardiness and the Big Five) three times over one academic year and determined the impact on performance in first year Army ROTC (AROTC) cadets while using university students as a control group. Field performance was measured via the Army Combat Fitness Test (ACFT). The ACFT is a series of six events reflecting the physical stress of a combat environment. GPA was used to assess academic performance in both groups. Through a mixed methods design, survey data was collected in August, January, and April to examine the relationship amongst stress, personality, and performance. The Big Five via IPIP was assessed in January and April and hardiness was measured in August, January, and April. Qualitative data consisted of interviews (n = 6) and self-assessments (n = 29) collected during the spring semester. All time points were completed by 19 cadets and 14 university students. Changes in hardiness were analyzed through a repeated measures ANOVA. Hierarchal linear regression models evaluated the influence of demographics (biological sex, military dependent status, in/out–state resident status, and scholarship status), the Big Five, and hardiness on the ACFT and GPA. Qualitative data explored cadet's conceptualization of stress, training, and performance. No significant changes

in hardiness occurred from August to April ($F_{1,18} = .806$, $p = .381$, $\eta^2 = .043$). From January to April conscientiousness decreased from 50.51 to 40.90 while university students slightly increased from 51.42 to 52.00 revealing a group by time interaction for both ($F_{1,46} = 11.166$, $p = .002$), ($F_{1,46} = 11.847$, $p = .001$). AROTC increased in neuroticism from 28.36 to 30.78, while university students decreased from 33.28 to 25.00. Army ROTC induces significant personality change, which differs from university students, and may also differ from military academy cadets or enlisted soldiers. Two regression models predicting field performance in August were significant, $R^2 = .784$, $p < .001$, and $R^2 = .791$, $p = .002$. Biological sex was the only significant variable in models 1 and 2 ($p < .001$). None of the models predicting academic performance were significant for cadets ($R^2 = .338$, $p = .462$) or university students ($R^2 = .972$, $p = .143$). Through qualitative data cadets described their year as a learning curve embodying a true first year experience with three emerging themes: *Getting Here, I Know Nothing,* and *Being Better*. Hardiness did not change, nor did it play a significant role in performance. Through mixed methods, cadets shared latent qualities of hardiness development within the qualitative data undetected by survey. Our findings serve as a first step in understanding the process of personality change through military training. Future studies should continue to examine the development of hardiness and the efficiency of training from early training to soldier status.

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List of Abbreviations

FFT	Five Factor Theory
ROTC	Reserve Officers' Training Corps
AROTC	Army Reserve Officers' Training Corps
ACFT	Army Combat Fitness Test
PT	Physical Training
HRG	Hardiness Resilience Gauge
PVS	Personal Views Survey
SF	Special Forces

CHAPTER I. INTRODUCTION

Introduction

Personality is defined as 'psychological qualities that contribute to an individual's enduring and distinctive patterns of feeling, thinking, and behaving' (Pervin & Cervone, 2010). The Five Factor Theory (FFT) is a theoretical model of all individual differences split into extra-psychological and psychological differences (McCrae & Costa, 2008). Extra-psychological differences include physical and cultural qualities. Psychological differences are personality. In the FFT personality differences are attributed to basic tendencies and characteristic adaptations of the individual (McCrae & Costa, 2008). Basic tendencies of personality include an individual's biologically based disposition and measurable abilities (e.g., verbal, math; McCrae, 2010). An individual's disposition consists of five core traits developed from commonalities in speech patterns across languages (McCrae & Costa, 2008). Known as the Big Five, they include conscientiousness, openness, extraversion, neuroticism, and agreeableness. The Big Five and their facet level traits (i.e., qualities that make up the Big Five) have dominated personality theory (Pervin & John, 1999). As the standard of personality measurement, the Big Five traits are a global, not exhaustive descriptors of personality nested within the FFT (McCrae & Costa, 2008). Conscientiousness is defined as socially prescribed impulse control facilitating task- and goal-directed behavior. Trait level facets or qualities include achievement striving, dutifulness, self-discipline, and competence. Neuroticism is the opposite of emotional stability and even-temperedness. Trait level facets include negative emotionality, self-consciousness, anxiety, and vulnerability. Extraversion is described as an energetic and enthusiastic approach to the social and material world. Some facet level traits include warmth, excitement seeking, and gregariousness. Openness to Experience, contrasting closed-mindedness, is breadth, depth,

originality, and complexity of an individual's mental and experiential life. Some trait level facets include curious ideas, unconventional values, and wide interests. Agreeableness is having a prosocial and communal orientation toward others. Facet level traits include trust, altruism, and compliance (Pervin & John, 1999).

In addition to basic tendencies, characteristic adaptations contribute to psychological aspects of individual differences or personality. Characteristic adaptations are formed by the interactions of basic tendencies with the world. Constructs measuring characteristic adaptations are often more theoretically applied, contextually specific, and in some instances better predictors of performance than the Big Five (Mosley & Laborde, 2016; Laborde et al., 2016; Roberts & Woodman, 2017). Hardiness is one construct that has shown utility predicting performance as a characteristic adaptation when measured in addition to and independent of the Big Five (Bartone et al., 2009).

Specific dimensions of personality related to buffering the effects of stress and increasing the capacity for performance, like hardiness (Kobasa, 1979; Kobasa et al., 1982), revolve around characteristics of mental fortitude. Some examples include grit (Duckworth et al., 2007), mental toughness (Gucciardi et al., 2015), and resilience (Galli & Gonzalez, 2015). These personality constructs have become popular measures of performance for sport-based and behavioral psychologists concerned with tactical athletes, and more specifically military personnel. Of them, only hardiness has been theoretically defined and empirically researched (Bartone et al., 2009; Crede et al., 2016). Best defined as a worldview, hardiness consists of three factors: commitment, control, and challenge (Bartone et al., 2013; Maddi et al., 2012). Factors are scored independently, and an aggregate score is given. Higher scores on each of the hardiness scales indicate greater levels of hardiness and higher total hardiness.

Hardiness is exhibited as the ability to maintain focus and perseverance during stressful scenarios through the qualities of commitment, control, and challenge. Commitment is a disposition towards engaging deeply in the activities of life whether interpersonal or with oneself (Bartone et al., 2013). Control is confidence and belief, through effort, events in life and outcomes can be influenced (Bartone et al., 2013). Challenge is receptivity to variety and change as a chance to learn and grow (Bartone et al., 2013). As a measure of interaction amongst stress, personality, and performance, hardiness was originally the focus of organizational research (Kobasa, 1979, Kobasa et al., 1982, Bartone, 1989), but has shown to be a valuable predictor of performance in tactical athletes. These include police officers (Sandvik et al., 2020 ; Fyhn et al., 2016 ; Martin et al., 2009 ; Andrew et al., 2008 ; Barton et al., 2004), firefighters (De La Vega et al., 2013 ; Moreno et al., 2006), ambulance/EMTs (Alexander & Klein, 2001), and military personnel (Bartone et al, 2008; Eid et al., 2008; Bartone et al., 2009; Johnsen et al., 2013; Bartone et al., 2013; Lovering et al., 2015; Krauss et al., 2019).

Personality and Hardiness in Military

Within the military there is increasing interest in performance optimization through personnel selection and development. Officer programs such as Officer Candidate School (OCS), the United States Military Academy (USMA, i.e., West Point), and Reserve Officer Training Corps' (ROTC) are a primary setting for evaluations. Becoming an officer assumes certain character qualities and performance. Officers are expected to meet the Army definition of leadership: influencing through purpose, direction, and motivation (*ADRP 6-22: Army Leadership* 2012). Development during officer programs emphasizes the Army leadership model components: what a leader is (attributes) and what a leader does (competencies; *ADRP 6-22: Army Leadership* 2012). Attributes of qualifying officers are molded into leadership

competencies, they include character, presence, and intellect (*ADRP 6-22: Army Leadership* 2012).

Intellectual tests have long served as the chief screening tool into officer programs (i.e., Scholastic Aptitude Test, SAT; American College Test, ACT; Rumsey, 2014). Intelligence is a predictor of success and plays a role in the primary tenets of officership, performance and leadership. Noncognitive personality variables (e.g., Big Five, hardiness) add value as screening tools (Rumsey, 2014). The other leadership attributes listed in the Army Leadership Requirements Model, presence and character, are comprised of noncognitive elements. Presence includes military and professional bearing, fitness, confidence, and resilience, while character is comprised of Army Values, Empathy, Warrior & Service Ethos, and discipline (*ADRP 6-22: Army Leadership* 2012).

Becoming an officer implies personality development through the Army Leadership Requirements Model, but investigations have primarily compared single measures of Big Five traits with performance (e.g., Sørlie et al., 2020; Conte et al., 2017; Barron et al., 2016a). Though the Big Five are relatively stable throughout the lifespan, they are affected by intrinsic maturation and major life experiences (Specht et al., 2011), such as joining the military (Elder, Gimbel, & Ivie, 1991). Only one study has evaluated the effect of military training on the Big Five. Jackson et al., (2012) found differences in Big Five personality traits prior to joining the military and differences that persisted throughout service in German males. High school graduates opting to serve in the military reported lower agreeableness, openness, and neuroticism when compared to graduates selecting civilian service. Further Jackson et al., (2012) revealed military training was associated with lower levels of agreeableness beyond natural maturation of adulthood, supporting the idea the military may influence personality. Though agreeableness

may account for some change in personality via basic tendencies, shifts in characteristic adaptations may also contribute to personality changes.

Hardiness is consistently associated with performance outcomes of military leadership, performance, and military academy success. Like the Big Five though, hardiness development has rarely been investigated. Only two investigations have examined the effect of military training on hardiness development with mixed findings (Zach et al., 2007 & Hystad et al., 2015). Hardiness was evaluated repeatedly over the course of nine weeks in the training and selection of an Israeli graduated military program for state security officers. Participants were soldiers, 21 to 24 years of age, with combat experience and had completed officer school. The training program lasted nine weeks consisting of progressively stressful and realistic scenarios. Using only two of the three hardiness facets, control and challenge, significant improvements ($p < .0001$) occurred from pre-training to post-assessment. Since participants completed the assessment four times over the nine weeks, some learning effects may have taken place. This study revealed the potential malleability of hardiness as a construct, based on physical and psychological military training. Furthermore, these findings support the ongoing changes in characteristic adaptations beyond initial military service because the participants had prior military experience.

More recently, Hystad et al., (2015) longitudinally examined hardiness in three separate Norwegian military academies over a three-year duration. All academies explained "development of individual resilience and coping with stress [is] a significant educational aim" of their respective military academies, but each took different approaches to military training (Hystad et al., 2015). Hystad et al. (2015) reported: Academy A emphasized field training (4 weeks per semester) in high stress exposure scenarios (e.g., parachute jump course); Academy B dually emphasizes leadership development and field training exercise under high levels of stress

(e.g. crossing the Atlantic Ocean by ancient sailing ship in eleven weeks); Lastly, Academy C focuses more on leadership development imposing less physically demanding tasks (i.e. shorter and fewer field exercises; less sleep deprivation and fatigue). Although qualities of academy training are associated with and suggest the development of hardiness, this was not the purpose of the intervention, nor the military academies. Four total time points were collected over three years, cadet's initial week at the academy and, subsequently, at the end of each year. Initial individual hardiness levels, scaled from 0 to 3, were significantly different amongst cadets across all academies (p = .003; Hystad et al., 2015). Three-year military academy within-person hardiness levels did vary over time (p = .002), but only 4% was attributed to time based on the regression analysis (Hystad et al. 2015). On average all academies saw changes in hardiness across three years. Academy A increased from 1.54 to 1.62, academy B decreased from 1.64 to 1.63, and academy C produced the sole significant change decreasing from 1.59 to 1.53. Through hierarchal linear modeling Hystad et al. (2015) found an insignificant decreasing trend in hardiness each year (-.005) collectively in all cadets. Listed as a limitation, participant dropout rate from the study was nearly 50% (293 to 146) from start to finish. No differences in hardiness were found based on attrition analysis between completers and non-completers of baseline hardiness assessment. The inconclusive findings of both Zach et al. (2007) and Hystad et al., (2015) focalize the many gaps in hardiness development literature within military research.

Statement of the Problem

Hardiness research within the United States Army has been limited to enlisted soldiers, commissioned officers, and military academies. While findings consistently support associations of hardiness and performance, the development process of hardiness is less clear. Only two

studies have investigated hardiness development through military training. Neither were conducted within the United States, as one was with Israeli military officers (Zach et al., 2007) and the other with Norwegian military academies (Hystad et al., 2015). Further, studies have attempted to measure the effectiveness of military training on hardiness without following the development of paralleling civilian groups like the work of Jackson et al., (2012) using the Big Five.

Examining hardiness development in members adjusting to service and lifestyle can provide clarity for current mixed findings. The Reserve Officer Training Corps is a novel population not previously examined. As an alternative method of joining the Army, ROTC consists of an elective curriculum taken in addition to required college classes. The curriculum consists of four military courses and a conjoining laboratory progressively complete during the students' tenure. Transitioning to college is a major life event entailing life and personality change (Specht et al., 2011) and arriving cadets are tasked with adapting to college life and ROTC requirements. Dually observing ROTC and university students may improve understanding of the effectiveness of military training beyond intrinsic, or maturation that occurs naturally.

Results of this study may provide evidence to support the use of personality as selection-criterion, or a malleable construct to be traced and developed over time. For the Army and members (ROTC and enlisted) the results of this investigation are may be an informative tool supporting character and military profession-specific development. Findings of this study also evaluated the consistency of the hardiness performance relationship in ROTC cadets, as a novel population.

Purpose of the Study and Study Objectives

The purpose of this investigation was to examine changes in hardiness over an academic calendar year within Army Reserve Officers' Training Corps (AROTC) first-year cadets compared to university students. Not all military personnel enlist or go to military specific academies. AROTC has commissioned more than half a million officers and nearly 60% of Second Lieutenants (lowest ranking officer), "[providing] cadets with the character-building aspects of a diverse, self-disciplined civilian education with tough, centralized leadership development training" (Legacy & Value, goarmy.com). As an alternative method of joining the Army, AROTC consists of an elective curriculum taken in addition to required college classes. AROTC offers a novel context and population to examine hardiness as students balance university life and AROTC requirements. This study observed hardiness development over an academic year in first year AROTC cadets. Hardiness development was also observed in university students, as non-military service members. University students served as a control population, not encountering military training and accounting for natural changes that occur transitioning from high school and throughout college. University students experience major life changes adjusting to college (Specht et al., 2011), cadets' transition was compounded by the AROTC program as developing service members. A secondary aim of this study was to examine the utility of hardiness as a predictor of performance in the AROTC, previously unmeasured in this population. Following hardiness across fall and spring semester offered insight of the construct to gauge capacity of adaptability, leadership, and performance. Results of this study may contribute to understanding personality development that may be applicable in fields of military and personality psychology (e.g., personnel selection, sport and performance).

Primary Objective: Compare changes in hardiness over an academic semester between Army Reserve Officers' Training Corps first-year (AROTC) cadets to university students.

Secondary Objective: Determine the role of hardiness as a predictor of performance in AROTC first-year cadets and university students.

Tertiary Objective: Understand first-year Cadets' conceptualizations of their ROTC experience as it relates to stress, personality and performance.

Research Question and Hypotheses

Research Question 1: What changes in the Hardiness Resilience Gauge occur over the course of an academic semester in AROTC first-year cadets and do these changes differ from university students?

Hypothesis 1: Changes in AROTC first-year cadet Hardiness Resilience Gauge scores will be significantly greater than changes that occur in university students.

Research Question 2: Does hardiness influence performance of AROTC first-year cadets and university students?

Hypothesis 2: Hardiness will be a significant predictor of academic and field performance for AROTC cadets. Hardiness will be a significant predictor of academic performance for university students.

Research Question 3: How do Army ROTC first-year cadets conceptualize their experience as it pertains to stress, personality, and performance?

Hypothesis 3: Research question three is qualitative in nature, therefore a hypothesis is not given. Qualitative data will be collected via semi-structured interviews and Cadet's semester self-assessments.

Delimitations

The following are delimitations of this study:

1. Participants include Auburn University Army ROTC first-year cadets and university students.

Limitations

The following are limitations of this study:

1. This observation will take place during a single academic year, providing potentially a snapshot of hardiness development.

2. COVID-19 has altered the experience of college with increased virtual learning. This may affect the social experience of students and influence hardiness development.

Summary

This chapter has summarized the background, statement of the problem, the purpose of the study and study objectives, the research questions and hypothesis, the significance of the study, delimitations and the limitations. Chapter two includes a review of the related literature concerning hardiness, personality, extant hardiness performance literature in military academies and academia, and relevant qualitative investigations completed within ROTC population. Chapter three outlines the proposed methods for this study, including human subjects' approval;

participants and setting; power analysis; procedures; the design of the intervention; measures; and the statistical analyses. Chapter four offers two full manuscripts on the results. Chapter five focuses on the discussion and implication of the results.

CHAPTER II: LITERATURE REVIEW

The primary purpose of this study was to investigate changes in hardiness across a university academic calendar (fall and spring semester) in first-year Army Reserve Officers' Training Corps (AROTC) cadets and university students. The secondary purpose was to evaluate the effectiveness of hardiness as a predictor of objective outcome (academic and field) performance measures in a novel population. Therefore, it is necessary to examine related research outcomes from these areas. First, I will review the construct of hardiness. Second, defend the use of hardiness as a measure of personality with consideration to the Big Five rather than similar measures (i.e., grit, mental toughness, or resilience). This review will also examine the utility of hardiness as a predictor of performance and hardiness development in militaristic populations. After, relationships of hardiness to academic performance and hardiness development in university settings are addressed. Finally, a brief summary of the qualitative research describing psychological qualities and experiences of ROTC cadets is provided.

Hardiness

Hardiness is best described as a worldview or holistic style of functioning. Increasing amounts of hardiness diminish ill-effects of stress and maintain health (Kobasa 1979; Kobasa et al., 1982). Consequently, higher hardiness facilitates better performance (Bartone et al., 2008). Originally termed by Kobasa (1979), hardiness is described by Maddi as a "fulfillment theory" formulated on the work of existential psychologists (Kobasa and Maddi, 1977; Maddi, 1975; White, 1959; Allport, 1955; Fromm, 1947).

Kobasa's seminal hardiness piece examined differentiating factors of why some highly stressed executives fell ill frequently, and others did not under similar events. Findings

demonstrated the association between the onset of illness and recent stressful events was mediated by personality characteristics (Kobasa, 1979). Individuals embodying the three characteristics of hardiness were less likely to become ill. The three factors linked to personality were coined the three Cs of hardiness: commitment, control, and challenge. To be higher in these qualities is to be hardier, or resistant to illness and maintain health. Through their own mechanisms, each subcomponent contributes to lessening the deleterious effects of stress. Commitment is a disposition towards engaging deeply in the activities of life whether interpersonal or with oneself (Bartone et al., 2013). Greater engrossment into life's activities can allow an individual to focus on tasks and improve gratitude, eliminating the opportunity for stress and negative thoughts. Control is the confidence and belief, through effort, events in life and outcomes can be influenced (Bartone, 2008). Having control, or belief of control, over aversive stimuli reduces the effects of stress (Averill, 1973). Lastly, challenge is receptivity to variety and change as a chance to learn and grow. Perceiving events in life as challenges encourages openness and appreciation of life's stress and pain (Bartone, 1999). This approach infuses positivity, as opposed to perceiving the same events as threats causing a negative approach and greater amounts of stress.

An ancillary factor embedded within the construct of hardiness is the perception of stress (Kobasa, 1979). A more positive appraisal or improved perception of stress is an implied consequence of being hardier. Similar findings support appraisal as one of the main mechanisms of hardiness (Delahaij et al., 2010). Often the perception of stress is villainized as having a solely debilitating impact, while equally impactful facilitating effects are overlooked. Researchers in psychology and physiology have presented conceptualizations of the dichotomized approaches to stress such as *threat* and *challenge* by Lazarus and Folkman (1984), *distress* and *eustress* by

Selye (1985), and *hindrance* and *challenge* by Lepine et al. (2005). The latter of all afore mentioned dyads represents the style associated with more positive appraisals of stress. The optimistic, or pessimistic perception of a given event determines subsequent emotional, cognitive, and behavioral responses (Lazarus & Folkman, 1984; Selye, 1985; Lepine et al., 2005). Similar events can evoke differing perceptions and subsequent responses. The perception of stress is the underlying and potentially most critical component of hardiness (Kobasa, 1979; Kobasa & Maddi, 1982; Delhaij, 2010) and individual's perspective determines the level of engagement with the 3Cs.

Measuring Hardiness. Commitment, control, challenge and perception of stress defined the early work in hardiness and were promising. However, psychometric issues developed because researchers used many questionnaires in effort to quantify the construct, sometimes using as many as nineteen different scales (Funk, 1992). Most of those scales were eventually dropped, forming the initial inventory of the Unabridged Hardiness Scale (UHS), a negatively keyed 71-item survey. Later the scale was shortened to 36-item and then 20-items (Funk, 1992). These were renamed the Revised Hardiness Scale (RHS) and the Abridged Hardiness Scale (AHS), respectively. Third generation scales of hardiness and their updated versions are the most well-known today: the Personal Views Survey (PVS) was created at the Hardiness Institute (Maddi et al., 2006) and the Dispositional Resilience Scale (DRS) authored by Paul Bartone (2018). The PVS (Maddi et al., 2006) and DRS (HRG; Bartone, 2018) scales, are the two predominant hardiness measures currently. These two scales have never been utilized in the same inquiry but support similar results for hardiness as a stress mitigating variable and positively associated with psychological well-being (Bartone, 1989; Florian et al., 1995; Bartone, 1999; Flowers & Maddi, 2004; Bue et al., 2013; Bartone et al., 2015).

Overview of the Effects of Hardiness.

Hardiness research examines personality characteristics as a mediator of stressful life events and outcomes of both, psychological stressors and physical strains. Early investigations of hardiness centered on overall health and well-being within working class populations (Kobasa, 1979; Kobasa et al., 1982; Bartone, 1989). Hardiness has extended into a broad range of populations including military (Bartone et al, 2008; Eid et al., 2008; Bartone et al., 2009; Johnsen et al., 2013; Bartone et al., 2013; Lovering et al., 2015; Krauss et al., 2019), students (Sheard & Golby, 2007; Sheard, 2009b; Alfred et al., 2014), healthcare (Park et al., 2017; Mintz-Binder, 2014; Abdollahi et al., 2014; DiBartolo & Soeken, 2003) and middle management (Cash & Gardner, 2011).

Eschleman and colleagues (2010) completed a meta-analysis of hardiness including 180 sample research studies. Studies examining hardiness using specific scales particular to a domain such as family, health, or academic hardiness were excluded and all populations using general hardiness scales were included (e.g., general, tactical, health care, athletics). In their meta-analysis, Eschleman et al. (2010) found hardiness related to stressors, strains, social support, coping, performance, and other personality traits. In some cases, one of the 3 Cs had a greater impact than the other two, but no consistent data was provided (Eschleman et al., 2010).

