



Research Note 2023-15

Leveraging Grit in Military Research: A Comprehensive Review

Krystal N. Roach
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September 2023

**United States Army Research Institute
for the Behavioral and Social Sciences**

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**U.S. Army Research Institute
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Research Report 2023-15

**Leveraging Grit in Military Research: A
Comprehensive Review**

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Selection and Assignment Research Unit
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September 2023

Approved for public release; distribution is unlimited.

LEVERAGING GRIT IN MILITARY RESEARCH: A COMPREHENSIVE REVIEW

EXECUTIVE SUMMARY

Research Requirement:

Personality has been a key topic of interest for the U.S. Military, with widespread use of measures examining various personality traits to inform selection and assignment decisions. Grit, defined as trait perseverance, is an additional personality trait that has been of interest to the military. This interest is likely due to its proposed positive relationship with key outcomes, most notably performance and retention. However, general research exploring the validity evidence of this construct remains inconclusive. The purpose of this review was to examine extant literature on grit and explain the construct, providing a summary explaining the dimensionality and measurement, as well as the validity evidence (or lack thereof). This research note also aimed to explain the potential applicability of grit to military contexts.

Procedure:

A review was conducted spanning the grit literature, with particular attention on literature that addressed grit within military contexts. Various types of literature were reviewed, including peer-reviewed journal articles, dissertations, and book chapters.

Findings:

In general, research has shown conflicting evidence regarding the dimensionality and structure of grit. The initial conceptualization of grit introduced a two-dimension model (i.e., consistency of interest and perseverance of effort). However, other researchers have argued that grit should instead be a combined, one-factor model. Construct and predictive validity evidence are also presented in this review. Construct validity research has generally shown that grit and cognitive ability are distinct constructs. Many personality variables have also been compared to grit, including conscientiousness, where the distinctness of grit has remained unclear. Resilience and hardiness have also been directly compared to grit, with some researchers claiming that grit is simply a rebranding of these personality variables. However, research has found some key distinctions between these constructs, and have proposed that each targets a different element of perseverance. The predictive validity evidence of grit remains limited because a majority of the studies conducted have been completed within the academic sphere and present conflicting findings. However, some academic and military research has shown that grit does have value in predicting performance, attrition, retention, and program completion, although the incremental benefit is not as large as initially claimed (see Scelfo, 2016).

Utilization and Dissemination of Findings:

More longitudinal military research is required to better understand the validity of grit and its value to military populations. However, this review provides a summary of the current literature, which may be useful to decision makers interested in grit.

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LEVERAGING GRIT IN MILITARY RESEARCH: A COMPREHENSIVE REVIEW

Introduction

The study of personality has been pervasive in psychology, and is particularly important to Industrial and Organizational psychology, as research has found that personality traits tend to predict important work outcomes, such as performance and attrition (e.g., Barrick & Mount, 1991; Zimmerman, 2008). The most common conceptualization of personality is the Five-Factor Model (FFM), which consists of openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (i.e., emotional stability; Barrick & Mount, 1991). However, researchers have expanded the view of personality beyond the FFM, identifying additional personality traits that may be useful to examine in the workplace, such as locus of control, self-efficacy (Judge & Bono, 2001) and grit (Kim et al., 2019). Grit can be defined as perseverance at the trait-level and it has been modeled to predict various workplace outcomes (Duckworth et al., 2007), although much of the existing research focuses on educational contexts (e.g., Stoffel & Cain, 2018; Warren & Hale, 2020).

Grit has attracted the attention of military research in recent years, likely due to its proposed relationship with attrition (Kelly et al., 2014) and course dropout (Eskreis-Winkler et al., 2014) in military environments. Attrition, particularly first-term attrition, costs military branches hundreds of thousands of dollars yearly in sunk costs (Enns, 2012, as cited by Marrone, 2020). As such, grit offers the military branches a unique opportunity to attempt to identify individuals who are more likely to attrit before they enlist, thus saving the military considerable costs. U.S. military research on grit has predominantly focused on U.S. Army samples, but researchers have argued that the construct applies well to all military environments because of the “warrior culture,” which emphasizes physical, mental, and emotional toughness, all of which are consistent with grit’s focus on perseverance (Pennings et al., 2015). The purpose of this research note is to review the literature on grit, both in the academic sphere and the military context. Specifically, this research note will focus on the dimensions of grit, the validity evidence garnered from the extant literature, and the military applicability of the construct.

Defining Grit

Grit was originally proposed as a way for psychologists to examine why performance differed between individuals of similar and different intellectual ability (Duckworth et al., 2007). That is, it sought to address performance differences between those of similar intelligence, and why individuals who were oftentimes less intelligent outperformed those who were more intelligent.

Grit can be defined as trait perseverance and entails a propensity for setting and pursuing long-term goals. Duckworth and colleagues (2007; 2009) frequently utilize a running metaphor to explain how the perseverance emphasis of grit differs from other traits. Whereas other personality traits such as conscientiousness equate to an individual’s ability to sprint towards a goal, grit is instead thought to be akin to the stamina that is needed to finish a marathon. In addition, grit is proposed to be useful across professions, whereas other personality traits are thought to only be beneficial in some professions, but not others (e.g., extraversion may be beneficial for those in sales but not very useful for data science; Duckworth et al., 2007).

Although meta-analytic findings have shown that some personality traits significantly predict performance in some occupational groups but not others, conscientiousness has been shown to consistently relate to job performance across occupational groups (Barrick & Mount, 1991).

Dimensions of Grit

In the formative article on grit, Duckworth and colleagues (2007) proposed a two-dimension structure for the construct, consistency of interest and perseverance of effort. Consistency of interest refers to the individual's enduring interest in achieving a goal, even without positive feedback or goal attainment. In other words, this individual is less likely to abandon their goal. However, it is important to note that all of the items in this dimension (e.g., "I often set a goal but later choose to pursue a different one;" "I have difficulty maintaining my focus on projects that take more than a few months to complete") are reverse-coded, such that this may instead model inconsistency of interest. Perseverance of effort, in comparison, describes an individual who is willing to dependably continue to invest time and energy into achieving their goal (e.g., "I finish whatever I begin" and "I am a hard worker"). Several researchers have proposed that the two-dimension model of grit should instead be a one-factor model due to the likely presence of a method factor (i.e., negatively-worded items in the consistency of interest dimension versus positively-worded items in the perseverance of effort dimension). However, Duckworth and colleagues (2007; 2009) maintain that these two dimensions are separate and further research has indeed found differential effects for the two dimensions (Kim et al., 2019; Zissman & Ganzach, 2021). These findings suggest that the two dimensions may be better examined separately, instead of aggregated into a grit construct, although the dimension-structure of grit continues to be an enduring area of controversy (see Credé, 2018). In this review, when referring to the overall grit construct, I will use the term "grit." However, when researchers have split their findings into dimensions, I will explicitly refer to the two dimensions of grit.

The Structure of Grit

Theoretically, the two-dimension model of grit suggests that grit is a higher-order factor that exists with two first-order facets, consistency of interest and perseverance of effort. Duckworth and colleagues (2007) tested a higher-order factor model in comparison to a single-factor model and reported that the higher-order factor model exhibited better fit. However, as Credé and colleagues (2017) have reported, this