Stressors, or events requiring an adaptive response and the potential to cause illness, were negatively related to hardiness (Eschleman et al., 2010). Consistent with the stress buffering theory, individuals higher in hardiness perceived fewer events as stressors and actively confronted negative conditions (Eschleman et al., 2010). Higher hardiness was also associated with decreased susceptibility to stressors. Being more hardy significantly decreased the likelihood of supervisor conflict (r = -.52 k = 4, N = 1,612), experiencing role conflict (r = -.36, k

= 2, *N* = 440), and role ambiguity (*r* = -.32, *k* = 2, *N* = 412). Other stressors included coworker conflict, role overload, family conflict, and interpersonal stressors (Eschleman et al., 2010). Consequently, experiencing fewer stressors was related to experiencing fewer strains, or negative health outcomes experienced due to stressors (Eschleman et al., 2010). Strains most strongly correlated with hardiness were total burnout (*r* = -.42, *k* = 14, *N* = 4,097), posttraumatic stress disorder (*r* = -.47, *k* = 6, *N* = 1,850), physical symptoms (*r* = -.26, *k* = 44, *N* = 8,677), fatigue (*r* = -.26, *k* = 2, *N* = 578), and absences due to illness (*r* = .10, *k* = 2, *N* = 258). Other strains included psychological distress, depression, state anxiety and anger, negativity, poor mental health, and dissociative symptoms. Lower hardiness increases susceptibility to stressors raising the likelihood of experiencing strains. In addition to associations with negative strains, hardiness was positively associated with psychological well-being measures like job and life satisfaction, positive state affect, personal growth, engagement, happiness, and quality of life (Eshleman et al., 2010). The strongest of these was life satisfaction (*r* = .50, *k* = 6, *N* = 1,070). In summary individuals lower in hardiness were more susceptible to perceiving stressors resulting in the increased probability of experiencing strains (Eschleman et al., 2010). The stressor-strain relationship was also moderated by hardiness alongside the main effects, stressors incorporated in the analysis were general life, specific, and major life events, while strains consisted of attitude changes, physical and psychological strain, and marital adjustment (Eschleman et al., 2010). The interaction of hardiness and stress predicted strain producing a moderating effect that accounted for an additional 4.5% of variance. This was considered practically significant (Eschleman et al., 2010).

Hardiness was associated with social support. Social support was defined as seeking out support resources and the likelihood of higher hardy individuals to have broader and more

engaged social circle (Eschleman et al., 2010). Hardiness was also positively related to problem-focused coping and positive intrusive thoughts, while negatively related to emotion-focused coping and negative intrusive thoughts (Eschleman et al., 2010). The meta-analysis concluded correlations with social support and coping were a result of their parallel with commitment and control (Eschleman et al., 2010). By this logic, higher hardiness directly affects perception of stressors rather than avoidance behaviors (Eschleman et al., 2010).

Hardiness was also associated with other established personality constructs correlated with mitigating the effects of stress. The strongest positive associations with hardiness were sense of coherence *(r* = .50, *k* = 4, *N* =1, 147), optimism *(r* = .43, *k* = 7, *N* =1,290), self-esteem *(r* = .43, *k* = 14, *N* =2,610), and negative affectivity *(r* = -.37, *k* = 6, *N* =3,315). In summary, Eschleman et al. (2010) found hardiness to be associated with many stress-mitigating variables, and to have value predicting outcomes while controlling for similar constructs. Evidence supports the utility and applicability of hardiness in a range of populations.

Hardiness, the Big Five, & Five Factor Theory

Findings confirm the utility of hardiness as a useful measure independent of or supplementary to the Big Five (Bartone et al., 2009; Eschleman et al., 2010). Personality is defined as psychological qualities that contribute to an individual's enduring and distinctive patterns of feeling, thinking, and behaving (Pervin & Cervone, 2010). Personality theory and, subsequently, the personality-performance relationship has been dominated by the Big Five (conscientiousness, neuroticism, extraversion, openness to experience, and agreeableness) and the facet level traits of the Five Factor Model that comprise them (See Table 1 below).

Trait	Definition	Facets/Qualities
Conscientiousness	Socially prescribed impulse control facilitating task- and goal-directed behavior	Achievement striving, dutifulness, self-discipline, and competence
Neuroticism	Opposes emotional stability and even -temperedness with negative emotionality	Self-consciousness, anxiety, and vulnerability
Extraversion	Energetic and enthusiastic approach to the social and material world	Warmth, excitement-seeking, and gregariousness
Openness to Experience	Opposes closed-mindedness, is breadth, depth, originality, and complexity of an individual's mental and experiential life	Curious ideas, unconventional values, and wide interests
Agreeableness	Agreeableness is having a prosocial and communal orientation toward others	Trust, altruism, and compliance

Table 1. Adapted from McCrae, 2010

The Five Factor Theory is the overarching theoretical model designed around the Big Five accounting for all individual differences (see Figure 1). The Big Five is a taxonomy of global traits. The Five Factor Theory (FFT) serves as an exhaustive list of all individual personality variance (McCrae, 2010). Individual differences are credited to extra-psychological or psychological factors. Extra psychological factors consist of differences beyond the psyche such as physical or cultural attributes (McCrae, 2010). Psychological factors are divided into two categories: basic tendencies and characteristic adaptations (McCrae 2010; McCrae & Costa,

2008). Basic tendencies are inborn qualities further classified as disposition (Big Five personality traits) or abilities (e.g., math and verbal; McCrae, 2010). Characteristic adaptations are developed through the interaction of basic tendencies with the world. They manifest as how an individual experiences the world. Examples include values, virtues, motivation, skills and beliefs. Some characteristic adaptations have more specific context. These are classified as personality-trait-like-individual-differences. Examples are narcissism, perfectionism, thrill-seeking, and emotional intelligence (Mosley & Laborde, 2016; Laborde et al., 2016).

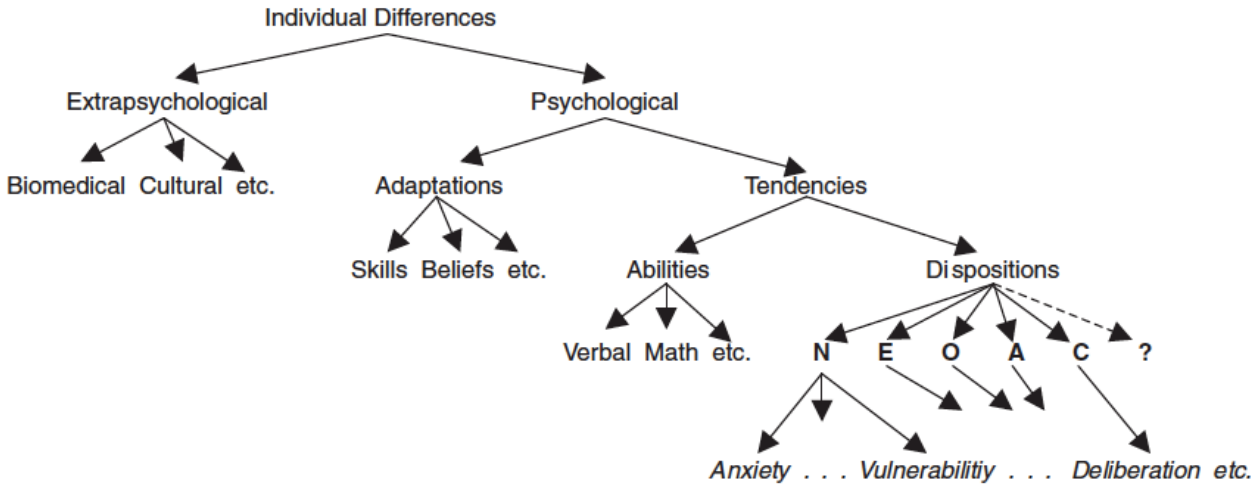

Figure 1. Adapted from McCrae, 2010

Hardiness and the Big Five in the General Population. Research comparing the Big Five and hardiness has generally supported the latter as an independent construct. Eschleman et al. (2010) in a meta-analysis found hardiness to remain associated with stress-related criteria after controlling for the Big Five traits (Costa & McCrae, 1992). Recent research by Merino-Tejedor et al. (2015) examined employees in a range of occupations confirming the utility of hardiness as a moderator of the Big Five and work effort. Correlations were highest with conscientiousness (r = -.36, p =.01) and emotional stability (r =.25, p =.01), or the inverse of neuroticism (Merino-Tejedor et al., 2015). Hardiness was also associated with extraversion (r =.15, p =.01) and agreeableness (r =.12, p =.001), but not openness (Merino-Tejedor et al., 2015). Kowalski & Schermer (2019) exclusively investigated the relationship between hardiness and neuroticism in undergraduate students aged 17 – 61 years (N = 258, M = 19.46, SD = 3.71) revealing a strong correlation between hardiness and neuroticism (r = -.60, p =.001; Schermer & Kowalski, 2019). Hardiness maintained partial correlations with reflection (r =.23, p = .001), worry (r = -.44, p = .001), mindfulness (r =.27, p = .001), and trait anxiety (r = -.33, p = .001) after controlling for neuroticism. When controlling for neuroticism, the correlations of hardiness with rumination, health, and coping were non-existent. The age range of participants was listed as a limitation of this study (Schermer & Kowalski, 2019). Overall and prevalent in more recent literature, hardiness has shown to be more associated with the premier traits of the Big Five, conscientiousness and neuroticism, in the general population (Merino-Tejedor et al, 2015; Kowalski & Schermer, 2019; Eschleman et al., 2010).

Hardiness, Separate from the Big Five. Although hardiness is associated with Big Five traits, extant literature highlights the ability of hardiness to remain independent. In an investigation of hardiness with United States Military Academy (USMA) cadets, regression

analysis revealed hardiness accounted for additional variance beyond sex, college entrance ranking, social judgement, and the Big Five in leadership performance (Bartone et al., 2009). Bartone et al. (2009) found a weak to moderate (r = - .25) correlation between hardiness and neuroticism, no greater than correlations amongst other Big Five traits (Bartone et al., 2009). Findings examining leadership performance dichotomized into field and academic showed hardiness to be a significant predictor of both. Of the Big Five, extraversion and conscientiousness were significant during summer field training and in the classroom (Bartone et al., 2009).

Relationships between hardiness and neuroticism seem to vary across studies. Enough evidence exists to support the assertion that hardiness is not solely the opposite of neuroticism, though further investigation is warranted. Overall hardiness is correlated with the Big Five as expected from a supplementary personality measure and characteristic adaptation. However, hardiness as a characteristic adaptation maintains utility and is not a redundant measure of any of the Big Five.

Constructs Similar to Hardiness

Hardiness is a useful personality construct independent of the Big Five, or as a supplementary measure of a characteristic adaptation as prescribed by the FFT. Personality measures comparable to hardiness are often used interchangeably in common conversation, blurring the work of independent researchers. Having more or being higher in resilience, mental toughness, and grit increases the likelihood of performing well through adversity and being resistant to stress. The following section will defend the use of hardiness as a supplemental measure rather than other constructs.

Grit. Grit is defined as sustained and passionate pursuit of a given interest, or goal (Duckworth et al., 2007). Grit is divided into two complementing components: consistency of interests and perseverance of effort. One meta-analysis questioned the construct validity of the consistency of interests subscale reporting a correlation of .92 between grit and conscientiousness of the Big Five (Credé et al. 2016). Whether considered a personality trait, characteristic adaptation, or cognitive measure, grit may be repackaged conscientiousness. With such a high correlation to conscientiousness, it adds no value as an alternative measure based on conscientiousness and Big Five literature.

The efficacy of grit and hardiness to predict performance was evaluated in military research. Maddi et al. (2012) compared the PVS III-R (Personal Views Survey III Revised) with the Short Grit Scale (Duckworth & Quinn, 2009) to measure roles predicting performance and retention over first-year USMA cadets. Hardiness and grit were positively correlated ($r = .46$, $p < .01$). Regression analyses indicated hardiness, grit, and Whole Candidate Score (WCS) were correlated with academy retention. WCS is comprised of high school academic performance, leadership potential, and physical fitness. Further analysis supported only hardiness as a positive and unique predictor after controlling for WCS. A 2017 follow up study evaluating cadets over their four years of training found hardiness to be a more reliable measure of performance and retention than grit (Maddi et al, 2017). A similar study was completed using the DRS, as the hardiness measure, and the Short Grit Scale to determine predictors of performance. Results showed components of both scales were valuable predictors of attrition based on cadet basic training. The consistency of interests component of grit and the commitment component of hardiness contributed to academic, physical, and military specific performance scores. Only grit was a predictor of performance across cadets' four-year period at the academy. Evidence

supports hardiness and grit as constructs measuring performance outcomes, but if grit is repackaged conscientiousness, it should be recognized as so.

Mental Toughness. Sports researchers present mental toughness as a construct exclusive to the realm of sport. Loosely conceptualized, it is the ability to maintain and persist under pressure through adversity in sport or performance. Investigations of mental toughness as a singular construct and subcomponent have decades of empirical research (e.g., Athletic Motivation Inventory, Tutko et al., 1969; Loehr, 1986), however the concept's theoretical backing is still in its infancy. Researchers present mental toughness as a discovered construct within the sport psychology field, ignoring similarities to pre-existing concepts, much like the relationship between grit and conscientiousness. Mental toughness has been compared to emotional regulation, a construct readily used in clinical and personality psychology (Gross, 2014). Approaching mental toughness as exclusive to the sport realm discredits the theoretical and empirical knowledge of existing psychological literature (Anthony et al., 2016; Weinberg et al., 2016). A secondary example of this in the mental toughness literature is the Mental Toughness Questionnaire – 48 (MTQ48). Clough et al. (2002) repackaged hardiness into the MTQ48 by adding confidence as a fourth subscale without acknowledgement of the sourced hardiness scale. The MTQ48 was not supported psychometrically or conceptually based on exploratory and confirmatory analyses (Andersen, 2011).

The many mental toughness inventories (Loehr, 1986; Clough et al., 2002; Sheard, 2009a; via Andersen, 2011 & Gucciardi et al., 2015) illuminate the lack of consensus in conceptualization, definition, and operationalization. Inconsistent subscales result in weak assessment of psychometric properties. In quantitative and qualitative investigations, mental toughness is represented as a pool of positive and favorable psychological characteristics, or

traits, that each performer draws from when performing well. Qualities of mental toughness mirror psychological profiles of elite athletes and may include self-control, negative & positive energy control, visualization & imagery control, determination, constancy, confidence, desire for success, tough attitude, affective intelligence, resilience, and desire to achieve (Andersen et al., 2011 & Anthony et al., 2016 for comprehensive lists mental toughness qualities). In evaluating the qualities of mental toughness, Caddick and Ryall (2012) question the similarities with success. The absent consensus on a definition of mental toughness results in a more difficult construct to operationalize and empirically collect data on.

Two studies have examined both hardiness and mental toughness. Golby and Sheard (2004) used the PVS III-R (Maddi & Khoshaba, 2001) and the Psychological Performance Inventory (PPI; Loehr, 1986) to investigate psychological characteristics across various levels of an elite rugby league. All players were professionals playing in International, Super League, or Division I. International league players scored significantly higher than Division I players in all three of the hardiness subscales, and in two of the seven mental toughness subscales (negative energy control and attention control). Several correlations of the hardiness and mental toughness subscales were significant at the .05 level. Commitment and challenge successfully discriminated players of the International, Super League, and Division I at 89%, 73%, and 65% respectively. In 2009, Sheard completed a secondary study using hardiness commitment and challenge to investigate an elite university rugby match between Australia and Great Britain. Using the same hardiness scale and an updated version of the PPI by Loehr (1986), the alternative Psychological Performance Inventory (PPI-A; Golby et al.,) were positively correlated ($r = .34$, $p < .05$). Australian players had significantly higher scores for total mental toughness and subscales of positive cognition and visualization. Only challenge was significantly higher on the hardiness

scale. Psychological variables may not be the ultimate determining factor of the many variable factors influencing the outcome of a match, but they did play a role. There have been no investigations using the DRS and mental toughness. Mental toughness, as measured by the PPI and PPI-A, and hardiness measure crucial factors contributing separately to success. Future investigations should examine current scales to better conceptualize and define mental toughness.

Resilience. Resilience is another variable offered as a component of mental toughness. Both terms are more conversationally popular than hardiness but are often used interchangeably. Bartone's hardiness scales have carried resilience in the name (Dispositional Resilience Scale and Hardiness Resilience Gauge). It is unclear why the verbiage was not transitioned from hardiness to resilience within scientific literature, in part that may be due to the similarly timed emergence of resilience and hardiness as areas of study in the early 1980s.

All definitions of resilience share a common theme of better-than-expected adjustment to difficult circumstances (Galli and Gonzalez (2015). Resilience as a scientific inquiry began with recognition of underprivileged at-risk youth overcoming their circumstances to achieve more than anticipated (Rutter, 1985; Werner & Smith, 1992; Rutter 2012). Resilience became a loose set of protective factors believed to aid positive adaptations of self-efficacy, self-esteem, an internal locus of control, optimism, a sense of humor, family support, and a close personal relationship with an adult (Rutter, 1985; Werner & Smith, 1992 via Galli and Gonzalez, 2015). Although individual qualities contribute to resilience, environmental and social context also provide influence (Galli & Gonzalez, 2015). There are two trajectory types of resilience in research: 1) Emergent resilience is long-term enduring positive adaptation; and 2) Minimal impact resilience occurs as a response to acute traumatic stressors (Bonanno & Diminich, 2013).

Psychological resilience has been adapted to the sport and performance context. Within sport psychology, it is examined as a psychosocial factor predicting performance after initial failure (Mummery et al. 2004) or a measure to understand thoughts, beliefs, emotions, and behaviors of athletes that have shown the capacity to successfully adapt to adversity (Galli & Vealey, 2008). These two components mirror minimal impact and emergent resilience, but resilience is without an operational definition as it applies to performance in sport (Wadey & Hanton, 2015). Athlete versions of adversity and adaptation are not equivalent to experiences of childhood trauma and perseverance. Additionally, questions are raised concerning differences in appraisal across individuals.

The Connor-Davidson Resilience Scale is the sole scale used as a sport resilience measure (CD-RISC; Connor & Davidson, 2003). The scale has been criticized by scholars for conceptualizing resilience as only trait-based, being too generic, and lacking an evaluation of resilience as a process-based concept (Galli & Gonzalez, 2015). There have been no direct comparisons of the CD-RISC with either hardiness scale, and researchers have urged continued exploration within the qualitative realm (Culver et al., 2012; Sarkar & Fletcher, 2013; Morgan, 2013).

Efforts should be made to better conceptualize and define grit, mental toughness, and resilience in the sport performance context, with alternative psychological variables considered in the future. The lack of theoretical substance and definite scales of grit, mental toughness, and resilience reinforce the psychometric stronghold hardiness has on research examining psychological performance variables particularly as it pertains to the military.

Hardiness and Performance

The correlation between hardiness and health is certain; however, when health is extended to physical fitness, or exercise, the evidence is less clear. Eschleman and colleagues (2010) suggest hardiness is a proximal cause of health, but a distal predictor of performance only mediated by health. This is most apparent in hardiness research examining athletics which requires mental fortitude, physical fitness, and technical skill. Significant relationships were revealed between hardiness and sport performance outcomes such as elite status in bowling (Sindik, 2008), elite status in professional motorcycling (Thomas et al., 2013), situation-related efficacy and season performance in basketball (Sindik & Adžija, 2013; Maddi & Hess, 1992), single game outcome and elite professional status in rugby (Golby & Sheard, 2004; Sheard, 2009a), overtraining in swimmers (Goss, 1994), and likelihood of and response to sport injury (Wadey et al., 2011 & Wadey & Hanton, 2015). Within the general population, psychological benefits and consequences (i.e., stressors) are most strongly and consistently associated with hardiness. Resultant strains produced by stressors are representative of the proximal impact of hardiness on physiological health. Through these relationships hardiness distally affects performance or task completion, the gross applicability and range of the construct is unique.

Hardiness and the Military

Hardiness contributes to performance outcomes in research completed within the armed forces (Bartone et al, 2008; Eid et al., 2008; Bartone et al., 2009; Johnsen et al., 2013; Bartone et al., 2013; Lovering et al., 2015; Krauss et al., 2019). In examining associations with exercise and physical fitness within armed forces, findings are equivocal (Johnsen et al., 2013; Lovering et al., 2015). Hardiness was unrelated to physical fitness and predicted the selection of Norwegian Armed Forces border patrol (Johnsen et al., 2013). The hardiness of this Norwegian elite

personnel group was not related to their physical fitness. In comparison, Lovering et al. (2015) found positive associations between hardiness and physical fitness in U.S. marine recruits arriving to the first week of training. Differences in the relationship between physical fitness and hardiness may be dependent upon length of service (e.g., basic training, multiple deployments) or occupation. Occupations requiring distinct levels of fitness may affect the relationship between hardiness and physical fitness in the military (e.g., human resources, elite personnel training). The lack of consistent interaction between exercise, or physical fitness and subsequently performance within the military warrants more attention to reveal the role of hardiness.

Resilience has played a leading role in United States Army readiness research. A Ready & Resilient component is implemented as part of each military installation's Comprehensive Soldier Fitness and Holistic Health and Fitness (H2F), the Army's holistic wellness program. The Ready & Resilient program equips soldiers with tools to better handle stress reactively and proactively from a health and performance perspective. Extant literature supports hardiness in national and international armed forces as a moderator of the stress and health relationship concerning protection against war-related stress (Zerach et al., 2020; Nordmo et al., 2017; Bartone, 1999; Bartone, 2000), PTSD symptomology (Pitts et al., 2016; Escolas et al., 2013), sustained cardiovascular health (Bartone et al., 2015), neuroimmunology (Sandvik et al., 2013) alcoholism (Bartone et al., 2017), sickness absences (Hystad et al., 2011) decreased mental health struggles, and depressive symptoms (Hoopsick et al., 2020; Krauss et al., 2019; Wang et al., 2019; Barringer et al., 2016; Thomassen et al., 2015).

Performance. In addition to the protective health mechanisms, hardiness is also a predictor of performance in stress-inducing scenarios. Hardiness research utilizes classroom and

simulated field settings as primary measures of performance. The expectation is that performance is transferable to live scenarios since they cannot be directly measured in the most stressful situations. Evaluations of performance are completed at entry level training (Maddi et al., 2017; Bue et al., 2016; Lovering et al., 2015; Kelly et al., 2014; Maddi et al., 2012; Bartone et al., 2009; Eid et al., 2008; Westman, 1990), leadership evaluation (Bartone et al., 2013; Bartone et al., 2009), and elite personnel selection processes (Johnsen et al., 2013; Bartone et al., 2008). Many military academy investigations that evaluate performance or leadership have been conducted at USMA; Maddi et al., 2017; Kelly et al., 2014; Maddi et al., 2012; Bartone et al., 2013; Bartone et al., 2009) and there have been occasional investigations internationally (Eid & Morgan, 2006; Eid et al., 2008; Bue et al., 2016; Westman, 1990). Entry-level military cadets and privates have been primary populations of research interest as attendants of military academies, or individuals entering basic training. Hardy individuals are associated with having greater academy retention and better performance within military academies (Maddi et al., 2017; Kelly et al., 2014; Maddi et al., 2012; Eid et al., 2008; Eid & Morgan, 2006).

Kelly et al. (2014) found hardiness commitment was a predictor of attrition at the USMA (Cohen's $d = .40$, $p = .001$) before the conclusion of Cadet Basic Training (CBT) which occurs during the summer the first-year cadets arrive. Hardiness control and grit were significant predictors of 4-year academic performance after college entrance exam rank (CEER), a composite evaluation that includes ACT/SAT verbal and math score and class rank (Kelly et al., 2014). Maddi et al (2012) also examined hardiness and grit as a predictor of performance as first-year Cadet Performance Score (CPS), and retention in the USMA. CPS is the cumulative weighted average of performance scores in multiple domains including military and academic course work. Grit and hardiness contributed to cadet retention after Whole Candidate Score

(WCS), a measure of high school performance already used for selecting entry into the program. Only hardiness accounted for unique variance in CPS after WCS. In a four-year follow up of the same cadets, hardiness was a more reliable long-term predictor of retention and performance (Maddi et al., 2017). At the Royal Norwegian Naval Academy, the challenge facet of hardiness was negatively associated with peritraumatic dissociation in response to mild stress and prisoner of war (POW) survival training (Eid & Morgan, 2006). Total hardiness was not associated with POW scenario performance score (Eid & Morgan, 2006).

Leadership. Performance measures at military academies often coincide with leadership, but only three studies have designed investigations of leadership performance. Hardiness influences leadership performance at entry-level positions (Bartone et al., 2009; Eid et al, 2008) and continues beyond (Bartone et al. 2013).

In a study by Bartone et al. (2009), leadership performance was evaluated as a military development course graded by supervisors. During summer field training cadets were evaluated on their ability to perform as leaders of groups and during the academic semester managing schedules to meet academic requirements while maintaining basic military and physical skills. Regression analysis results revealed hardiness was a predictor for summer and academic leadership performance when controlling for general intelligence. In an investigation of leadership growth, Eid et al. (2008) found hardiness to be negatively associated with passive avoidance leadership style ($r = .52$, $p > .001$) and positively associated with transformational ($r = .53$, $p > .01$) and transactional leadership ($r = .37$, $p > .01$). Evaluating leadership beyond the military academy showed hardiness of first-year cadets to be reliable over seven years (Bartone et al., 2013). First year cadet hardiness predicted leadership performance ($r = .06$, $p < .01$) as seniors at USMA and leader adaptability (self and supervisor rated) three years after graduation.

Military Program Score (MPS) measured leader performance at USMA, a cumulative weighted average of grades received in leadership and military performance. Leader adaptability was self and supervisor-rated qualities of military, leadership, intellectual, physical, moral-ethical, and human spirit dimensions of development. Higher self-rated adaptability was associated with hardiness ($r = .27$, $p < .001$) and higher rated supervisor adaptability was correlated with the control facet of hardiness ($r = .36$, $p < .01$).

Findings also indicate hardiness was associated with performance in basic training (Bue et al., 2016; Westman, 1990). Individuals in basic training are usually of a comparable age (18-24) to individuals in military academies but are not enrolled in tertiary education programs. Bue et al. (2016) found hardiness had a weak direct effect ($r = .04$) predicting attrition in Dutch Army basic training. Hardiness was also associated with physical performance on a self-defense exercise. The effect size was large ($r = .79$) for score categories: *very good* and *insufficient* (Bue et al., 2016). An additional study reported hardiness was positively predictive of objectively assessed performance in navigation ($r = .22$) and obstacle course tasks ($r = .23$) in Israeli Defense Forces during basic training (Westman, 1990). A follow-up a year later revealed hardiness was also related to first-year on-the-job performance appraisal ($r = .24$).

Hardiness has been correlated with elite personnel selection in Army Special Forces (SF; Bartone et al., 2008), Israeli military officers (Zach et al., 2007) and Norwegian Armed Forces Border Patrol (Johnsen et al., 2013). United States Army SF candidate school graduates were significantly higher in hardiness (Cohen's $d = .24$, $p = .001$) than non-graduates. A 1-point increase in hardiness equated to a 3.3% greater chance of graduation (Bartone et al., 2008). A 9-week Israeli military state officer training and selection program evaluated the relationships of stress, motor, and mental performance (Zach et al., 2007). Trainings comprised of progressively

stressful scenarios such as dangerous obstacle courses, overpowering terrorists, disabling lawbreakers, negotiation with kidnappers and other challenges evaluated by a panel of instructors (Zach et al., 2007). Performance scenarios were one-on-one terror simulations based on real events (e.g., Ben-Gurion International Airport in 1972, assassination of the Prime Minister of Israel in 1995, September 11th in 2001). Hardiness was correlated with training performance (r = .37) throughout the 9 weeks and performance simulation (r = .42). Both relationships were mediated by anxiety, training performance throughout the 9 weeks (partial r = .02) and the culminating simulation performance (partial r = .23). The selection program for Norwegian Border Patrol includes a continuous 9-day ski trip that covers over 155 miles through the Artic (Johnsen et al., 2013). Successful completion was predicted by total hardiness (p = .04), and more specifically the commitment facet (p = .02) after controlling for nutrition, physical fitness, and sensation seeking (Johnsen et al., 2013). Overall, the military performance studies above show hardiness consistently has a small, but significant effect in different military populations even when it is not the central predictor.

The utility of hardiness within military performance literature has been thoroughly established and there has been no investigation of the hardiness-performance relationship within the AROTC. Further, few studies have measured hardiness repeatedly, even in studies that are longitudinal. As higher hardiness has benefits, more research is needed to create a fuller understanding of hardiness development, particularly in the military population.

Hardiness Development

Investigations of hardiness development are scant across the general workforce and military. When examining the general workforce findings support hardiness as a trait that can be developed (Maddi et al., 2009; Judkins et al., 2006; Tierney & Lavelle, 1997; Maddi, 1987).

Training initiatives varying in length, one day to three months, reveal improvements in hardiness immediately post-intervention. The increased values trend toward baseline values at the six-month follow-up (Maddi et al., 2009; Judkins et al., 2006; Tierney & Lavelle, 1997; Maddi 1987). Unlike the military, these trainings are designed to explicitly improve hardiness and post-intervention changes may result as a learning effect (Hystad et al., 2015).

Military. Hardiness development within the military has been the focus of two investigations reporting mixed results. Hystad et al. (2015) examined hardiness over three years (4 total waves of data collection) in Norwegian military academies with cadets aged 19 to 37 (M = 23 years, SD = 2.92). No supplementary information was provided on prior service history. Hystad et al. (2015) found participant hardiness levels significantly varied over time (p = .002) when using hierarchal linear models across three separate military academies, but only 4% of the variance was due to time. The model revealed a downward trend of hardiness over the duration of the study. Cadets mean score was 1.57 in a range of 0-3 placing them around the midpoint reducing the likelihood of a ceiling effect as an explanation for the lack of change. A nearly 50% dropout from start to finish rate raised cause for concern, but through attrition analysis no difference was found between completers and non-completers (Hystad et al., 2015).

In 2007 Zach et al. tracked hardiness levels of Israeli military officers during a training and selection program. Participants were 21 to 24 with twelve years of education, completed full army service as combat soldiers, and graduated from officer school. The nine-week program included familiarization with a variety of realistically stressful simulations (e.g., responding to fire, hostage taking, and defense & attack) that were gradually incorporated (Zach et al., 2007). Findings revealed significant improvements in hardiness (p = .001) following the vigorous training program. Israeli military officers and Norwegian cadets training and experience are

different from one another; AROTC is different from both. While it is plausible to anticipate military training and experience to effect hardiness without a targeted intervention, based on the results of these two studies no certain conclusions may be drawn on the malleability of hardiness in this context.

Hardiness and Academic Performance

Understanding the relationship of general hardiness with academic performance is a secondary purpose of this study. The examination of hardiness and academic performance did not include research utilizing the Revised Academic Hardiness Scale (RAHS) that is specific to academic stressors (Benishek et al., 2005; Weigold et al., 2016), but instead used general hardiness scales consistent with this review. Though the RAHS was, in part, inspired by Kobasa (1979; 1982), the control facet has been divided into effort and affect reminiscent of Dweck & Leggett's (1988) theory of academic motivation. The RAHS better suits the needs of researchers seeking to understand the result of combating student stressors and motivation specific to the academic setting (Weigold et al., 2016), whereas our purpose is to approach stressors and motivation in a general and generalizable manner.

GPA. In a meta-analysis hardiness was positively associated with school performance (p = .23, k = 3, N = 623; Eschleman et al., 2010). This relationship was weaker than the association with health, but as previously mentioned the connection of hardiness to performance is distal and may work via health (Eschleman et al., 2010). Maddi et al. (2012) evaluated the relationship of hardiness to college performance. Participant hardiness scores of eight prior investigations in undergraduates (n = 2,352) were compared with graduating GPA obtained up to two years later (Maddi et al., 2012). In all eight samples hardiness was correlated with GPA, r ranged from .001

to .223 and through regression analysis hardiness was a significant predictor of GPA in five samples.

Two studies by Sheard and colleagues (Sheard & Golby, 2007; Sheard, 2009b) have evaluated hardiness and academic performance both using scales designed by Maddi et al. (2006). Exercise science students (n = 134, M = 20.87, SD = 2.66) at a university in the United Kingdom were given the hardiness questionnaire the first week of their second year of a three-year program (Sheard & Golby, 2007). Hardiness and the three components were dichotomized into high and low based on median scores (e.g., high total hardiness > 38, low total hardiness ≤ 38. These were based on the normalized range (19-49) and average scores (38-41) reported. Students with high total hardiness (>38, n = 51) achieved a higher dissertation mark ($F_{1, 132}$ = 7.26, p = .008, partial η^2 = .052), which was comparable to a senior project (Sheard & Golby, 2007). The commitment facet subgroup was a more valuable predictor of academic performance (Wilks' λ = 0.86, $F_{4, 123}$ = 4.95, p = .001, partial η^2 = .139) than total hardiness overall (Sheard & Golby, 2007). Students high in commitment (> 35) received higher average Year 2 GPA ($F_{1, 126}$ = 7.50, p = .007, partial η^2 = .056) and higher average dissertation mark ($F_{1, 132}$ = 9.33, p = .003, partial η^2 = .069), first year grades were not calculated in final GPA (Sheard & Golby 2007).

In a similar two-year follow-up with exercise science students investigating hardiness, gender, age and their relationship to academic performance. Hierarchal regression analysis revealed final degree GPA and dissertation mark were predicted by commitment, and commitment and gender respectively (2009b). Commitment accounted for 4% of variance in final degree GPA and 10% in dissertation mark (2009b). Both studies found hardiness to be a valuable predictor of academic success but did not measure hardiness in first-year students, nor take multiple measures of hardiness.

Overall findings support hardiness as a predictor of academic performance in university undergraduate students. Much of the extant literature is concerned with graduating GPA of students as they prepare to join the workforce, not first-year GPA as transitioning into college.

Hardiness Development in Undergraduates. Maddi and colleagues have investigated hardiness development at the university level through evaluating the effectiveness of direct hardiness training (2002; 2012). The *HardiTraining* workbook protocol designed by Maddi and Kobasa (2001) includes honing the skills of coping, social support, and self-care. Feedback is implemented while developing skills with the purpose of increasing hardiness specific qualities: commitment, control, and challenge (Maddi et al., 2012). Coping is problem solving life's stressors through situational reconstruction, focusing, and compensatory self-improvement (Maddi et al., 2012). The social support component hones the effectiveness of the interactions with significant others (Maddi et al., 2012). This phase consisted of identifying and resolving conflict, improving communication, and developing listening skills. Self-care emphasizes balancing arousal through effective interactions with self and others while avoiding health problems (Maddi et al., 2012). Activities to improve and maintain self-care included the ability for individuals to identify and rectify arousal levels that are too high or too low through relaxation, nutrition, and exercise (Maddi et al., 2012).

Coping, social support, and self-care were evaluated via the HardiSurvey III-R, a 65-item questionnaire composed of 4-point Likert items (Maddi et al 2012). Additional variables evaluated were stress, strain, transformational coping, regressive coping, family social support, and work/school social support (Maddi et al 2012). Stress, strain, and regressive coping were formed into a composite vulnerability index (Maddi et al 2012). Hardiness attitudes,

transformational coping, family social support, and work/school social support were formed into a resistance index (Maddi et al 2012). Lastly, vulnerability and resistance scores were combined into a wellness index (Maddi et al 2012).

In the first study using this hardiness training, Maddi et al. (2002) evaluated the effectiveness of hardiness training in first-year high risk undergraduates as classified by the U.S. Department of Education criteria (i.e., a history of reading deficits, writing, or mathematics; first-generation immigrant status; no model in the home with a college degree; a minoritized member of society; or living with a disability). Students registered for a fall-semester hardiness course (n = 40) meeting one-hour twice a week or a control student enrichment group (n = 53). In the student enrichment course leadership training was emphasized. The focus was time management, study skills, and remedial work. The *HardiTraining* workbook (Maddi & Khoshaba, 2001) was utilized for course instruction emphasizing coping and social support components. All composite and individual items of the HardiSurvey (Maddi & Khoshaba, 1999) were significant pre-to-post training for the hardiness group supporting the possibility and effectiveness of changes in hardiness through training: total vulnerability (Stress, strain, and regressive coping), total resistance (Hardiness attitudes, transformational coping, family social support, and work/school social support), and total wellness (the combination of total vulnerability and resistance scores). The student enrichment group exhibited significant changes from pre-to-post training in hardiness coping (p = .002), total vulnerability (p = .03), and total resistance (p = .04) revealing the college experience may naturally influence hardiness development. When comparing the hardiness group to the comparison group from pre-to-post training only index variables of total resistance (p = .02) and total wellness (p = .01) were significantly different. Individually significant items that differed between groups were strain (p = .02), regressive coping (p = .05),

hardiness attitudes (p = .002), and hardiness work support (p = .05). Students completing the hardiness course reported mean GPAs of 3.06, which was significantly higher, p =.02, than the student enrichment group GPA of 2.75. This also provides evidence that hardier attitudes are associated with increased academic performance.

Maddi et al. (2012) completed a follow-up study to expound on the trainability of hardiness. This study allowed for greater variability and produced greater generalizability. This included allowing all undergraduates to participate, shorter course length, and larger enrollments (100-150 students). The hardiness training group (n = 349) and comparison group courses (n = 378), health psychology, personality, clinical psychology, or existential psychology lasted for 11-weeks. Utilizing the *HardiTraining* workbook (Maddi & Khoshaba, 2001) the hardiness-course incorporated all domains: coping, social support, and self-care. In the hardiness group the total resilience index score (p = .009) and individual items of stress (p = .001), strain (p = .003), hardy attitudes (p = .007), hardy coping (p = .02), and school/work support (p = .002) were significantly different from pre-to-post. The comparison group reported significant changes in strain (p = .02) and total vulnerability index (p = .002). The end of the 11-week quarter produced significant GPA improvements with a t-score value (1, 726) of -7.04 (p = .001) for the hardiness group (M = 3.41, SD = 0.53) when compared to the comparison group (M = 3.23, SD = 0.59). The difference in GPA was sustained until graduation ($t_{1, 726}$ = -3.34, p = .001), for this study was in the range of six to twenty-four months. These investigations by Maddi and colleagues offer confirmation that hardiness scores are associated with college GPA, but more importantly reveal changes in hardiness can occur naturally over the course of a college semester and trainability of hardiness is possible.

Qualitative Research Review

The extant literature on hardiness within the military lacks any qualitative investigations. Of the studies utilizing AROTC cadets, one exclusively focused on the Leadership Development and Assessment Course (LDAC) attended by all AROTC third-year cadets (Gilson et al., 2015) and the other centered on Physical Training (PT) that usually occurs three to four mornings throughout the week (Fischer, 2015). However, neither study was relegated to first-year cadets, both integrated psychological qualities and experiences of cadets as a primary finding. Insights can be summed as attributes and competencies of the Army leadership requirements model. Foreseeably so, attributes and competencies were underlying themes of both studies. They are chiefly emphasized as part of officer development throughout ROTC training as shown in Figure 2.

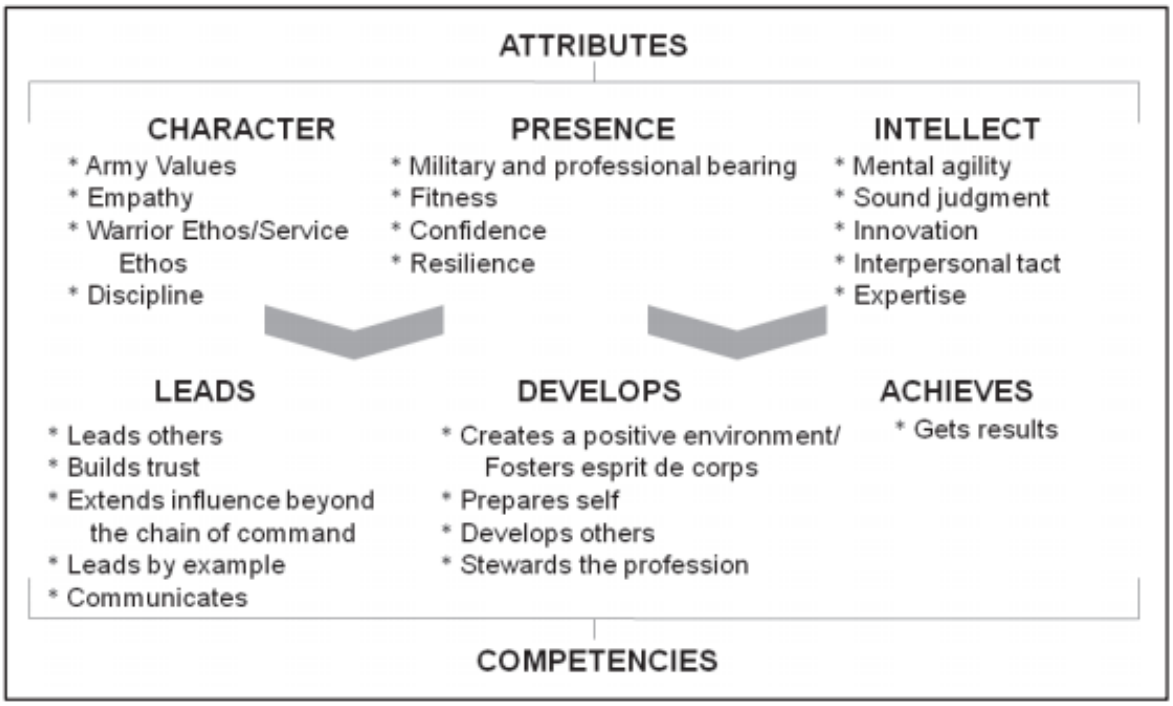

Figure 2 Adapted from (*ADRP 6-22: Army Leadership* 2012)

Qualitative ROTC Research. Fischer (2015) investigated the impact of motivational climate during PT on leadership development using Achievement Goal Theory (AGT; Nicholls, 1989). There are two types of motivation in AGT: task and ego-centered. Task-centered is driven by mastery of skill and characterized by high effort, while ego-centered is driven by competition and characterized by recognition of performing better than others. Fischer (2015) found the motivational climate during PT maintained both task and ego-centered qualities. When cadets performed well the climate was perceived as facilitative, but conversely when cadets were not doing well the climate could be interpreted as debilitative (Fischer, 2015). Analysis of field notes and interviews (n = 20) identified three primary themes: leadership culture, camaraderie through challenge, and evaluation and success. Components of each major theme were elicited: 1. Leadership culture encompassed leading by example and building a chain of command; 2. Camaraderie through challenge included PT camaraderie and cadet support; and 3. Evaluation and success consisted of APFT scoring and rewards of performance. The themes and components revealed by Fischer (2015) parallel the Army leadership requirements model and place emphasis on individual development of the cadet resulting in a better team, or battalion. Though Fischer (2015) included all cadets and examined only PT, themes and components may be similar in first-year cadets total experience in the proposed study as PT accounts for the most amount of time spent participating in ROTC activities throughout the program. Further, first-year cadets' perspective may echo themes and components as they acclimate, subsequently influencing development.

Examining cadet experiences from LDAC attended by third year AROTC cadets, Gilson et al. (2015) reported three themes: perceived difficulty of course, social climate experiences, and psychological skills for success. While the two former are specific to the LDAC,

psychological skills for success are of critical importance for all cadets, particularly developing first-year cadets. Confidence, domain knowledge, being opportunistic, and adapting to circumstances were the skills that cadets felt were emphasized during the LDAC. The psychological skills listed are encompassed within the Army leadership requirements model. These are emphasized to first-year cadets and are honed as cadets progress through ROTC.

These qualitative investigations are evidence individuals can respond differently to a climate with similar training, highlighting the importance of personality and perspective to create success in ROTC. The purpose of the qualitative portion of inquiry in this study was to further understand individual and collective cadet perspectives as well as their conceptualizations of stress, personality, and performance.

Summary

Hardiness has shown to be an effective psychological measure of personality independent of, or in addition to the Big Five traits (conscientiousness, neuroticism, openness, agreeableness, and extraversion). Described as a style of functioning, hardiness diminishes the ill-effects of stress and increases the ability to maintain health. Research evidence supports hardiness as a consistent predictor of performance in tactical and, more specifically, militaristic populations. However, investigations of hardiness development within this same population are scarce. The current study addressed this gap in the hardiness literature by utilizing ROTC as a novel population, assessing hardiness at more than one time point, and providing qualitative data to supplement the quantitative results.

This study aimed to determine the effect of AROTC on hardiness development across a fall and spring semester in first-year cadets compared to university students. Findings provided evidence to support the use of hardiness as a stable selection-criterion and potentially a more

malleable construct to be developed. As a secondary aim this study evaluated the relationship of hardiness to academic and ROTC specific performance to determine the reproducibility of the hardiness-performance relationship in a novel population. The tertiary aim was to understand individual and collective cadet conceptualizations of stress, personality, and performance. Results of this study contributed to extant personality development and performance psychology literature that may result in optimization of selection and/or training of soldiers.

CHAPTER III: METHODOLOGY

Method

The primary purpose of this study was to determine whether Army ROTC training affected changes in hardiness over an academic calendar in first year cadets. University students were recruited via flyers and utilized as a control group to measure changes in hardiness from January to April. The intended design was a matching first-year university sample from August to April, but recruiting limitations served as the primary barrier. The secondary purpose of this study was to examine the relationship of hardiness to performance in first year AROTC cadets and participating university students. The tertiary purpose was to understand individual and collective cadet conceptualizations of stress, personality, and performance. This chapter provides an overview of the research design and variables of interest. Participant information, the context and characteristics of the study, research procedures, and instrumentation are included. Finally, data analyses and statistical procedures are presented.

Human Subjects Approval

Prior to recruitment for this study, a research protocol review form was submitted to the Auburn University Institutional Review Board for Research Involving Human Subjects (IRB (Institutional Review Board)). IRB approval was granted on 1/5/2021 under approval number: 20-372 EP 2008.

Research Design

This research study implemented a mixed methods design. Mixed methods research, for the purpose of this study, is defined as "the collection, analysis, integration of findings, and drawing inferences using quantitative and qualitative methods" (JMMR, 2020). A mixed

methods approach was practically chosen to provide a better understanding of our inquiry than either a quantitative or qualitative, approach alone (Morgan, 2014). This study used an explanatory-sequential design (Creswell & Plano Clark, 2011 via DeCuir-Gunby & Schutz, 2017); meaning data collected from qualitative portion offered further understanding of quantitative findings.

Quantitative Research Design. This study incorporated two separate quantitative designs. A mixed ANOVA design (between and within-subjects) used to determine whether first-year ROTC cadets improve hardiness scores following an academic semester of ROTC training in addition to any improvements that may occur in university students. A correlational design was used to determine whether there is a relationship between hardiness scores, the Big Five, and other relevant personality variables to performance measured by academic grades and ROTC specific field performance.

Qualitative Research Design. As a mixed methods design, this study assumed a pragmatic framework to answer the research question. First-year cadets were invited to share their experiences to capture the essence of ROTC. Additionally, interviews were analyzed for differences in experiences between cadets.

Observations, interviews, and cadet self-written assessments were utilized as qualitative forms of inquiry for this study. ROTC-specific events were observed to improve the researcher's situational context for interviews and self-assessments. Interviews and self-assessments allowed cadets an opportunity to further describe their perspective and experiences.

Participants and Setting

The participants in this study were recruited as first-year students from an AROTC program or university students at a Southeastern University in the United States. The AROTC is

an alternative method to enlisting in the Army. Requiring students to complete an elective Army-based curriculum in addition to college courses "provid[ing] cadets with the character-building aspects of a diverse, self-disciplined civilian education with tough, centralized leadership development training" (Legacy & Value, goarmy.com). Since the ROTC's official inception in 1916 with the signing of the National Defense Act, Army ROTC has commissioned more than half of a million officers and nearly 60% of Second Lieutenants. Though the documented founding is dated 1916, similar unofficial college and university training programs have been dated as early as 1819. The creation of the military training program at the university of interest coincided with the beginning of the university in 1856. The context is necessary to acknowledge the long-standing tradition and pride associated with Army ROTC members on campus. See appendix C for further explanation of environment and context.

AROTC first year cadets commit to a weekly 1.3-hour long instructor, or cadre, led-course that is supplemented by a 2-hour applied lab in an outdoor setting. Labs are Army-specific consisting of tasks like land navigation, rappelling, battle drills, and large group movements (Army, 2020). Cadets partake in 1-hour physical training (PT) four to five times per week that is supervised by cadre from 5:50 to 6:50 AM. Frequently activities are scheduled during the weekend for cadets to receive further applied experience and provide opportunity to enhance camaraderie (e.g., training exercises, drill team, attending/working athletic events, and other peer-led activities).

Procedure

ROTC. After receiving approval from the university's Institutional Review Board for Research Involving Human Subjects AROTC cadets were allotted class time during the first and second week of fall and spring semester and the last two weeks of the spring semester to

complete survey. Informed consent and baseline data were collected through completion of the survey containing demographics, International Personality Item Pool, and Hardiness Resilience Gauge. Additionally, cadets were invited to participate in interviews during the spring semester to provide richer content of their experiences during the spring semester. Invitees displayed a range of hardiness scores to share perspective on their personal development while in ROTC. Throughout the semester the researcher observed AROTC-specific events such as class, laboratory, PT, physical fitness testing (Army Combat Fitness Test; ACFT), and other extracurricular activities weekly to provide authentic context and further understand the AROTC environment for interview and self-assessment. ACFT scores were shared the week after testing. During the second and third data collections cadets shared self-reported GPA. From April to January cadets that volunteered participated in semi-structured interviews.

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University Students. Due to only three participants sharing interest in the study, recruiting was opened to all university students, not only first years. University students were recruited via flyer online as an opportunity to receive extra credit through the university system. University students served as a comparison group to trace natural changes in personality variables over the course of a semester and asked to provide GPA. A visual of the participant flow chart is provided in Figure 3.

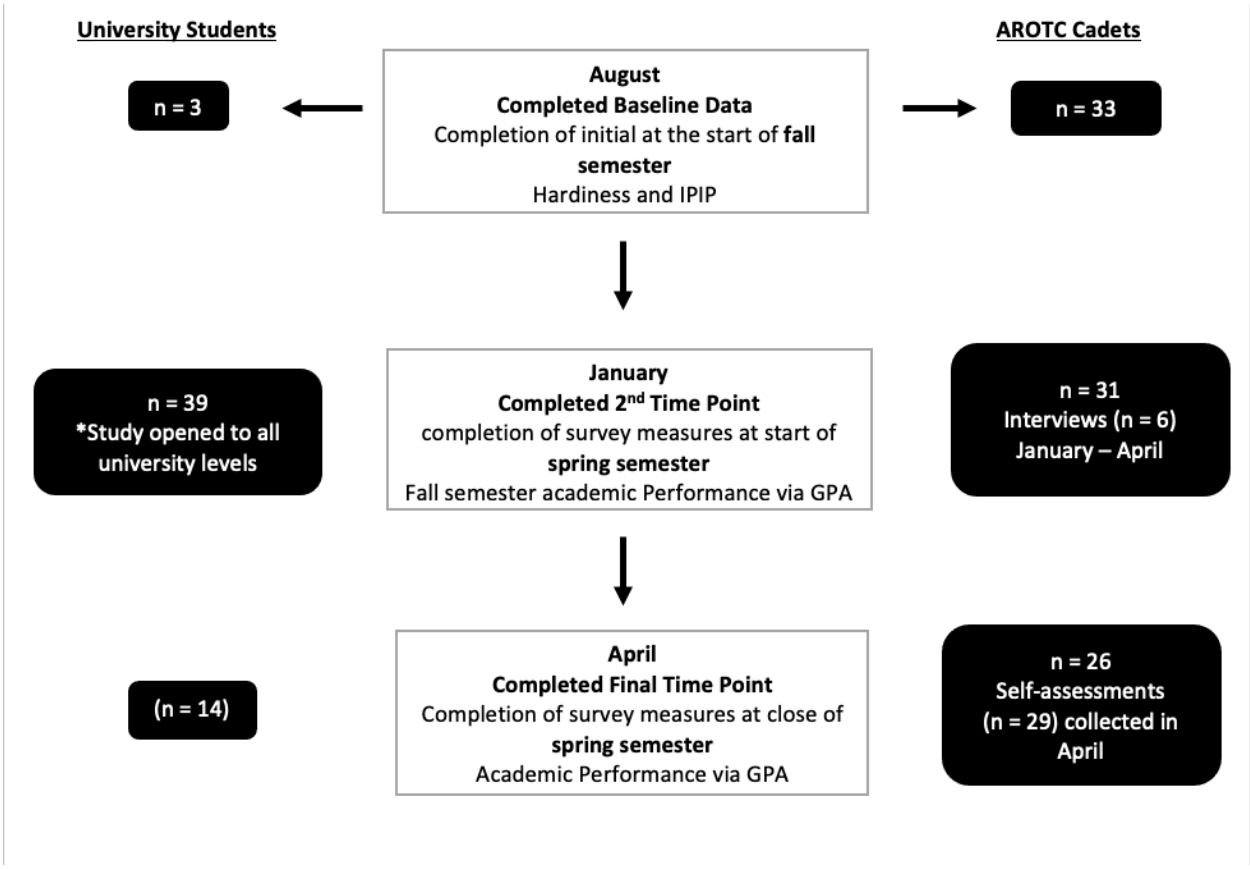


Figure 3. Participant Flow Chart

Measures

Multiple instruments were used for this study. Quantitative components were administered online via Qualtrics. Instruments consisted of the Hardiness Resilience Gauge (HRG, Bartone, 2018) and the International Personality Item Pool (IPIP) based on the Big Five personality (Goldberg et al., 2006). Academic performance was assessed via GPA for AROTC cadets and university students, in addition AROTC provided Army Combat Fitness Test scores as field performance.

Instrumentation

Demographics Questionnaire. Demographic information gathered included age, most closely identified race/ethnicity, biological sex, academic classification, military dependent status (child of a service member), and in/out of state resident status. Additional questions specific to ROTC such as commitment status (non/contracted, or scholarship), simultaneous membership program (SMP) status (dually involved in National Guard), and prior service experience, This information was collected in August.

Hardiness Resilience Gauge. The Hardiness Resilience Gauge (HRG) is 28-item questionnaire designed through Multi-Health Systems. The HRG is the most updated Dispositional Resilience Scale designed by Paul Bartone (2018). The instrument contains three subscales 1) challenge and 2) commitment both contain ten items and 3) control has eight. Hardiness, or resilience is defined by Bartone (2018) as individual's ability to cope with stressful and unexpected situations. This scale is intended to quantify the worldview of an individual. Face and content validity have been tested and established via Mental Health Systems. The test-retest reliability for the total HRG was .81, while the subscales challenge, control, and commitment were .80, .74, and .79 respectively. This scale was used to quantitatively assess hardiness in both groups of participants in August, January, and April.

Multi-Construct International Personality Item Pool. Collected at all three time points, the NEO-PI-R assessment is based on the Five Factor Model (FFM) of personality. The scale measures domains of neuroticism, extraversion, openness, agreeableness, and conscientiousness using a five-point Likert format with items positively and negatively keyed. The FFM is the standard of quantitative personality assessment in psychology research for normative adults. The multi-construct items taken from this personality item pool is an open-source version of Costa

and McCrae's (1992) NEO Personality Inventory (NEO-PI-R). The 50-item version of the scale from the International Personality Item Pool (IPIP; Goldberg et al., 2006) will be used for brevity and the high correlation with the NEO-PI-R (0.81, 0.90 when corrected for reliability). Previously reported Cronbach's alpha is 0.89. This scale was used to assess the personality of university students and decipher correlations with non-personality variables. The IPIP was adjusted from a five to seven-point scale to maintain uniformity throughout the survey. Evidence shows surveys the transformation does not produce significant differences and scales maintain meaning (Taherdoost, 2019; Dawes, 2008).

Academic Performance. Academic performance, or self-reported student GPA, was utilized as a secondary outcome measure for AROTC cadets. Studies show high correlations between self-reported and registry GPA in the range of .84 - .89 (Gray & Watson, 2002; Noftle & Robins, 2007). Tertiary education academic performance has been reliably associated with work performance (Poropat, 2009) and personality independent of intelligence (Vedel & Poropat, 2017). Most notably conscientiousness of the Big Five shows largest correlation with Cohen's *d* ranging from .21-.26 (Poropat, 2009; Richardson et al., 2012; McAbee & Oswald, 2013; Vedel, 2014). As covered in the literature review hardiness has also been associated with higher GPA (Maddi et al., 2012).

Academic performance was the primary measure of performance for university students. This was the only measurable outcome available to determine the influence of hardiness on performance in university students. Students and cadets reported current overall GPA in January and April.

AROTC is a university elective with cadets graded similar to any other course of instruction. First-year cadets are enrolled in a Military Science course, an introduction to Reserve

Officer Training Corps and the US Army. Cadets are graded via quizzes, tests, and larger assignments. In addition, physical fitness testing scores (ACFT) also contribute to course grade. Although first-year cadets have limited amounts of formal assessments, there was no correlation between ROTC course grade and ACFT score. GPA and ACFT are seen as separate performance assessments and no multicollinearity was revealed through statistical analysis.

AROTC Field Performance. The grade a cadet receives is cumulative based on all AROTC graded activities. Some may include marksmanship, land navigation, Army Combat Physical Fitness Test (ACFT), and a course of instruction (Army, 2020). The first-year cadet experience is described as a *crawl phase* by the cadre with limited testing occasions. The primary objective of a first-year cadet is to become acclimated to the AROTC program and requirements. For this study, cadet ACFT scores were considered as field performance. The ACFT is designed to bridge fitness with combat readiness for all soldiers (Army, 2020). Exhausting all energy systems and testing cadet mental fortitude, the ACFT consists of six events: three repetition-maximum deadlifts (MDL), standing power throw (SPT), hand release push-up with arm extension (HRP), sprint-drag-carry (SDC), leg tuck (LTK), and two-mile run (2MR). In each of the six events cadets can receive up to 100 points for a total of 600 points. Progressively greater loads, distances, repetitions, and faster speeds achieve higher scores. To pass the ACFT at the Army's Gold Standard, cadets must score no less than 60 points on any given event (see appendix B for scoring standard chart). Lowest overall scores determine the classification of physical work a cadet qualifies for. There are three classifications moderate (60), significant (65), and heavy (70). To qualify for combat Cadets must achieve a total minimum score of 70 on each event.

For the AROTC at this university the ACFT are scheduled in advance and cadets complete the physical testing at 6am or 8am on one of the three scheduled days in a week. Only cadre are authorized to score tests. ACFT scores were shared following the week of testing.

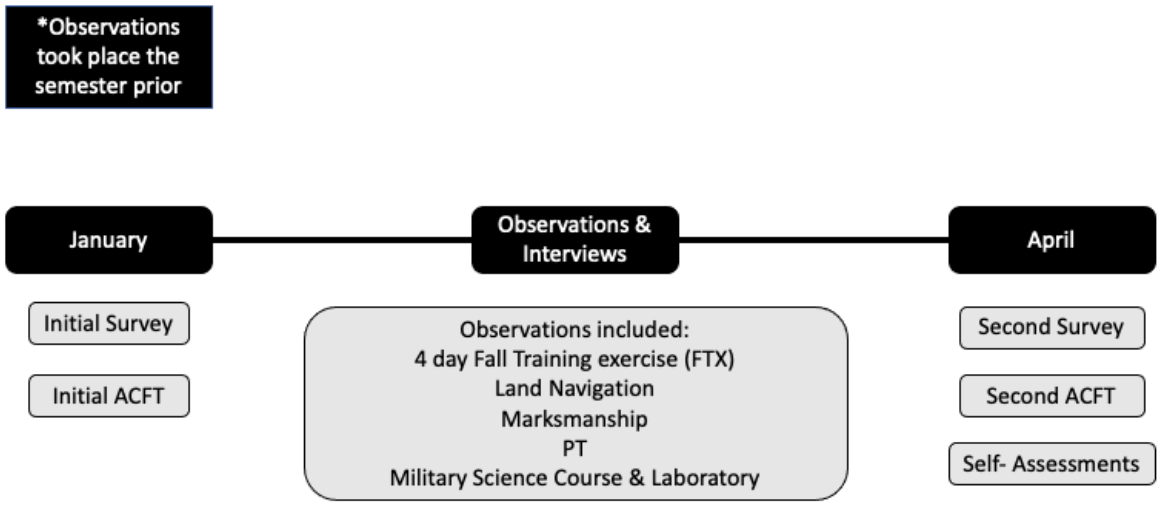


Figure 4. Data Sources with Timeline

Qualitative measures

Observation. The observational protocol was designed to provide a holistic view and context of the cadet environment shaping their ROTC experience. Throughout the year the researcher developed familiarity and comfortability through spending extensive time attending numerous events in the field with cadre and cadets. These included but were not limited to weekly military science courses (classes and laboratories) and field activities (physical training, marksmanship, and land navigation). Throughout the semester every week would consist of a minimum of four hours in ROTC related activities. This time in the field provided improved understanding of Army standards, language, dynamics rapport. Time spent during the semester prior to the commencement of the study was foundational to progressing dialogues with cadets and cadre to deeper insights throughout the duration of the study.

During the study observations of military science courses and field activities continued. The researcher observed and took field notes of the AROTC climate and culture at various events. Field notes from observation provided context and framework for interview questions regarding cadet ROTC specific experience. These included weekly military science classes and applied laboratory, weekly physical training (PT) sessions, and other extra-curricular activities (e.g., marksmanship, land navigation). The purpose of observations was to continuously build authentic relationships and engage with the ROTC program, as this improved understanding of the comprehensive environment. All observations were completed by the researcher. AROTC cadre encouraged the researcher to attend all cadet activities with unrestricted access. The researcher-AROTC relationship continued into the spring semester building further rapport, engagement, and comfortability with cadets to produce authentic data.

Observation Events

Classes & Laboratories. Class and laboratories served as an introduction to the ROTC and the U.S. Army held once/week. The basic military science courses provided unique classroom and hands-on instruction in orienteering, small unit tactics, first aid, physical fitness, and leadership skills. They introduced the cadet to the Army as a profession, laying the foundation of value-based, ethical decision-making and illuminate the Army's place in society preparing the cadet for the advanced military courses that follow.

Physical training (PT). PT consisted of three to four days of morning exercises split into three groups of 40-50 cadets. Exercise began at 5:50 AM and lasts for one hour. Some examples include long slow distance runs, shuttle runs, circuits, and combat specific exercises.

Land Navigation. Land navigation required cadets to locate points in a heavily wood area (e.g., Tuskegee National Forest, Red Diamond at Fort Benning) by plotting coordinates on a map

Fall Training Exercise (FTX). FTX is a culminating 4-day event where cadets display military knowledge, tactics, and execution ability.

Marksmanship. Marksmanship consisted of cadets practicing shooting using military standard issue weaponry at a 300-meter range.

Gatekeeper

The gatekeeper was the Executive Officer. A cadre member introduced to the researcher when first broaching the idea of working with AROTC one year prior to the start of the study. The gatekeeper is the longest serving member of the AROTC cadre at this institution and is an alumnus. Though not actively involved in the daily activities of cadets, the Executive Officer is the link between the researcher and cadet world.

Semi-structured Interview Schedule

Semi-structured individual interviews were conducted using broad open-ended questions (Moustakas, 1994) allowing the researcher to gain rich descriptions of how participants make-meaning of their experiences between January and April. The interviews were guided by participant's perception of stress, personality, and performance with limited questions enabling a fluid dialogue between interviewer and interviewee. Six interviews were completed. Hardiness scores were utilized for interview selection. Scores were divided into thirds (<100, 100-109, and >109) based on normative values (Bartone, et al., 2018). Interview selection is described further below. When there were not enough subjects in each score range, interviewees were selected to collect representative sample of the scores. Interviewees were contacted via email to participate in the interview. The interviews were conducted in person. All interviews were audio-recorded

using a digital recording device. All interviewees were briefed about the nature of the interview and informed that the conversation was recorded and transcribed.

Interview Protocol. Cadets were invited to schedule an interview via email. Participants were met at the entrance and guided to a private room. Each participant was reminded of the study and informed the purpose of the interview was to receive further insight and perspective of their experiences. The researcher shared the interview would take approximately an hour. Participants were informed "there were general questions for guidelines, but this will be informal and more like a conversation than an interview". Prior to the start the researcher ensured confidentiality, asked the participants if there were any questions or concerns, and informed the participant notes may be taken to revisit areas of interest during the discussion. Interviews were recorded on an iPhone. Following the interview participants were thanked for their time and led out of the building.

Rationale for Interview Selection. Cadets indicated whether they would like to participate in an interview while completing survey in August & January. Interested participants were divided into three groups of hardiness scores: low (≤ 100), medium (101 – 109), high (≥ 109). Initially two participants were to be randomly selected from each group, however based on participant interest and availability scores were not used as a factor for selection. Interview participant demographics and hardiness scores are listed below. Cadets were invited via email to schedule an interview time. Two emails were sent to each cadet, an initial and a follow up. If there was no response an alternate cadet willing to complete the survey interview was emailed. The process was repeated until six cadets were interviewed.

Self-Assessment

At the end of each semester cadets provided a self-assessment of their performance in the AROTC program as part of their required coursework. As a reflection of their experiences, this self-assessment served as a way of gathering qualitative data from all cadets providing insight on their perspective of their own development. Self-assessments were collected and reviewed by the researcher after the April collection. Self-assessment instructions provided by the cadre were intentionally vague allowing for open interpretation. Cadets were asked to reply to the following question: How has your mindset changed from fall semester to now?

Data Analysis

Power Analysis. According to power analysis, with an estimated .25 effect .05 a priori alpha level estimated total sample size is 54 (27 per group). This power analysis was computed via G*Power 3.1 software using power analysis for a difference between two independent means.

Quantitative. Data analysis was conducted using Statistical Package for the Social Sciences. Descriptive statistics were calculated using all demographic variables, pre-to-post personality, and academic and ROTC-specific performance scores. This study focused on research questions testing within subject differences (pre-to-post personality scores) and between subject differences (ROTC and university students).

The first research question was answered using a mixed ANOVA to determine if ROTC cadet hardiness scores showed significant differences from the pre-test to post-test and whether change, if any, is different than university students. Post-hoc analysis followed upon a significant main or interaction effect. The alpha level for significant is 0.05 a priori.

To answer research question two, a hierarchal linear regression model was used to determine the influence of demographics (sex, military dependent, in/out of state, commitment status, service experience), personality (IPIP), and hardiness (HRG) on measures of performance (GPA and ACFT score). This analysis identified whether a relationship between hardiness and performance existed, described the nature of relationship between variables, evaluated the accuracy of the regression equation magnitude, and identified the importance of multiple predictor variables (i.e., demographics, hardiness, and personality) as well as how they contributed to variability in performance (Kachigan, 1991). Overall, this approach assessed the

relationship of hardiness and performance after accounting for demographic and personality characteristics.

Qualitative. Analysis of qualitative data examined individual differences between cadets and essential experiences amongst all. Interview transcripts and self-assessments were analyzed using a six-step thematic analysis by Braun and Clarke (2006) as follows:

1. Familiarizing with data: Otter was used to for initial transcription and edited for accuracy. Each interview was listened to audibly, then read for full immersion. Each transcript followed this process with a final read through of each.
2. Generating initial codes: Extracts of raw data were organized into meaningful groups
3. Searching for themes: Drawing larger meaning from codes into themes.
4. Reviewing themes: Refining themes for coherence and reviewing codes within themes. Ensure themes accurately reflect the data set by re-reading transcripts.
5. Defining and naming themes: Identify essence of each theme and data within as it relates to the overarching story and research question.
6. Producing the report: Selecting vivid examples or extracts to share the essence of the story with unnecessary complexity.

Reliability/Credibility. Executing a mixed methods study requires reliability and credibility of quantitative and qualitative approaches respectively. To address quantitative reliability internal consistency (Cronbach's alpha) was calculated from survey results. Qualitative credibility was established via detailed field notes and quality recording devices. Transcriptions were reviewed for accuracy.

Validity/Trustworthiness. Discriminant validity was evaluated through multicollinearity of constructs predicting outcomes. Trustworthiness was established by triangulating data (Richardson & St. Pierre, 2005) through multiple sources. A semester of prolonged engagement in the field developed rapport with ROTC cadets. Field notetaking and observations provided rich thick descriptions (Lincoln & Guba, 1985). I understand and accept the report presented is an attempt to accurately showcase my interpretations as an author, indicating these are not the only meanings that can be drawn from the data gathered. External audits of transcripts and meaning unit transformation process were performed. Knowing this work may be limited as a re-presentation I engaged in reflexive practices (e.g., journaling) throughout the data collection process acknowledging my own biases in attempt to maintain authenticity. My biases include the belief mental fortitude can be changed through our environment and changes that occur within military personnel may be beneficial for health, performance, and productivity.

Data Integration. Quantitative and qualitative data was analyzed and discussed individually, then integrated to draw meta-inferences. As an explanatory-sequential mixed-methods design the qualitative data expanded quantitative findings. This study design utilized both data approaches over time to create a holistic view of all findings through full analysis (Teddlie & Tashakkori, 2009).

CHAPTER IV: RESULTS

Introduction

Within the armed forces negative health outcomes from stress affect longevity and increase the attrition rate of soldiers. This results in greater burdens on the Department of Defense and duties of individuals (Congressional Budget Office, 2014). The army's holistic wellness program, based on extant hardiness-resilience lit erature, is designed to reduce the impact of stress and subsequent related negative health outcomes (Meredith et al., 2011). The program equips soldiers with tools to better reactively and proactively combat the negative effects of stress. In national and international armed forces hardiness moderates the stress-health relationship protecting against war-related stress (Zerach et al., 2020; Nordmo et al., 2017; Bartone, 1999), PTSD symptomology (Pitts et al., 2016; Escolas et al., 2013), sustained cardiovascular health (Bartone et al., 2015), neuroimmunology (Sandvik et al., 2013) alcoholism (Bartone et al., 2017), sickness absences (Hystad et al., 2011) decreased mental health struggles, and depressive symptoms (Hoopsick et a; Krauss et al., 2019; Wang et al., 2019; Barringer et al., 2016; Thomassen et al., 2015). While hardiness is associated with well-being and performance, there is less consensus on the impact of military training on hardiness.

Hardiness, or resilience, is a cognitive approach reflected in soldiers' perceptions and behaviors that influences success. It is a specific aspect of personality related to buffering the effects of stress and increasing an individual's capacity to perform, (Kobasa, 1979; Kobasa et al., 1982). Hardiness is a worldview exhibited as the ability to maintain focus and perseverance during stressful scenarios through the qualities of commitment, control, and challenge (Bartone et al., 2013; Maddi et al., 2012). Commitment is a disposition towards engaging deeply in the activities of life whether interpersonal or with oneself (Bartone et al., 2013). Control

is confidence and belief, through effort, events in life and outcomes can be influenced (Bartone et al., 2013). Lastly, challenge is receptivity to variety and change as a chance to learn and grow (Bartone et al., 2013).

Hardiness has consistently shown positive associations with health maintenance and better performance in commissioned officers (Zerach et al., 2020; Nordmo et al., 2017; Bartone, 1999), enlisted soldiers (Bue et al., 2016; Lovering et al., 2015), and military academies (Maddi et al., 2017; Kelly et al., 2014), however, investigations of hardiness have largely ignored the Army's premier source of leadership and soldier development, the Reserve Officer Training Corps (ROTC). As an alternative route to joining the Army, ROTC provides character-building education and leadership development similar to active-duty training through university-paired programs. As ROTC has commissioned more than a million officers since 1916 inception and 70% of new lieutenants (Lopez, 2016), this population should be more thoroughly understood in terms of hardiness development and relationship to performance.

Hardiness-Performance Relationship

As a measure of interaction amongst stress, personality, and performance, the utility of hardiness within military psychology literature is well established; however, studies measuring hardiness primarily focus on predicting performance outcomes prospectively, often without reassessing hardiness after the event, training, or simulation. Cadets and privates are the primary populations of research interest as entry level military members at academies or entering basic training. This is consistent across basic training (Bue et al., 2016; Lovering et al., 2015; Westman, 1990), military academies (Maddi et al., 2017; Kelly et al., 2014; Maddi et al., 2012),

leadership (Bartone et al., 2009; Eid et al, 2008), and elite personnel selection (Johnsen et al., 2013; Bartone et al., 2008), but AROTC remains absent.

Individuals with higher hardiness are associated with greater academy retention and better performance in military academies (Maddi et al., 2017; Kelly et al., 2014; Maddi et al., 2012; Eid et al., 2008; Eid & Morgan, 2006). Hardiness-commitment assessed during arrival was a predictor of attrition at the United States Military Academy (USMA; Cohen's $d = .40$, $p = .001$) before the conclusion of Cadet Basic Training (CBT) that occurs over the summer as first-year cadets arrive (Kelly et al., 2014). Another study completed at USMA evaluated hardiness and grit as predictors of performance measured by first-year Cadet Performance Score (CPS) and academy retention. Grit and hardiness measured at the beginning of the year contributed to cadet retention after Whole Candidate Score (WCS), a measure of high school performance already used for selecting entry into the program. Only hardiness accounted for unique variance in CPS after WCS. In a four-year follow up first-year cadet's hardiness was a more reliable long-term predictor of retention and performance (Maddi et al., 2017). At the USMA, hardiness is a predictive measure of success as it relates to performance and attrition. Results of these studies support the durability of hardiness by maintaining significance across time in summer training, the conclusion of the first year, and upon graduation. A reassessment of hardiness following the performance outcomes would provide insight to changes in hardiness during training and the resultant effect on performance, as well as the effectiveness of hardiness-resilience training.

Hardiness is an effective performance predictor beyond the military academy and into professional duties. Performance measures at military academies coincide with leadership following graduation. Two studies have evaluated leadership performance finding initial

hardiness impacts leadership during cadets first year and continued to influence soldier performance three years after departing the academy (Bartone et al., 2009 & 2013). The consistency of performance across seven years evidences the lasting effect of hardiness. A study conducted in Israeli Defense Forces reported similar findings relating hardiness to basic training performance outcomes and first-year on-the-job performance appraisal the following year (Westman, 1990). Based on these findings with soldiers, hardiness impacts performance upon arrival and continues to affect success into early years of professional soldiers.

Comparable ages of basic training and military academies (18-24) may indicate a lack of experience as the primary reason for the hardiness-performance relationship, but hardiness has been correlated with elite personnel selection in Army Special Forces (SF; Bartone et al., 2008), Israeli military officers (Zach et al., 2007) and Norwegian Armed Forces Border Patrol (Johnsen et al., 2013). United States Army Special Forces candidate school graduates were significantly higher in hardiness (Cohen's $d = .24$, $p = .001$) than non-graduates, with a one-point increase in hardiness equating to a 3.3% greater chance of graduation (Bartone et al., 2008). A 9-week Israeli military state officer training and selection program evaluated the relationships amongst stress, motor, mental performance, and hardiness (Zach et al., 2007). Hardiness was directly correlated with training performance ($r = .37$) throughout the 9 weeks and the culminating performance simulation ($r = .42$). Successful completion of the selection program for Norwegian Border Patrol that includes a continuous 9-day ski trip covering over 155 miles through the Artic was predicted by total hardiness ($p = .04$; Johnsen et al., 2013). Studies examining experienced and elite military personnel show hardiness consistently impacts performance. The continued effect of hardiness on military performance at varying levels reveals validity of the construct. A secondary hardiness assessment following performance outcomes at

the entry or elite-level would be informative for soldier development, training outcomes, and performance however, few studies have examined changes in hardiness over time even in studies that are longitudinal.

Measuring Hardiness Over Time

Two investigations have examined the effect of military training on hardiness development with mixed findings (Zach et al., 2007; Hystad et al., 2015). Hardiness was evaluated four times over the course of nine weeks in the training and selection of an Israeli graduated military program for state security officers. Using only two of the three hardiness facets, control and challenge, significant improvements ($p < .0001$) occurred from pre-training to post-assessments. While potential learning effects cannot be ignored, this study reveals the potential malleability of hardiness in military training. Furthermore, findings support changes in personality beyond initial military service since participants had extensive prior military experience.

More recently Hystad et al., (2015) longitudinally examined hardiness in three separate Norwegian military academies over a three-year duration. All academies explained "development of individual resilience and coping with stress [is] a significant educational aim" of their respective military academies. This shared objective was associated with and suggest the development of hardiness, but acknowledges it was not the intended purpose of training. Four time points were collected over three years, cadets initial week at the academy and, subsequently, at the end of each year. Initial individual hardiness levels were significantly different amongst cadets across all academies ($p = .003$; Hystad et al., 2015). Three-year military academy within-person hardiness levels did vary over time ($p = .002$), but only 4% was attributed to time based on the regression analysis (Hystad et al. 2015). Through hierarchal linear

modeling Hystad et al. (2015) found an insignificant decreasing trend in hardiness each year (-.005) collectively in all cadets. Listed as a limitation, participant dropout rate was nearly 50% (293 to 146) from start to finish, though no differences in hardiness were found based on attrition analysis between completers and non-completers at baseline assessment. While it is plausible to anticipate early military training and experience would affect hardiness without a targeted intervention, based on the results of these two studies no certain conclusions may be drawn on the malleability of hardiness or the effect of military training in this context. Therefore, the purposes of this study were to track changes in hardiness induced by Army ROTC training in first-year cadets and the role of hardiness as a predictor of performance.

Rationale for Mixed Methods

Survey measures are effective at capturing the relationship of hardiness with well-being and performance but the paucity and inconsistency in findings examining soldier development warrant broader investigation of cadet experiences during training. The perception of stress is the underlying and potentially most critical component of hardiness (Kobasa, 1979; Kobasa & Maddi, 1982; Delhaij et al., 2010). Combining a quantitative and qualitative approach for this study provided further depth of individual and collective perspectives. Mixed methods allowed for authentic and personal insights from the battalion richer than survey measures alone. The purpose of the qualitative portion of this inquiry was to understand how cadets conceptualize their first-year experience of ROTC with consideration to stress, training, and performance as described by them.

Purpose of the Current Study

We aimed to assess hardiness over time and determine its impact on performance in a novel group. ROTC training was treated as an intervention lasting the duration of the academic calendar in first-year cadets (August to April). We used a mixed method design with quantitative data collected at three time points (fall semester first day of ROTC class, spring semester first day of ROTC class, and spring semester last day of class) to examine hardiness. Qualitative data comprised of interviews and end of the spring semester self-assessments. To better understand the context and environment surrounding qualitative data one researcher spent extensive time observing ROTC-related activities throughout the academic year. Overall, this allowed for authentic relationships with cadets and cadre.

We expected hardiness to increase throughout the year and to play a role in predicting performance for quantitative data. In terms of qualitative data, the intention was to explore cadet perceptions of their first year. Utilizing the benefits of a mixed methods design, we examined the relationship between quantitative and qualitative regarding cadet development.

Method

A mixed method approach was used collecting quantitative and qualitative data concurrently. Following methodology, results and discussion are addressed individually. After both are discussed together in the general discussion to provide a holistic perspective (Teddlie & Tashakkori, 2009). Prior to recruitment for this study a research protocol review form was approved by the Institutional Review Board for Research Involving Human Subjects (protocol # 20-372 EP 2008).

Demographics

Demographic information included age, most closely identified race/ethnicity, biological sex, academic classification and major. Additional questions specific to ROTC were collected, these included: commitment status (non/contracted, or scholarship), simultaneous membership program (SMP) status (dually involved in National Guard), prior service experience, whether they are/were a military dependent (child of a service member), and in/out of state resident status.

Hardiness

The Hardiness Resilience Gauge (HRG, Bartone, 2018) was used as a measure of hardiness. The HRG is the most updated Dispositional Resilience Scale designed by Bartone (2018) and uses a 4-point Likert-type scale ranging from "Not at all True" to "Completely True". The 28-item instrument contains three subscales 1) challenge and 2) commitment both contain ten items and 3) control has eight. Hardiness, or resilience is defined by Bartone (2018) as an individual's ability to cope with stressful and unexpected situations. The possible range for scores is 70-130. Face and content validity have been tested and established via Mental Health Systems. Previous research established test-retest reliability for the total HRG as .81. Cronbach's alpha for this study was .84.

Performance

Performance outcomes were assessed via Army Combat Fitness Test (ACFT) in August, January, and April. The ACFT is designed to bridge fitness with combat readiness for soldiers (Army, 2020). Exhausting all energy systems and testing cadet mental fortitude the ACFT consists of six events: three repetition-maximum deadlift (MDL), standing power throw (SPT), hand release push-up with arm extension (HRP), sprint-drag-carry (SDC), leg tuck (LTK), and two-mile run (2MR). The test takes 75 minutes to complete. Cadets can receive a maximum

of 100 points based on their performance in each of the six events for a total of 600 points. Individual event scores are an indication of level of fitness for laborious positions within the military.

Participants

Participants were first-year Army ROTC cadets recruited from a southeastern university. The Army ROTC (AROTC) program is an alternative method to joining the United States Army. Requiring students to complete an elective Army-based curriculum in addition to college courses "provides cadets with the character-building aspects of a diverse, self-disciplined civilian education with tough, centralized leadership development training" (Legacy & Value, goarmy.com). First-year cadets commit to a weekly 1.3-hour long instructor, or cadre, led-course that is supplemented by a 2-hour applied lab in an outdoor setting.

The total sample consisted of 33 first year AROTC cadets. Ninety-one percent of the sample identified as Caucasian/White ($N = 30$), seventy percent were male ($N = 22$), and ninety-four percent were under 20. Fifty-five percent of the cadet's permanent residence was in-state ($N = 18$) and 42% were military dependents ($N = 14$). There was a broad distribution of commitment, or scholarship status: 49% were non-contracted or not pledged to the Army following graduation; $N = 16$), while another 40% were contracted (pledged to the Army following graduation; $N = 9$) and scholarship (pledged to the Army following graduation and currently receiving funding; $N = 8$). Concerning Army specific experience, 3 cadets were dually enrolled in the National Guard (Simultaneous Membership Program, SMP) and 4 cadets said they had prior service experience.

Qualitative data

A rigorous and recursive analysis of interview transcripts and self-assessments was conducted to answer the question: How do Army ROTC first-year cadets conceptualize their experience? The interviews used broad open-ended questions allowing the researcher to gain rich descriptions of how participants make-meaning of their experiences concerning stress, personality, and performance. Observations provided opportunities to build rapport with cadets and cadre. Observation also helped the researcher appreciate the context of the environment during self-assessments and interviews. Analysis of qualitative data examined individual differences between cadets and essential experiences amongst all.

Observation

The observational protocol was designed to provide a holistic view and context of the cadet environment shaping their ROTC experience. These included but were not limited to weekly military science courses (classes and laboratories) and field activities (physical training, marksmanship, and land navigation). This time in the field provided improved understanding of Army standards, language, dynamics, and rapport. Time spent with AROTC cadre and cadets was foundational to progressing dialogues and deeper insights throughout the duration of the study. Field notes from observation provided context and framework for interview questions and self-assessments regarding cadet ROTC specific experience.

Interviews

A total of 6 semi-structured interviews took place from January to April. Ranging from 23-80 minutes in length, interviews were guided by participant's perception of stress, personality, and performance with limited questions enabling a fluid dialogue between

interviewer and interviewee. A total of 21 individuals expressed interest in participating. Due to scheduling conflicts and time restraints only 6 interviews were completed. Interviewees ranged in the hardiness and Big Five scores. Demographic information for interview participants is listed below in Table 1. Information not listed is uniform across all interview participants. These included first-year status, age, lack of national guard and prior service experience.

Table 1. Interviewee Demographics

HRG Score	Sex	Race/ethnicity	Resident status	Commitment Status	Military Dependent	Other Activities
127	Male	Caucasian	Out-of-State	Scholarship	No	No
125	Female	Caucasian	In-State	Scholarship	No	Yes
124	Male	Caucasian	Out-of-State	Contracted	No	Yes
100	Female	Caucasian	Out-of-State	Contracted	Yes	Yes
100	Male	Caucasian	Out-of-State	Contracted	No	Yes

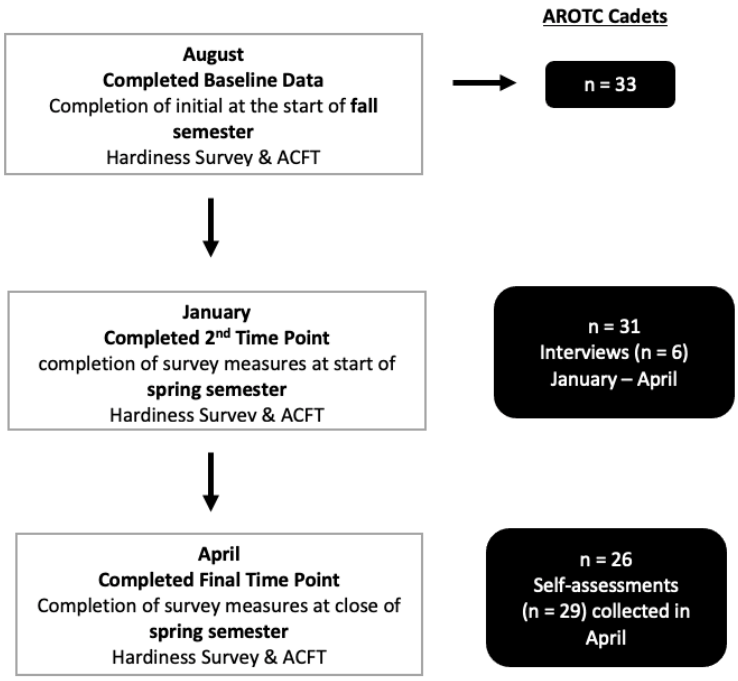
Self-Assessments

At the end of each semester cadets are required to provide a self-assessment of their performance in the AROTC program as required ROTC coursework. These assessments are not anonymous and reviewed by cadre for completion, not content. As a reflection of their experiences, the self-assessments served as a way of gathering qualitative data from more cadets providing insight on their perspective of their development. Self-assessment instructions provided by the cadre were intentionally vague allowing for open interpretation. Cadets were asked to reply to the following question: How has your mindset changed from fall semester to now? Assessments were submitted online. Reflections from 29 cadets April self-assessments were explored. They comprised cadet's blended sentiment of their second semester and the entirety of the year.

3.1.2 Procedure

On the first day of class during fall semester cadets were informed about the goals of the study. The researcher provided all information via a brief PowerPoint presentation in August that lasted 5 minutes. Cadets were provided a QR code and allotted 15 minutes to complete surveys if they chose to participate in study. In addition to in-class time, cadets were permitted additional two weeks to if they were absent, chose to complete surveys beyond class time, or engage with researcher. Surveys were completed three times over the year in August at the onset of fall semester, January at the onset of spring semester, and April close of spring semester. ACFTs were completed three times over the year, approximately two weeks after each survey completion. All three survey data collections were taken online via Qualtrics to collect demographic information, hardiness scores, and gauge interview interest. Interviews were conducted throughout spring semester following the January survey completion. Self-assessments were collected after the conclusion of the spring semester. The participant flow chart is shown in Figure 1 below.

Figure 1



Analyses

Quantitative

Data analysis was conducted using Statistical Package for the Social Sciences (SPSS) 26. According to power analysis, with an estimated .25 effect size and .05 priori alpha level, the estimated total sample size was 43. This power analysis was computed via G*Power 3.1 software using power analysis for a difference between two independent means. Descriptive statistics were calculated using all demographic variables, hardiness, and ACFT scores. A repeated measures ANOVA was used to calculate changes in total hardiness score (August, January, April). Alpha level was set at .05 a priori.

Three hierarchal linear regression models were used to determine the influence of demographics (biological sex, military dependent status, in/out--state resident status, and commitment status), and hardiness (HRG) on measures of field performance (ACFT).

August hardiness and demographics scores were used as the predicator in ACFT scores in August, January, and April.

Qualitative

Interview transcripts and self-assessments were analyzed using a six-step thematic analysis by Braun and Clarke (2006). This included familiarizing with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. This process was completed with each data set. Meta-inferences were drawn from both to make overarching conclusions, therefore results from interviews and self-assessments are presented together.

Results

Quantitative

Changes in Hardiness

All assumptions for the repeated measures ANOVA were met. Minimum and maximum hardiness scores were 78 and 133 respectively. The average hardiness score across three collections was 109.33 and within the range of normative values (100 – 110). Data are mean ± standard deviation, August (M = 110.89, 3.54), January (M = 108.95, 2.56), and April (M = 108.16, 3.15). There were no significant changes in hardiness from August to April ($F_{1,18}$ = .806, p = *.381*, η^2 = .043*).* Based on the present sample, it appears hardiness does not change during the first year of AROTC program but there does appear to be a downward trend. As there were no significant differences, no post-hoc analysis was completed.

Predictors of performance

Three hierarchal regression models were used to determine the influence of demographic variables, as listed above, and hardiness on ACFT performance. Regression models were input based on three ACFT time points: August, January, and April. Both August ACFT models were statistically significant, $R^2 = .784$, $p < .001$, and $R^2 = .791$, $p = .002$, respectively. Student sex was the only significant predictor in model 1 ($p < .001$) and model 2 ($p < .001$). Although hardiness contributed to a change in *R* squared, it was excluded from the final model. See Table 2.

Regression models for January and April used demographic variables and August hardiness scores. The January ACFT models were insignificant while accounting for nearly 70% of the variance. Model 1 significance value was .139 ($R^2 = .684$) and model 2 was .219 ($R^2 = .714$). The amount of variance demographics and hardiness accounted for decreased in April. Still neither model 1 ($R^2 = .268$) nor model 2 ($R^2 = .362$) significantly influenced ACFT scores.

Table 2
ACFT Regression

Predictor	Model 1					Model 2			
		β	SE	95% CI		β	SE	95% CI	
August									
Step 1									
Sex		-230.67[a]	34.89	-306.05	-155.29	-215.239[a]	43.638	-310.319	-120.160
Commitment		30.84	23.59	-20.11	81.79	24.76	26.103	-32.12	81.633
SMP		22.5	53.71	-93.53	138.54	18.243	55.472	-102.62	139.12
Dependent		-52.87	37.38	-133.622	27.89	- 46.15	39.82	-132.916	40.62
Resident		14.88	38.03	-67.28	97.04	8.74	40.22	-78.9	96.38
Step 2									
Hardiness						- 0.825	1.34	-3.74	2.09
R^2	0.784[a]					0.791[b]			
ΔR^2						0.007			
January									
Step 1									
Sex		-110.42	48.91	-230.11	9.26	-121.96	53.28	258.93	15.01
Commitment		41.99	29.73	-30.75	114.73	56.69	36.86	-38.07	151.44
SMP		-54.19	74.14	-235.6	127.21	-47.5	77.7	-247.24	152.24
Dependent		-21.32	50.65	-145.24	102.6	-28.28	53.56	-165.97	109.4
Resident		-24.89	65.82	-185.94	136.17	-16.69	69.41	-195.12	161.75
Step 2									
Hardiness						1.22	1.67	-3.06	5.502
R^2	0.684					0.714			
ΔR^2						0.031			
April									
Step 1									
Sex		-21.11	0.3286	-92.7	50.48	7.01	38.86	-78.52	92.54
Commitment		-14.99	28.45	-76.96	46.99	-31.18	30.49	-98.28	35.92
SMP		-16.33	52.03	-129.68	97.03	-20.352	50.81	-132.18	91.47
Dependent		-39.63	40.63	-128.15	48.89	-24.97	41.23	-115.71	65.78
Resident		-1.71	37.41	-83.21	79.79	-10.37	37.08	-91.98	71.25
Step 2									
Hardiness						-1.49	1.17	-4.065	1.08
R^2	0.268					0.362			
ΔR^2						0.095			

[a] Significant to $p < .001$, [b] Significant $p = .002$

Qualitative

How do Army ROTC first-year cadets conceptualize their experience?

Cadets describe their year as a learning curve that embodies a true first year experience. Three overarching themes were identified from the data that depict their stories: *Getting Here*, *I Know Nothing*, and *Being Better*, each with corresponding sub-themes. The order of themes depicts a story and is not detailed in the order of importance (see appendix D for thematic map).

Getting Here. Getting Here informs how cadets arrived at their university. Interviewees recognized their need for both, a respected ROTC program and university. Making the decision to come to the university had to meet both of those needs. This overarching theme was present in 5 of the 6 interviews, the final cadet chose the university because their father was an alumnus. The two sub-themes are the primary components cadets were seeking from their decision: *Normal College Experience* and *University Prestige*.

> *"I wouldn't get the normal college experience at West Point, but I can still have the same job going through ROTC and going through West Point" - Interview*

Normal College Experience. Cadets described their desire to join the military and maintain what they envisioned as a normal college experience. Five of six considered early military service (West Point Academy, National Guard, or enlisting following high school graduation). They were deterred from pursuing options closer to active duty by experiencing the lifestyle through camps and parental suggestions.

I wanted to have more fun and not always be military cadet strict and be able to live a little bit and go home and see my family" – Interview

University Prestige. Participants desired an esteemed university and ROTC program. All but one of the interview participants resided in the state of the university, or a metropolitan city in a neighboring state. Cadets desired to attend a "really big school" with a "hometown small community". The sole non-local interviewee shared an ROTC alumnus and high-ranking cabinet official strongly recommended the university.

"It (The ROTC program was not a) rinky-dink operation where they just hand you a pamphlet" - Interview

I Know Nothing. Cadets quickly identified the disconnect between their expectations of normalcy and balance with the reality of how the year would progress. This process was embodied by the second major theme, *"I Know Nothing".* Cadets faced academic, physical, and personal challenges within the context of a new environment. The three sub-themes, *A Stressful Year*, *Balance & Prioritization*, and *Adapting with Acceptance* detail their process as expressed via interview and self-assessments.

"I was like I literally know nothing right now. I thought I knew what I was doing then I get here, and I know absolutely nothing." - Interview

A Stressful Year. The consensus amongst cadets when asked to describe their year was stressful. The dependent nature of academics and ROTC weigh heavy and require a balancing act to excel in both. When prompted to share the most demanding acute challenge, 5 of 6

interviewees referenced an ROTC specific task (see appendix E). All 5 identified a physical challenge. The variety and complexity of the cadet experience was evident, 3 expressed their difficulties as primarily physical (i.e., being out of shape), the remaining two expressed their barriers as a "mental challenge". The lone participant believed they had not faced any true challenges, but was expecting them from ROTC.

"It's stressful knowing that if I don't make good grades in my other classes, then I will lose my [ROTC] scholarship and fail and not be able to be a doctor or get in med school" – Interview

Balance & Prioritization. With limited hours in the day cadets were feeling exhausted, via interview all shared experiences with fatigue in their attempt to do everything well. This was echoed in self-assessments. *Balance & Prioritization* is cadet recognition of incongruence between value placement and energy invested. Cadets repeatedly expressed the importance of their grades emphasizing their desire to excel but revealed extracurricular activities and social life caused their focus to drift.

"I was not prepared for the load of work that would come from so many aspects of my life, both professional and personal" - Self-Assessments

Adapting with Acceptance. In the final sub-theme *Adapting with Acceptance,* cadets presented a willingness to adapt intentionally in pursuit of progress. All explicitly shared wanting to improve on fitness or academic testing, but only some realized betterment does not always take the additive form. Some examples of adjustments to become an improved soldier were accepting limited amounts of sleep as necessary and beneficial, equating the importance of

mental performance and physical performance, and letting go of perfectionism concerning grades. By adapting their intent from perfection on ACFT and GPA to balance, cadets expressed some pressure was alleviated without jeopardizing long-term objectives.

"Objectives such as high grades are very important, but they don't have to be perfect in order to accomplish what you need, and I am beginning to learn that." – Self Assessments

4.2.1.3 Being Better. The objective of ROTC programs is to learn to lead, as such, self-improvement for better leadership was a primary concern for cadets. As the final theme, *Being Better* conveys cadet commitment to improvement for themselves and ROTC program community. Although, *Being Better* is vague and does not outline an explicit plan for improvement, cadets were only limited by their imagination to become better. *Mindset* and *Social Support* were the two primary avenues and sub-themes.

I just want to push myself to be better, I want to push people around me to be better. And that's really it. I just want to be better." – Interview

Mindset. During the interviews much of what cadets shared about their mindset concerned their approach to uncertainty and failure. All interviewees willingly accepted many of their experiences would be novel and focused their attention on controlling their approach prior and response after a demanding event. The seriousness of their preparation and increased experience over the year led to the leaps in confidence shared within the self-assessments. Improvements in confidence did not eliminate doubtful thoughts, but instead inspired cadets to be undeterred by them.

"I am more confident in myself than I was in the beginning of the semester. This allowed for me to do more and to take opportunities that would help me to improve despite the possibility of rejection and failure" - Self-Assessments

Camaraderie. Moving beyond themselves, the social support cadets provided to and received from one another was critical to their first-year experience. This was evident in both qualitative data sets and is captured by the sub-theme *camaraderie*. The ROTC program did not shift to online courses and classes continued in person unlike the remainder of the university. Cadets may not have had close ties with all peers, but bonded over shared experiences whether learning, teaching, or supporting fellow cadets.

We're all there for one reason and that's to get a commission. So, we all know what we have to do to do that and having that and having that like group of people who are driven to the same goal, and are willing to help each other - Interview

Discussion

Quantitative

Results from this study showed no significant changes in cadet hardiness scores from August to April. Average hardiness values were 109, slightly below the criterion of 111 indicating a high hardiness score based on normative values (Bartone, 2018). Results were consistent with findings of three years of Norwegian military academy training, the insignificant downtrend in scores was mirrored providing further evidence that military academy training may have a steady effect (Hystad et al., 2015). The lack of change could be attributed to expectancy and perceived intensity of training as cadet long-term commitment to Army and novice training may delay early changes. These findings may be a product of self-selection, as individuals

joining AROTC may be hardier than those who do not. AROTC makes an eight-year promise to military service in high school. It is likely they arrive ambitious and eager to do well, however unaware of what to expect as most of their experiences are novel. This is unlike experienced personnel that show arduous training has the capacity to change hardiness (Zach et al., 2007). The COVID-19 pandemic and required quarantine cannot be disregarded as influencing hardiness scores prior to arriving to campus. Although AROTC was operating at a full face-to-face capacity, these cadets were isolated before the fall semester and seclusion during the semester in other life aspects may have affected cadet qualities of commitment, control, and challenge. Findings contribute to the literature by supporting similar findings in military academies across different populations.

The results of the hierarchal regression models revealed hardiness did not influence ACFT performance during cadet's first year. At baseline assessment in August, biological sex was the only significant influencing variable of ACFT testing as males were more likely to be prepared for physical test requirements. By January and into April, biological sex was no longer a significant determinant of ACFT scores showing that training regimens appear to remove significant sex disparities. The regression model in August accounted for nearly 80% of the variance and, though insignificant, 70% in January. In April the model decreased to 30%. It appears that demographics play a predominant role in early ACFT score outcomes that training within the program diminishes these effects. Future research is necessary to determine long-term influences on successful completion of the ACFT throughout the ROTC program.

Comparing acute training exercise to our AROTC cadets' first year at an academy may give reason for the lack of impact of hardiness. Time may act as a determining factor for hardiness's utility as an indicator of performance. Investigations at the USMA evidence the

hardiness-performance relationship at three months, one year, and four years (Maddi et al., 2017; Kelly et al., 2014; Maddi et al., 2012). The current study lasted nine months and displays no influence of hardiness on cadet performance. Based on these findings, it appears that length and intensity of training may create thresholds to elicit a hardy response.

Cadets are only beginning their careers in ROTC. More time allows for adaptations of training and opportunities to respond to adversity. Personality does not fully develop until thirty years of age (McCrae, 2010). Although prior research has shown hardiness to be a small and significant contributor to success within the military setting, the strength of hardiness as a predictor of success is not evident in the current study.

Qualitative

Results from interviews and self-assessments were consistent across data sets. The subset of individual interviews provided further depth to self-assessments. Although there were differences of cadet perspectives collectively they embodied cadet first-year experience. Cadets expected to have a normal college experience, but adjusting from high school to college, there is no gauge of normal. They arrived untested and persevered through a stressful first year of college compounded by the ROTC program. Stress appeared to be induced by the process, co-dependent obstacles of becoming a high-performing cadet and meeting expectations to perform amongst their peers. Feeling and acknowledging the course of change cadets became more reflective. They described increases in their perspective, confidence, self-awareness, and self-evaluation as they shed expectations. For some, these qualities transferred from ROTC to academics and were implement throughout daily living.

Being part of ROTC challenges first-year students to balance dual first priorities, military training and academic grades. Cadets arrive from across the nation with intention to garner tools necessary "to be an infantry officer and an effective combat leader" and approach their process with due diligence. Unbeknownst to cadets based on self-assessments, AROTC training shifts how cadets approach all aspects of their life. They willingly put forth effort and trust in the experience of leadership to achieve success. This process heightened their awareness facilitating growth and development. Cadets' adjustment could be described similar to athletics with specific skill and character development. However, for cadets, ROTC is the beginning of their careers, unlike collegiate athletics being the culmination for most. Knowing their purpose is well beyond the four years of university and an eight-year commitment, cadets lean into their transformation. Their outlook was oriented towards continuing to develop into the person, soldier, and leader that they intend.

3. General Discussion

We can confirm the value of incorporating quantitative and qualitative components into this investigation. This is the first study to incorporate qualitative measures with hardiness and to measure the impact of military training on personality in first-year ROTC cadets. Results show demographics play a role in early training performance and the effect decreases with time. Although only sex was significant, the remainder of variables accounted for much of the variance for performance early in the year. Differing factors that are more relevant to the ROTC and university atmosphere presumably have a greater effect as cadets progress through their first year.

The three qualities of hardiness, commitment, control, and challenge, were apparent in the themes of the qualitative data set although they were undersized to divide hardiness into high,

medium, and low. Noted across interviews and self-assessments, social support and camaraderie were apparent in hardiness-commitment as a deep engagement in the activities of life with others and self. Hardiness-control and hardiness-challenge, as the belief through effort events in life can be influenced and receptivity to change as an opportunity to grow, were concepts latent concepts in qualitative findings. They paralleled with cadets' description of mindset, development of confidence, and process of adapting with acceptance. Although not exact, themes have great overlay with the construct of hardiness.

Acknowledging our limited sample size, quantitative findings suggest a trending decrease in hardiness and changes in what affects overall performance across the year. Through qualitative findings cadet expectancy of change and commitment to ROTC is present. These appear as a variety of intangible qualities of mindset, crucial for success, fortitude, growth, mental toughness, and self-regulation. Withholding the probability of learning or testing effects, changes in hardiness via survey might suggest cadets are becoming less interested in ROTC, however interviews and self-assessments assure their pledge. Cadets must commit to eight years of service for ROTC, those on scholarship agreed to the contract while in high school. Like then, cadets see past the four years of undergraduate studies staying steadfast to their long-term commitment. The price of breaching the contract is pay back funding in full or immediately enlist. Based on these findings cadets appear to be motivated by their continuous development. Enduring and engaging in their training with optimization is a learning process. Cadets interpret it as useful and necessary for their military careers and beyond. They perceive training as the vehicle for success and are willing to endure sacrifices to make improvements. Overall, these conclusions represent a holistic view of the first-year cadet experience and provide insight to psychological happenings during early military training, in credit to the methodological approach adopted. The primary

limitation of this study was the underpowered sample size. A secondary limitation is collecting single interviews from cadets. Multiple interviews would allow for direct comparison, while a single interview only captures one moment and asks them to share thoughts retrospectively.

5.1 Study Implications & Future Research

Although quantitative findings concerning changes in hardiness are consistent with previous literature at the academy level, the addition of qualitative perspective adds depth and perspective. For future research in this area, we would recommend utilizing an expanded interview pool and potentially more than one interview across time. Engaging multiple universities with established programs to broaden the assessment to varying training approaches similar to Hystad et al. (2015) would add valuable information. A tertiary path of research would be to track changes in development in graduating officers into their professional duties while following the effects of deployment over time (Bartone et al., 2012; Krauss et al., 2019). The primary focus would explore whether personality qualities or high-performance affects the longevity and attrition of soldiers. This study offers an improved understanding of initial baseline, early development, and outlook of personality, particularly within the military officer development setting.

4. Conclusions

Hardiness did not change nor play a significant role in performance, results were consistent with recent findings in military academy settings. A mixed method approach provided value that otherwise would have been undetected, cadets described latent qualities of hardiness within qualitative data set. The identified limitations of this study was the small homogenous sample size and single interview collections. Future studies should continue to examine the

development of hardiness from training to soldier status. Identifying this timeline could expedite training programs and ensure soldier readiness.

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Manuscript II:

The Impact and Effectiveness of Personality Development in Military Training

Joining the military is a major life experience for service members that results in personality change beyond intrinsic maturation (Jackson et al., 2012; Ivie, Gimbel, & Elder, 1991). This occurs not by happenstance as one of the armed services' goals is to develop tactical, physical, and character attributes of soldiers (U.S. Army, 2019). Personality, consisting of emotional and cognitive qualities, contributes to soldier performance in all three of these attribute categories. Although it is known personality can influence outcomes and has the capacity to be influenced, less is understood of the mechanism of change, particularly within the military setting (Sørlie et al., 2020; Conte et al., 2017; Barron et al., 2016a; Hystad et al, 2015; Merritt et al., 2022). Since personality is linked to soldier success, it is important to explore the development of personality to further understand soldier development and training effectiveness.

Personality Development & Performance in the Military

As 'psychological qualities that contribute to an individual's enduring and distinctive patterns of feeling, thinking, and behaving', personality has both, cognitive and emotional components (Pervin & Cervone, 2010). The Big Five (conscientiousness, agreeableness, openness, extraversion, and neuroticism) are set of global, not exhaustive descriptors of personality that dominate the personality-performance literature because they are predictive of job performance and other skills in applied settings such as the military (Barrick & Mount, 1991; McCrae & Costa, 2008). Although conscientiousness and the inverse of neuroticism, emotional stability, have shown to be the best predictors in work and training settings, conscientiousness is the

primary determinant in leadership and job performance within the military. (Sørlie et al., 2020; Conte et al., 2017; Barron et al., 2016a).

The influence of the Big Five on military performance is consistent when measured at single time points (Barron et al., 2016b; Bartone et al., 2009; Halfhill et al., 2005; Bartone et al., 2002), but only one study has evaluated personality changes prior to and induced by military training with a non-military comparison group (Jackson et al., 2012). Although performance outcomes were not examined, Jackson et al. (2012) found differences in Big Five personality traits prior to joining the military and differences that persisted throughout service in German males. High school graduates opting to serve in the military reported lower agreeableness, openness, and neuroticism when compared to graduates selecting civilian service. Further Jackson et al., (2012) revealed military training was associated with lower levels of agreeableness beyond natural maturation of adulthood, offering support for the influence of military training on personality. Though agreeableness may account for some change in personality, other changes may not be detected through only assessing the Big Five as the basic tenets of personality.

Other qualities, known as characteristic adaptations within the Five Factor Theory contribute to how individuals experience the world (e.g., values, virtues, motivations, skills, and beliefs; McCrae & Costa, 2008). These qualities are also classified as personality-trait-like-individual differences (Mosley & Laborde, 2016; Laborde et al., 2016; Roberts & Woodman, 2017). Constructs measuring characteristic adaptations are often more theoretically applied, contextually specific, and, in some instances, better predictors of performance than the Big Five. Hardiness is one such characteristic.

Hardiness

Hardiness-resilience is best described as a worldview or holistic style of functioning. Based on three decades of support, higher hardiness diminishes the ill-effects of stress and maintains health (Kobasa 1979; Kobasa et al., 1982). Often compared to conscientiousness, or the inverse of neuroticism, hardiness-resilience has support as an independent construct when measured in conjunction with the Big Five (Eschleman et al, 2010). Overall hardiness is correlated with the Big Five, as expected from a supplementary personality measure, and has shown utility to predict performance in students (Sheard & Golby, 2007; Sheard, 2009b; Alfred et al., 2014), sport (Wadey & Hanton, 2015; Sindik, 2008), military (Pitts et al., 2015; Maddi et al., 2017), healthcare (Park et al., 2017; Mintz-Binder, 2014; Abdollahi et al., 2014; DiBartolo & Soeken, 2003) and management (Cash & Gardner, 2011) populations.

The military has been the primary setting for hardiness research in the pursuit of understanding resilience within and beyond the United States. Hardiness has shown value protecting against war-related stress (Zerach et al., 2020; Nordmo et al., 2017; Bartone, 1999), PTSD symptomology (Pitts et al., 2016; Escolas et al., 2013), sustained cardiovascular health (Bartone et al., 2015), neuroimmunology (Sandvik et al., 2013) alcoholism (Bartone et al., 2017), sickness absences (Hystad et al., 2011) decreased mental health struggles, and depressive symptoms (Hoopsick et al., 2020; Krauss et al., 2019; Wang et al., 2019; Barringer et al., 2016; Thomassen et al., 2015). In addition to the protective health mechanisms, hardiness is also a predictor of performance at entry level training (Maddi et al., 2017; Bue et al., 2016; Lovering et al., 2015; Kelly et al., 2014; Maddi et al., 2012; Bartone et al., 2009; Eid et al., 2008; Westman, 1990) leadership (Bartone et al., 2013; Bartone et al., 2009), and elite personnel selection processes (Johnsen et al., 2013; Bartone et al., 2008).

While findings consistently support associations of hardiness and performance in the military, the development process of hardiness is less clear. Like the Big Five, few studies have explored the effect of entry-level military training. Following three Norwegian military academies across three years, results revealed an insignificant downtrend in hardiness (Hystad et al., 2015). Merritt et al. (2022) similarly found no changes in ROTC cadet hardiness over the course of an academic year in first year cadets and no relationship to fitness test performance but did report subjective change from cadets based on qualitative analysis.

Interventions to develop hardiness through direct training at the university level also reveal interesting findings (Maddi et al., 2009; Maddi et al., 2002). First year students, identified as high risk by the U.S. Department of Education criteria, registered for a fall-semester hardiness course (n = 40) meeting one-hour twice a week or a control student enrichment group (n = 53). Both groups reported significant increases in hardiness and the intervention group improved slightly more (Maddi et al., 2002). In the follow-up study all-level university students were invited to participate. With a broader population, shorter course lengths, and larger course enrollments results were consistent with changes in hardiness of the original study (Maddi et al., 2009). There were improvements to hardiness scores for the hardiness and control group. Within these two studies, hardiness was also associated with improved GPA. These studies reveal changes in hardiness can occur naturally over the course of a college semester regardless of the student's academic year, support the effectiveness of direct hardiness training, and the relationship between hardiness and GPA.

Studies utilizing Big Five and hardiness have primarily used single time point assessments. Like the Big Five, hardiness development within the military has rarely been investigated and extant literature reports mixed findings. Further, studies have attempted to

measure the effectiveness of military training on hardiness without following the development of paralleling civilian groups like the work of Jackson et al., (2012) using the Big Five.

The Present Study

The objective of this study was to examine whether and to what extent personality change occurs beyond intrinsic maturation during military training through comparing first-year ROTC cadets with university students across a single semester from January to April. We also explored the role of personality, Big Five and hardiness, in academic performance. We hypothesized hardiness would be a small and significant predictor of academic performance.

Method

Measures

Demographics: Collected demographics included sex, race/ethnicity, age, year, military dependent, resident status. Participants selected male or female sex. Most closely identified race or ethnicity options were Black/African American, White/Caucasian, Asian, and multi-racial. Age was freely entered, while student rank in years was selected based on first through fifth. Military dependent status denoted whether participants were children of military members. Resident status recognized students that resided in the same state as the university this research study was conducted.

Instruments

Hardiness. Hardiness was measured by the Hardiness Resilience Gauge (Bartone, 2018). Hardiness, or resilience is defined by Bartone (2018) as an individual's ability to cope with stressful and unexpected situations. The scale uses a 4-point Likert-type scale ranging from "Not

at all True" to "Completely True". The 28-item instrument contains three subscales 1) challenge and 2) commitment both contain ten items and 3) control has eight. Normative ranges are 90-110 and possible scores are 70-130. Only total hardiness scores were analyzed. Face and content validity have been tested and established via Mental Health Systems. Previous research established test-retest reliability for the total HRG as .81. Cronbach's alpha for this study was .84.

Multi-Construct International Personality Item Pool. The Big Five were measured via the Multi-Construct International Personality Item Pool (IPIP; Goldberg et al., 2006), an open-source version of Costa and McCrae's (1992) NEO Personality Inventory (NEO-PI-R). NEO-PI-R assessment is based on the Five Factor Model (FFM) of personality. The scale measures domains of neuroticism, extraversion, openness, agreeableness, and conscientiousness using a five-point Likert format with items positively and negatively keyed. The FFM is the standard of quantitative personality assessment in psychology research for normative adults. The 50-item version of the scale from the International Personality Item Pool (IPIP; Goldberg et al., 2006) was used for brevity and high correlation with NEO-PI-R (.90). Previously reported Cronbach's alpha is .89. The IPIP was adjusted from a five to seven-point scale to maintain uniformity throughout the survey. Evidence shows surveys the transformation does not produce significant differences and scales maintain meaning (Taherdoost, 2019; Dawes, 2008).

Academic Performance. Academic performance, or student GPA, was utilized as the primary outcome measure. Tertiary education academic performance has been reliably associated with work performance (Poropat, 2009). GPA was attained through self-report via survey at baseline

and post-measurements. Extant literature supports high correlations between self-reported and registry GPA in the range of .84 - .89 (Gray & Watson, 2002; Noftle & Robins, 2007).

Procedure

After receiving approval from the University's Institutional Review Board for research involving human subjects, first-year AROTC cadets were invited to participate in a research study examining the relationship between personality and performance. The researcher provided a brief presentation to inform cadets of the nature of this study on the first day of spring classes in January. Following presentation cadets were allotted 10 minutes of class time to complete the study if they chose to. The survey remained open for two weeks allowing cadets to share concerns before completing survey. Informed consent and baseline data was collected through completion of the survey containing demographics, International Personality Item Pool (IPIP), and Hardiness Resilience Gauge (HRG). Cadets were provided in-class time to complete the same surveys during the last two weeks of the semester and as to provide their estimated GPA following the semester. Similarly, the surveys remained open for two weeks.

University students were recruited online or via flier as an opportunity to receive extra credit through the university system. Due to low participant interest the study was opened to all university students, not only first year students. University students served as a comparison group to trace natural changes in personality variables over the course of a semester and provided GPA as a measure of academic performance.

Statistical Analysis

Data was analyzed using Statistical Package for the Social Sciences (SPSS) 26. According to power analysis, with an estimated .25 effect size and .05 priori alpha level, the estimated total sample size was 43. This power analysis was computed via G*Power 3.1 software using power analysis. Descriptive statistics were calculated using demographic variables, personality variables, and GPA. Bivariate correlations are listed across both groups. A mixed ANOVA was used to determine whether changes occurred in any of the six personality measures, Big Five and hardiness, from January to April within and between groups (ROTC and university students). Alpha was set to .05 a priori. Hierarchal linear regressions models were used to determine the influence of baseline demographics, Big Five, and hardiness on April GPA scores.

Results

Participants

Descriptive personality statistics for each group are presented in Table 2. The university sample (n = 14) was less than half the size of AROTC (N = 33). Only two university students were first-year students. Both samples were predominantly white, around 90% and 80% for AROTC and university students respectively. Cadets were 67% male (n = 22) and 94% were under 20 years of age (n = 31), while university students were 79% female (n = 11) and 61% were older than 20 years of age (n = 10). About 40% of cadets were military dependents and only one university student was a military dependent, equating to 7%. Resident status was split nearly even amongst cadets and 79% of university students were from in-state. Demographic information listed below in Table 1.

Table 1

Demographic Characteristics of Participants at Baseline

Characteristic		First-year Cadets		University Students	
		n	%	*n*	%
Sex	Male	22	67	3	21
	Female	11	33	11	79
Race/Ethnicity	White/Caucasian	30	91	11	79
	Black/AA	1	3	3	21
	Asian	1	3		
	Multi-racial	1	3		
Age	< 20	31	94	4	29
	≥ 20	2	6	10	61
Year	First-Year	31	94	2	14
	Other	2	6	12	86
Military Dependent	Yes	14	42	1	7
	No	22	59	13	93
Resident Status	In-state	18	55	11	79
	Out-of-state	15	45	3	21

Table 2
Descriptive Personality and GPA Statistics

		Pre (January)		Post (April)	
		M	*SD*	*M*	*SD*
First Year ROTC	Conscientiousness	50.51	6.85	40.90	8.82
	Agreeableness	52.42	6.76	50.84	6.73
	Openness	44.39	9.94	45.60	8.13
	Extraversion	46.27	9.381	46.36	10.06
	Neuroticism	28.36	8.44	30.78	8.39
	Hardiness	108.69	11.85	106.03	12.04
	GPA	3.34	0.7	3.43	0.36
University Students	Conscientiousness	51.42	8.58	52	5.4
	Agreeableness	51.28	11.22	52.64	8.01
	Openness	46.21	10.67	42.50	8.87
	Extraversion	49.14	10.07	45.78	13.53
	Neuroticism	33.28	9.4	25	7.86
	Hardiness	106.85	10.27	108.14	10.29
	GPA	3.46	0.4	3.6	0.31

Changes in Personality Scores. A mixed ANOVA was used to determine whether changes in AROTC cadet personality occurred that were significantly different from university students. Personality averages across time are listed in Table 2. Total range for personality change was 10-70. There was a group by time interaction for conscientiousness ($F_{1,46}$ = 11.166, p = .002) and neuroticism ($F_{1,46}$ = 11.847, p = .001) as shown in Table 3. Army ROTC

conscientiousness decreased from 50.51 (6.85) to 40.90 (8.82). University students slightly increased from 51.42 (8.58) to 52.00 (5.40). Inverse changes also occurred in neuroticism. Army ROTC increased in neuroticism from 28.36 (8.44) to 30.78 (8.39), while university students decreased from 33.28 (9.40) to 25.00 (7.86). There was also a significant effect of time for conscientiousness. There was a steep decrease in Army ROTC cadets. University student average was similar to baseline with a decrease in standard deviation.

Table 3
Mixed ANOVA

Measure	Group x Time				Time			
	F	Sig.	Eta	Power	*F*	Sig.	Eta	Power
Conscientiousness	11.166	0.002*	0.199	0.905	8.799	0.005*	0.164	0.827
Agreeableness	0.861	0.358	0.019	0.149	0.005	0.945	.000	0.051
Openness	2.611	0.113	0.055	0.353	0.673	0.416	0.015	0.127
Extraversion	1.262	0.267	0.027	0.196	1.132	0.293	0.025	0.181
Neuroticism	11.847	0.001*	0.208	0.920	3.548	0.066	0.073	0.454
Hardiness	1.084	0.303	0.024	0.175	0.132	0.718	0.003	0.065

Predictors of Academic Performance. A hierarchal regression model was used to determine the influence of demographics, the Big Five, and hardiness on GPA for ROTC in Table 4 and university students in Table 5, respectively. Baseline measures were to predict future incorporated the Big Five, and model 3 added hardiness. None of the models were significant for academic performance at the end of the semester. Model 1 included only demographics, model 2 first-year cadets (R^2 = .338, p = .462) or university students (R^2 = .972, p = .143)

Table 4
Predictors of Academic Performance in ROTC cadets

	Predictor	Model 1				Model 2				Model 3			
		β	SE	95% CI		β	SE	95% CI		β	SE	95% CI	
	ROTC												
Step 1													
	Sex	0.243	0.129	-0.021	0.506	0.242	0.142	-0.052	0.536	0.245	0.143	-0.052	0.542
	Age	0.13	0.126	-0.127	0.388	0.111	0.153	-0.206	0.427	0.152	0.162	-0.185	0.489
	Year	-0.308	0.403	-1.133	0.517	-0.32	0.473	-1.299	0.658	-0.485	0.518	-1.56	0.59
	Resident Status	0.133	0.126	-0.125	0.392	0.174	0.156	-0.148	0.497	0.162	0.158	-0.166	0.489
	Dependent Status	0.231	0.13	-0.036	0.498	0.293	0.143	-0.002	0.589	0.317	0.147	0.013	0.622
Step 2													
	Conscientiousness					-0.002	0.012	-0.027	0.023	0.002	0.013	-0.025	0.03
	Agreeableness					0.012	0.012	-0.013	0.037	0.013	0.012	-0.012	0.038
	Openness					-0.001	0.007	-0.017	0.014	0	0.008	-0.016	0.015
	Extraversion					-0.007	0.008	-0.025	0.01	-0.006	0.009	-0.024	0.012
	Neuroticism					-0.004	0.01	-0.025	0.017	-0.007	0.011	-0.03	0.015
Step 3													
	Hardiness									-0.006	0.011	-0.022	0.01
	R2	0.245				0.318				0.338			
	Delta R2					0.074				0.02			

Table 5
Predictors of Academic Performance in University Students

	Predictor	Model 1				Model 2				Model 3			
		β	SE	95% CI		β	SE	95% CI		β	SE	95% CI	
	University Students												
Step 1													
	Sex	0.126	0.231	-0.407	0.658	0.513	0.586	-1.353	2.378	1.79	0.374	0.374	0.374
	Age	0.306	0.167	-0.08	0.691	0.314	0.241	-0.452	1.081	0.102	0.105	0.105	0.105
	Year	-0.149	0.167	-0.535	0.236	-0.187	0.29	-1.109	0.734	0.697	0.234	0.234	0.234
	Resident Status	-0.706	0.3	-1.398	-0.014	-0.651	0.461	-2.118	0.816	-0.279	0.197	0.197	0.197
	Dependent Status	-1.128	0.418	-2.092	-0.165	-0.655	0.709	-2.91	1.599	0.025	0.315	0.315	0.315
Step 2													
	Conscientiousness					-0.023	0.027	-0.11	0.065	0.374	0.374	0.374	0.374
	Agreeableness					-0.005	0.016	-0.056	0.046	0.105	0.105	0.105	0.105
	Openness					-0.006	0.029	-0.098	0.086	0.234	0.234	0.234	0.234
	Extraversion					-0.001	0.024	-0.076	0.074	0.197	0.197	0.197	0.197
	Neuroticism					0.008	0.017	-0.046	0.062	0.315	0.315	0.315	0.315
Step 3													
	Hardiness									0.076	0.018	0	0.153
	R2	0.572				0.718				0.972			
	Delta R2					0.146				0.255			

Discussion

These findings improve our understanding of how military training affects personality. Based on our analysis there was a significant interaction by group for conscientiousness and neuroticism, the premier traits of the Big Five. No changes occurred in hardiness. For cadets there was a ten-point drop in conscientiousness and a three-point increase in neuroticism. Cadets' sharp decline in conscientiousness was unexpected based on the definition of conscientiousness, "socially prescribed impulse control facilitating task and goal-directed behavior" (Costa & McCrae) and the qualities of high-performing soldiers (Sørlie et al., 2020; Conte et al., 2017; Barron et al., 2016a). The expectation would be for military training to increase facets of achievement striving, dutifulness, self-discipline, and competence (Costa & McCrae) due to the enforced structure and added responsibilities of ROTC for cadets. The paired increase in neuroticism albeit small, may raise cause for concern. Neuroticism opposes emotional stability, even-temperedness, and negative emotionality; It is associated with qualities of self-consciousness, anxiety, and vulnerability (Costa & McCrae, 2008). Paired changes in these two primary traits could reduce confidence and cadets' ability to be self-driven as well as raise their negative outlook and volatility. Identifying how military training effectively changes personality is crucial. First year cadets are provided a rigid atmosphere while being pushed to their physical and mental limits. This environment could decrease feelings of autonomy, excessive instruction can reduce competence, and ultimately displace a cadet's locus of control (Deci & Ryan, 2008). Anecdotally, the process of soldier development, and more specifically character development is described through a 'break them down to build them up" model. Acknowledging there is an optimal amount of adversity to induce success, progress, and growth, our results may document

the early ‘break down’ effect military training has on personality through a quantitative assessment. Further assessment over time is necessary.

The university sample conscientiousness slightly increased, and neuroticism decreased by 0.5 and 8 points respectively. Although our initial goal of the project was to compare these two populations, a lack of participation by first-year university students limited our ability to compare and generalize findings. This data was collected during the Spring of 2021 and some COVID restrictions were in place, restricting access to traditional university students; ROTC operated fully during the fall semester of 2020 and spring of 2021. Tracking cadets over an extended period while comparing development to an expected progression (Specht et al., 2011) may be an alternative. Army ROTC participants were predominantly male under twenty years of age, while the university pool consisted mainly of upper-class females. Because of these differences, comparisons between the groups are not warranted.

Hierarchal regressions indicate personality and demographics are not determinants of GPA, no model from either group was significant. We chose GPA as a standard measure of performance consistent for both groups and used dependent variables including demographics, as well as personality, that have consistently shown to contributed to performance (Vedel & Poropat, 2017). Conscientiousness of the Big Five shows largest correlation with Cohen’s *d* ranging from .21-.26 (Poropat, 2009; Richardson et al., 2012; McAbee & Oswald, 2013; Vedel, 2014) and hardiness has been linked to a higher GPA (Maddi et al., 2012) but there was no relationship in the present study. The lack of significance for the university students although factors account to 97% of the variance is likely due to a small and underpowered sample size.

Limitation & Conclusion

There are two primary limitations of this study. One mentioned above is the small and underpowered sample size. A secondary limitation of this study is collecting data at the start of the cadets' second semester after they may have gone through preliminary changes during the first. This was an intentional choice by the researchers to mitigate exaggerated changes in personality based on cadets potentially inflating scores due to feeling even more overwhelmed during the first semester than they reveal during the second. Third, there are dissimilarities between are target population and control group. Further, university students were under further quarantine restrictions in the fall semester versus the spring semester.

Our study offers support that military training does affect personality change over the course of a semester and does not support demographics and personality as valid predictors of academic performance. This study adds to personality literature through utilizing ROTC as a novel population to investigate personality change at the university level. Further, the study highlights Army ROTC induces significant personality change, which may differ from military academy cadets or enlisted soldiers. Our findings serve as a first step in understanding the process of personality change through military training. Future studies should use longitudinal measures to follow soldiers from entry to active soldier for clearer understanding of the personality path of a soldier and the effectiveness of training. The primary purpose and instructed progression of military training as described by the training entity should be considered when evaluating the soldier and training.

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CHAPTER V: CONCLUSION

This project aimed to examine changes in hardiness over an academic calendar year in Army Reserve Officers' Training Corps (AROTC) first-year cadets alongside university students. Effects of hardiness on academic and field performance were also evaluated. Collected during the COVID-19 pandemic, this study incorporated two distinctive components by utilizing a university sample control group and a mixed method approach. The low number of university student participants compounded by dissimilarities of demographics between samples made for limited comparisons. Within these restraints, this study offers novel insights specific to military populations concerning personality development.

Over the nine-month period changes in personality attributed to military training were revealed. While hardiness did not significantly change for either group, the premier Big Five personality traits appeared to reciprocate between samples. Cadets decreased conscientiousness and slightly increased in neuroticism, and university students decreased neuroticism. Hardiness showed a downward trend which is consistent with previous findings in military academies (Hystad et al., 2015).

The shifts in the Big Five personality traits, conscientiousness, and neuroticism, were novel. Based on personality changes, training across the first year decreases the likelihood of cadet's impulse control potentially impeding task- and goal-directed behavior for conscientiousness (McCrae & Costa, 2008). Changes in neuroticism, though small, increase the likelihood of cadets to be emotionally volatile (McCrae & Costa, 2008). For a cadet this could realize as reductions in self-discipline and perceived competence paired with increases in self-consciousness, anxiety, and negative emotionality resulting in poor performance. Linking these changes in the primary Big Five traits together have the potential to initiate or continue a

negative psychological spiral that could impact grades, ROTC performance, and overall mood although not visible in the present study (Zell & Lesick, 2021; Schneider, 2004; Chammoro-Premuzic & Furnham, 2003; Palinkas et al., 2000). Conversely, university students' decline in neuroticism makes them more even keeled which may reflect their greater amount of experience and comfortability in the college setting having made it past the first year. Benefits of lower neuroticism present as less feelings of self-consciousness, anxiety, negative emotionality (McCrae & Costa, 2008).

Concerning the role of personality and demographics in performance, August was the only time point that produced a significant model to predict ACFT performance. Biological sex was the sole influencing variable. Males were more likely to score higher when entering university. The insignificance of biological sex by January reveals discrepancies in fitness scores can be eliminated through physical training at the ROTC level. This year was also the first use of the ACFT or weighted exercises as part of the Army fitness testing. Nonetheless, the ability to close the ACFT score gap is promising for the long term, because fitness scores are considerable factors in the likelihood of promotions. The Army is currently revamping the ACFT to eliminate age and gender neutrality scoring. Although this study reveals scoring discrepancies can be reduced through training, this adjustment by the Army indicates scoring disparities may be more enduring and prevalent in other samples. Other major adjustments to the ACFT include re-titling the assessment to a general fitness test that is not battle specific, replacing the leg tuck with the plank, a walking option for individuals unable to run, and delay the impact of ACFT score on personnel decisions (Winkie, 2022).

None of the models significantly predicted academic performance at any time point for either group revealing there are other factors contributing to the success inside the classroom.

The absence of predictive variables for fitness and academic performance raises curiosity. In the hardiness meta-analysis, it was suggested hardiness is a proximal cause of health, but a distal predictor of performance. This may have contributed to the lack of influence of hardiness as a measure and provide insight on the inconsistent relationship of hardiness and fitness. As a construct hardiness is strongly linked with psychological factors and physical health, but the relationship to fitness and performance remains elusive. In the military, fitness is frequently tied to task performance, but success in selection, development, or a task has shown to be affected by hardiness. Hardiness may be more influential in more real life-like scenarios. More investigation needs to be done to unpack this interaction.

Beyond hardiness, demographic and personality measures did not impact performance either, piquing intrigue on which influencing factors were not collected. Extant literature supports demographic and personality characteristics as influencers of performance (Nye et al., 2020; Vedel & Poropat, 2017; Lo Bue et al., 2017). Contextual, situational, and environmental factors may play a more primary role in academic and fitness test performance outcomes as participants gain experience.

A mixed method approach was utilized to ensure a holistic perspective from cadets to collect their perceptions of stress, personality, and performance. Cadets chose AROTC seeking to have a "normal college experience", not dominated by the military. Without an accurate gauge of normal, the first-year transition from high school to college, compounded by AROTC, was stressful. Trying obstacles created opportunities for reflection such as shifts in perspective, and increases confidence, self-awareness, and self-evaluation. Some cadets transferred this reflective approach to aspects of their life beyond AROTC. Initially, themes from the quantitative and qualitative findings may seem contradictory based on the lack of change via surveys and evident

changes in perspective via interviews and self-assessments. Surveys showed a trending decrease in hardiness and the two primary Big Five traits shifting away from high-performing characteristics, while qualitative data revealed commitment to change for bettering performance in AROTC. Cadets' pledge to the Army is eight years, their malleability may reveal conviction rather than contradiction as seen through cadets sharing sentiments similar to this, "We're all there for one reason and that's to get a commission. So, we all know what we have to do to do that and having that and having that like group of people who are driven to the same goal and are willing to help each other". This is not an anticipated thought from an individual that may be decreasing in qualities of hardiness, increasing in neuroticism, and becoming less interested in their commitment. Cadets faced internal difficulties concerning mindset on how to manage stress but did not waver on their long-term intention. Though on an individual basis, cadets are preparing intentionally for their future and invested in their own purpose (see appendix E for additional qualitative themes). This mixed methods approach revealed insights from individual cadets layered by ROTC experience. For this reason, my interpretation of the themes from the two approaches were complementary, the qualitative portion of this study provided depth otherwise undetected by quantitative measures.

AROTC is unlike military academies or enlistment. Cadets chose to circumvent the lifestyle of military academies and enlisting by joining AROTC. Cadets met for physical training four times per week, in-person learning environments twice per week, and on selected weekends. Still, they were able to participate in conventional college activities beyond these commitments. The dichotomization of military and non-military settings may create a more difficult adjustment to ROTC, college, and adulthood when juxtaposed with military academy cadets and enlisted privates. Fractioned weeks demand differing levels of autonomy dependent on the day. Although

an easier adjustment into less formal military conditions is expected for cadets, they have no extensive experience to compare. Based on the qualitative findings in this study, there is an evident, even if only temporary struggle between two separate worlds as cadets adapt early on. This may be compounded by the militaristic approach of "break them down to build them up". There is a necessary amount of adversity and discomfort to create growth (Selye, 1953). While this is reflected in the Big Five personality change, the lack of change in the quantitative measure of hardiness might be attributed to the intensity and duration of training. However, changes in hardiness were expressed in the qualitative analysis as changes in stress, personality, and performance. Themes of social support and camaraderie link to hardiness-commitment. Cadets' motivation toward continuous development while facing adversity is synonymous with hardiness-challenge and hardiness-control. Overall, there is no gauge of normal when entering the military in any capacity, particularly at a time coinciding with life changes of young adulthood and college. The dichotomized lifestyle of AROTC may impede smoother adjustment but does not affect their determination.

Two primary implications can be concluded based on the findings of this mixed method approach. First, quantitative assessments alone are unlikely to provide the total perspective of cadets. Second, cadets' first year experience may provide future insight into their four years in AROTC and military careers (Bartone et al., 2013; Westman, 1990). On an elongated timeline cadets would maintain early confidence, adversity would cause uncertainty, which may nudge personality and perspective shifts. With appropriate support and reflection cadets would respond by attaining a new higher baseline of resilience readied for the next challenge. Broadly, this depicts Hans Selye's general adaptation syndrome (1953) or a cycle of comfortability, challenge, adapting to meet the challenge, and forming a new baseline of comfortability. Thus, changing

cadets' perspective, appraisal process of stress, and hardiness as a result (Lazarus & Folkman, 1984; Selye, 1985; Lepine et al., 2005). This is crucial for cadets as the AROTC program is designed to improve resilience and they will be continuously challenged throughout their careers. Cadets' ability to be challenged and respond effectively is vital to their success.

Limitations of this study are acknowledged. One academic calendar charts only one year of cadet progression. Without continuing to follow cadets long-term, there is no way to predict the process of personality development. This study serves as the first snapshot of their developing careers. Cadet increases in resilience may occur over summer when they are granted space to reflect. Time outside of AROTC would allow space for cadets to adapt similar to a retention test task performance. Disconnecting from the program for the summer could create an effect of no change supporting the definitiveness of this study's findings, or create a supercompensation resulting in increases in hardiness, conscientiousness, and a reduction in neuroticism that was lower than baseline. Future studies should further investigate this process. Findings could have been limited by sample size for both groups. G power required 57 total participants, but only 19 cadets and 11 university students completed all time points. For example, although the influence of personality and demographics on academic performance are supported throughout the literature and the hierarchal regression model accounted for 90% of the variance, the model was still insignificant.

In summary, this is the first study to investigate hardiness utilizing a mixed method approach. Our investigation provided environmental context, depth to hardiness, and a dynamic comparison of quantitative and qualitative findings. Cadets' direct perspective in their self-assessment and in-depth interviews revealed a timeline. Expressive descriptions outlined past thought processes, current state of mind, and future focus. Without the qualitative portion,

crucial insights of underlying objective and perspective that created the framework of the findings would have been undetected.

Moving forward, more emphasis should be placed on systematic measurement and consistent collection of soldier development in AROTC as 60% of lieutenants are commissioned through these programs. Assessment of soldiers is not lacking in other components of the Army. Extant literature shows support for hardiness in terminal scenarios like Special Forces (Johnsen et al., 2013; Bartone et al., 2008) selection or likelihood of PTSD (Pitts et al., 2016; Escolas et al., 2013), but the progression of personality and perspective has been evaluated less frequently. Following soldiers' personality and career development would lead to improved performance and efficiency of selection. Better understanding of the system and process would improve strategic placement of resources for soldier support. Policy implications include insight on typical soldier development, effect of military training approach on personality change, and more operative personnel selection. This area is particularly lacking for ROTC cadets, but consolidation and synthesis of available personality data from other components would be informative.

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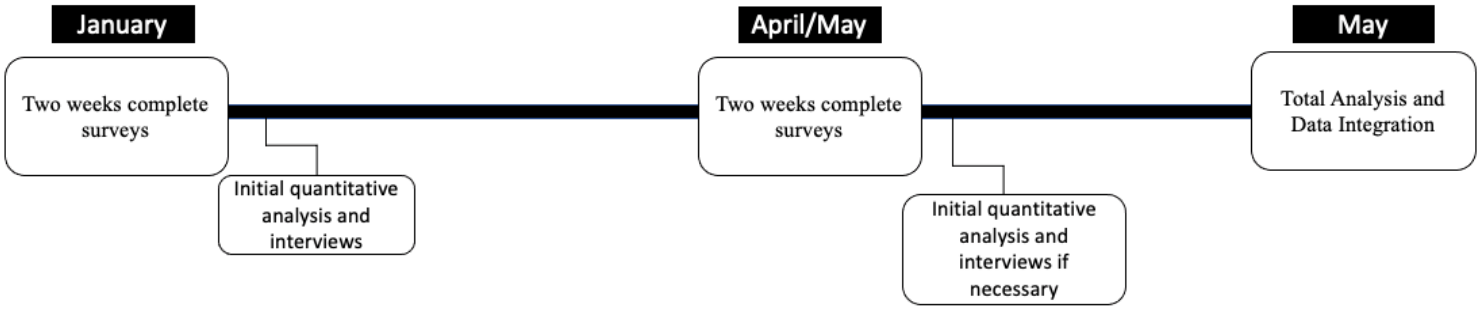
APPENDIX A: Mixed Methods Diagram



APPENDIX B: Study Instruments

Demographic Questionnaire

1. Sex assigned at birth
    a. Male
    b. Female
    c. Intersex
    d. Prefer not to respond

2. Which race/ethnicity do you most closely identify with?
    a. European/white
    b. African American/Black
    c. Latinx
    d. Asian/Pacific Islander
    e. Native American
    f. Multi-race
    g. Other _____

3. What is your age?_____

4. Student resident status
    a. In-state
    b. Out-of-state

5. What is your current academic standing?
    a. Freshmxn
    b. Sophomore
    c. Junior
    d. Senior

6. What is your commitment status?
    a. Non-contracted
    b. Contracted
    c. Scholarship

7. Are you part of the simultaneous membership program (SMP)?
    a. Yes
    b. No

8. Do you have any service experience prior to ROTC here at Auburn University?
    a. Yes
        i. How many years? _____
    b. No

9. Are/Were you a military dependent (i.e. a member of a military family)?
    a. Yes
    b. No

10. Would you be interested in participating in a follow-up interview
    a. Yes
    b. No
    c. Maybe

Hardiness Resilience Gauge (HRG)

Directions: Indicate how true each statement is for you by selecting one of the four response options

1. I spend most of my life doing things that are meaningful
2. I can achieve my goals if I work hard
3. I don't like to make changes in my regular activities
4. How things go in my life depends on my actions
5. Changes in routine are interesting to me
6. I look forward to my daily activities
7. I don't think I can influence my future
8. I enjoy the challenge when I have to do more than one thing at a time
9. Life is interesting and exciting to me
10. It is up to me to decide how the rest of my life will go
11. Life in general is boring to me
12. My choices make a real difference in how things turn out in the end
13. I have a clear sense of purpose in my life
14. I am responsible for my own successes in life
15. Unexpected changes provide me with learning opportunities
16. I enjoy my day-to-day tasks
17. I am confident I can accomplish whatever I set out to do
18. I find the positives in any life change
19. I immerse myself in the things I do
20. Even if I fail at something, I look for ways to improve
21. My daily activities are important to me
22. When things go wrong, I try to learn something useful to apply in the future
23. I feel energized about life
24. Mistakes are opportunities to learn and improve
25. I fully involve myself in all aspects of my life (e.g. family, friends, work)
26. Big life changes excite me
27. When I set out to do something, I am certain I can get it done
28. I am good at dealing with adversity

Note. This has been taken adapted from online format. Response options are listed on a four-point Likert scale from 1 (not true at all) to 4 (completely true). Only survey given in separate link.

International Personality Item Pool (IPIP)

Items in each of the preliminary International Personality Item Pool (IPIP) scales measuring constructs similar to those in the 5 NEO-PI-R Broad Domains. Mix all positively and negatively keyed items. Based on the Five Factors Costa and McCrae's (1992) NEO-PI-R

Directions as will be presented: Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Indicate for each statement whether it is 1. Completely Inaccurate 2. Very Inaccurate 3. Somewhat Inaccurate, 4. Neither Accurate, Nor Inaccurate, 5. Moderate Accurate, 6. Very Accurate, or 7. Completely Accurate as a description of you

Neuroticism

1. Often feel blue
2. Dislike myself
3. Am often down in the dumps
4. Have frequent mood swings
5. Panic easily
6. Rarely get irritated
7. Seldom feel blue
8. Feel comfortable with myself
9. Am not easily bothered by things
10. Am very pleased with myself

Extraversion

1. Feel comfortable around people
2. Make friends easily
3. Am skilled in handling social situations
4. Am the life of the party
5. Know how to captivate people
6. Have little to say
7. Keep in the background
8. Would describe my experiences as somewhat dull
9. Don't like to draw attention to myself
10. Don't talk a lot

Openness to Experience

1. Believe in the importance of art
2. Have a vivid imagination
3. Tend to vote for liberal politics
4. Carry the conversation to a higher level
5. Enjoy hearing new ideas
6. Am not interested in abstract ideas
7. Do not like art
8. Avoid philosophical discussions
9. Do not enjoy going to art museums
10. Tend to vote for conservative political candidates

Agreeableness

1. Have a good word for everyone
2. Believe that others have good intentions
3. Respect others
4. Accept people as they are
5. Make people feel at ease
6. Have a sharp tongue
7. Cut others to pieces
8. Suspect hidden motives in others
9. Get back at others
10. Insult people

Conscientiousness

1. Am always prepared
2. Pay attention to details
3. Get chores done right away
4. Carry out my plans
5. Make plans and stick to them
6. Waste my time
7. Find it difficult to get down to work
8. Do just enough work to get by
9. Don't see things through
10. Shrink my duties

Note. Respondents will be instructed to describe themselves as they are now in relation to others of same sex and age. Seven-point scoring scale will be present from 1 (Completely Inaccurate) to 7 (Completely Accurate). Items six through ten are negatively keyed for each domain. Taken from IPIP (Goldberg et al., 2006)

***Interviews are semi-structured and subject to change as the participants will guide particulars of the dialogue**

Interview Protocol

1. Tell me about yourself?
2. Were you a part of the ROTC in high school?
3. How did you come to be at Auburn?
4. Tell me about why you chose to join ROTC
5. How has your semester been?
    a. Emotions and thoughts you are feeling? Tell me about the transition from HS to college, juggling tasks
6. What ways do you decompress or relax?
7. Tell me about a time you were really challenged by something in ROTC. What was the challenge?(resilient)
    a. What was the challenge? How did you handle it? What preparation did you it take? What were the pressures to perform?
8. Tell me about a time you were expected to demonstrate something you'd learned in ROTC.
    a. What was the task? How did you do? In what ways were you able to prepare?
9. What about in another area of your life? That you felt challenged? Or expected to demonstrate what you have learned?
10. How have you changed (grown) over the semester?
11. What is your outlook on moving forward next semester and in the upcoming years?
12. What is some advice you would give to an incoming freshman or yourself back in August?
13. What's your favorite quote?
14. Any else you would like to share, or anything else in overall?

Army Combat Fitness Test Scoring Chart

Army ACFT FY20 Standards (As of 1 Oct 19)

Points	MDL	SPT	HRP	SDC	LTK	2MR	
100	340	12.5	60	1:33	20	13:30	
99		12.4	59	1:36		13:39	
98		12.2	58	1:39	19	13:48	
97	330	12.1	57	1:41		13:57	
96		11.9	56	1:43	18	14:06	
95		11.8	55	1:45		14:15	
94	320	11.6	54	1:46	17	14:24	
93		11.5	53	1:47		14:33	
92	310	11.3	52	1:48	16	14:42	
91		11.2	51	1:49		14:51	
90	300	11.0	50	1:50	15	15:00	
89		10.9	49	1:51		15:09	
88	290	10.7	48	1:52	14	15:18	
87		10.6	47	1:53		15:27	
86	280	10.4	46	1:54	13	15:36	
85		10.3	45	1:55		15:45	
84	270	10.1	44	1:56	12	15:54	
83		10.0	43	1:57		16:03	
82	260	9.8	42	1:58	11	16:12	
81		9.7	41	1:59		16:21	
80	250	9.5	40	2:00	10	16:30	
79		9.4	39	2:01		16:39	
78	240	9.2	38	2:02	9	16:48	
77		9.1	37	2:03		16:57	
76	230	8.9	36	2:04	8	17:06	
75		8.8	35	2:05		17:15	
74	220	8.6	34	2:06	7	17:24	
73		8.5	33	2:07		17:33	
72	210	8.3	32	2:08	6	17:42	
71		8.2	31	2:09		17:51	
70	200	8.0	30	2:10	5	18:00	HVY
69		7.8	28	2:14		18:12	
68	190	7.5	26	2:18	4	18:24	
67		7.1	24	2:22		18:36	
66		6.8	22	2:26		18:48	
65	180	6.5	20	2:30	3	19:00	SIG
64	170	6.2	18	2:35		19:24	
63	160	5.8	16	2:40		19:48	
62	150	5.4	14	2:45	2	20:12	
61		4.9	12	2:50		20:36	
60	140	4.5	10	3:00	1	21:00	MOD
59				3:01		21:01	
58				3:02		21:03	
57				3:03		21:05	
56				3:04		21:07	
55		4.4	9	3:05		21:09	
54				3:06		21:10	
53				3:07		21:12	
52				3:08		21:14	
51				3:09		21:16	
50	130	4.3	8	3:10		21:18	

Army ACFT FY20 Standards (As of 1 Oct 19)

Points	MDL	SPT	HRP	SDC	LTK	2MR
49						21:19
48				3:11		21:21
47						21:23
46				3:12		21:25
45		4.2	7			21:27
44				3:13		21:28
43						21:30
42				3:14		21:32
41						21:34
40	120	4.1	6	3:15		21:36
39						21:37
38				3:16		21:39
37						21:41
36				3:17		21:43
35		4.0	5			21:45
34				3:18		21:46
33						21:48
32				3:19		21:50
31						21:52
30	110	3.9	4	3:20		21:54
29						21:55
28				3:21		21:57
27						21:59
26				3:22		22:01
25		3.8	3			22:03
24				3:23		22:04
23						22:06
22				3:24		22:08
21						22:10
20	100	3.7	2	3:25		22:12
19						22:13
18				3:26		22:15
17						22:17
16				3:27		22:19
15		3.6	1			22:21
14				3:28		22:22
13						22:24
12				3:29		22:26
11						22:28
10	90	3.5		3:30		22:30
9						22:31
8				3:31		22:33
7						22:35
6				3:32		22:37
5		3.4				22:39
4				3:33		22:40
3						22:42
2				3:34		22:44
1						22:46
0	80	3.3	0	3:35	0	22:48

APPENDIX C: Insight on Environment & Context of AROTC

Environment & Context

Cadets returned for spring semester feeling a greater sense of readiness, "I came into the second semester of my ROTC career significantly more prepared than I was going into the first semester. I was more physically fit, knew what to expect, and was ready to compete to be a standout cadet." – (CE). Experiencing one semester provided Cadets with confidence to compete amongst their peers. This was a long cry from day one of orientation, "I had no idea what I was doing. Even when we started PT, running multiple miles before the sun came up sounded like a challenge." – (UK).

Upon arrival competition is fostered within the battalion. Heavy emphasis is placed on Cadets being better than they were, rather than competing against their *teammates,* as their Lieutenant Colonel (Lt. Col.) described their relationship to one another. For first-year Cadets, or MSIs, center their attention on themselves can prove difficult to execute within the structured program. Their primary objective: learn to lead. The premise is by focusing on self-improvement during their first and second-year, Cadets are better equipped and disciplined to lead others in the future. Though rare and brief, positions of leadership for MSIs provide an opportunity for them to highlight their capabilities in an environment where they are otherwise led and only theoretically taught how to lead others. Some, recognized for improvement or excelling consistently are placed in sought after leadership positions amongst their MSI peers. Since there are few opportunities, MSIs grow frustrated and bored, but they understand the natural progression of the program. The likelihood of leadership opportunities increases every year within the AROTC program. A designated opportunity for some first-year Cadets to lead takes

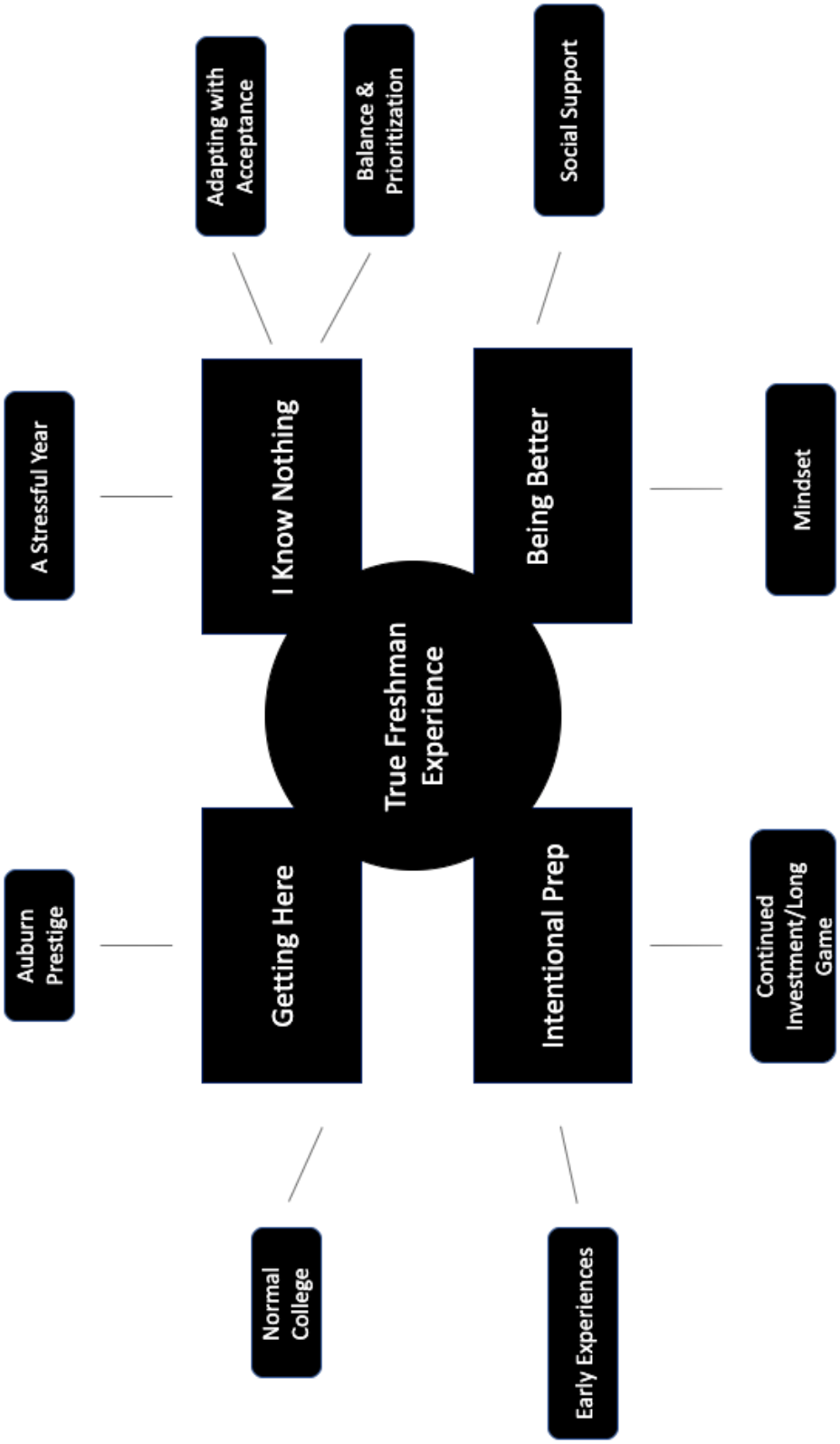
place during the FTX, Fall Training Exercise, (yes, the event takes place in the spring) on a nearby military installation. Aptly described by a Cadet:

"The event, consisting of four days of sleeping in the woods and eating MREs, executing a mission, land navigation, and going through classes all on limited amounts of sleep. This event showed me that I could do a lot more than I thought I was capable of, especially when we did a movement through uneven terrain for approximately 2.5 klicks. On top of all of this, I was a Team Leader and in charge of the wellbeing of three other cadets, which is something that was absolutely a new challenge for me." – CE

For some Cadets this training exercise provided their first opportunity to lead, resembling coursework and leadership by third and fourth-year Cadets they have followed all year long. This is the closest all Cadets without a prior service background have come to experiencing a live military scenario. The extract above reveals the mentally, emotionally, and physically taxing nature of the event; still, many Cadets describe this as their favorite learning experience and the most fun they had thus far within the program.

Cadets also understand the demand to perform at a high level constantly. They are ranked on a list amongst all other ROTC cadets in the country that determine their future on an Order of Merit List (OML). It is based on a combination of academic, physical, military specific, and extracurricular factors. The OML is not revealed until Cadets are in their third year. Warranted, Cadets feel the pressure early whether they intend to lead a life with the Army as the focal point, or a component. MSIs understand they must meet the standard of excellence upheld by the program as they balance college life, early adulthood, and adapt to the military.

APPENDIX D: Thematic Map



APPENDIX E: Additional Qualitative Themes

Continuation of "I Know Nothing" Theme: A Stressful Year

Task	Emotion	Perception of Task
First distance run	Grateful	Physical
First fitness test	Humility	Physical
Losing weight	Disgust/Disbelief	Physical
6-mile ruck march	Shame	Mental
Obstacle course	Fear	Mental

Cadets were motivated to do more and better in all tasks; however, they were less interested in the accompanying responsibilities of improvement. For example, improving an ACFT score requires increases in working out, better eating habits, and giving more effort at PT, but this would also increase fatigue making them less likely to do homework, study for tests, and participate in other activities they did for themselves. With limited hours in a day Cadets were busy feeling exhausted, all shared experiences with fatigue in their attempt to do everything well. Spread thin, Cadets persevered. They had never experienced a spring break but were keen to the need for days off. Toward their impending commitments two implied a numbness, "I feel overwhelmed, but like I don't know. I guess because I'm used to it, like I always have a busy day and I'm fine with it." – (AM). This style of enduring acceptance was one of the ways Cadets coped with the adjustment, while others emphasized their willingness to change, "I definitely learned a lot about myself first [year]: what I really struggle with, and like what I need to work on…" – (WB). For the six, abandoning ROTC was not an option. Their focus was beyond the four years of ROTC as evidenced by their long-term commitment to the Army.

Running as a metaphor. Running emerged as a metaphor for Cadet process of adjustment during the year. Many Cadets were as unprepared for running like they were unprepared for the college

life. Unlike other enduring stressors ROTC and academics, Cadets noted progress in their fitness. CE described the epiphany they reached through their fitness journey, “I might not be able to run this fast or lift this weight right now, but in one month or two months I’m absolutely going to be able to do that if I keep at it so just don’t give up”. The shift in mindset was evident, CE previously identified as a “D-lineman” incapable of running. Cadets were patient and rational sharing their thought process regarding running improvements, “when I thought about it… I’ll get better at running when I start doing it consistently” – (WB). They recognized improvement takes time, but the sureness of getting in shape was not immediately transferred to other areas of life. Cadets’ more optimistic approach to running may be due to notable progress of fitness which occurs over a year, whereas Cadets may not have identified similar progress over a year regarding college life within the same brief time span. Expecting balance and normalcy, Cadets arrived untested and knowing nothing. This contributed to a highly stressful first year juggling the desire for a normal college life, coming into adulthood, and adjusting to military standards. Cadets refused to surrender, each had personal reasons for enduring the new physical and mental demands.

Additional Theme: **Intentional Prep**

“So, I just decided that was something I wanted, I want to move around, I want to meet new people, I want to work for the army.”

Intentional prep acknowledges all participants chose AROTC as the most effective path to get to the U.S. Army, while each Cadet remained invested in their own purpose. The army is part of the plan for everyone, but not the end goal for all. Cadets shared early experiences that motivated their decision to join the Army. Interviews further reflected each of their on-going

commitment to this initial purpose, Cadets were preparing intentionally. Fully invested, they were focused on the long-term or post-graduation outcomes. This lessened the burden of enduring stress. The table below lists extracts of Cadets' early experiences that influenced joining the army and continued investment that mirrored the early experience. The final column interprets whether the Cadet's motivation or purpose drives them toward familiarity or unfamiliarity in their future.

Cadet #	Deciding on ROTC	Continuing Investment	Underlying Purpose
1	“on my deathbed, if I look back and I was like, missed out on that opportunity [being in army], I would not like it, you know, I'd hate myself for it.”	“active duty for a few years at least get the taste of everything, travel the world while I'm young. you know, be in the Army be tough be ‘huuuh’”	Unfamiliarity
2	“I wanted to, I wanted to be dropped in somewhere… Doing army things. I didn't really have much of a plan to it, I just wanted to go Basic. I wanted to go out, I wanted to get sent to who knows where, doing whatever they said I wanted to go fight basically, that's pretty much what I wanted to do what I still want to do technically but…”	“I’m kind of pushing my Army career before I do any of that, and we’ll see where that takes me… I’m going to get a lot of experience in the army so we’ll where that ends up”	Unfamiliarity
3	“she joined the Navy right out of high school, and how she being from such a small town, she got to see so many cool things and meet so many different types of people. And just told us like how awesome her job was and what she got to do…And I was just like, that's something that I would want to do”	I don't want a regular job. I want them to send me wherever they want to send me and let me do my job. You know?	Unfamiliarity
4	“I was used to a military lifestyle, just because that's how I'd grown up, and I was thinking like okay this is what, like I don't know like I couldn't imagine it without it, but like personally me, I can't see myself doing military stuff like that’s just not my personality…”	“so that's why I decided like I don't think if nursing was like an option for me, like fingers crossed that make it in nursing school that I would like, want to do that. Like, be part of the army”	Familiarity
5	“to become effectively the best lieutenant that I can be”	“my end goal in life was military…And do 20 years active duty, and if my career is at a point where you can keep like keep going then. I would love to keep going.”	Familiarity
6	“My dad was a captain in the Army. He was Signal Corps… my dad went to the same program here he was also at Auburn, yeah, both my parents are alums”	“I want to be the best leader I can be, when I get in that position. When I get out of the army I hope to land a nice job. And get my, I just want to be like a father who my kids look up to me, that kind of, that kind of guy. The guy who coaches for his kids teams, he does it all.”	Familiarity

The Long Game. Cadets were evenly divided between whether they were drawn to the army for familiarity or not. Those grouped by familiarity, Cadets 4 through 6, shared at least one parent had service experience. For Cadet 4 and 5 their experiences as an "army brat" influenced what they sought from their relationship with the military. Cadet 5 wanted the opportunity to serve and intended to dedicate his working life to doing so, while Cadet 4 was uninterested in the lifestyle, but recognized the long-term benefits of security and stability from military career. Cadet 6's version of familiarity was more related to their father than the military. They were unconcerned with the direct experiences of the military and envisioned gaining the attributes of their father by following a similar path.

Cadets seeking unfamiliarity were driven by their expectations. They recognized the certainties in their lives and desired to explore beyond them, determined to encounter what they otherwise would not. Cadets 1 and 3 were primarily drawn toward travel, the opportunity to see the world. Cadet 4 wanted to fight, facing the unknown and seeing the worst. Though Cadets maintained differing motives, both end goals are experiences serving in the army.

Whether drawn to familiarity or unfamiliarity, Cadets recognize their investment is long-term, unlike committing to a 4-year university or using your degree after graduation. To secure their future, high school Cadets agree to complete an 8-year period of service with the army following graduation (goarmy.com, 2018). The foresight necessary to make this decision made their commitment more durable during the stress of the year. Steadfast in their motivations, Cadets executed on their self-constructed paths into early adulthood.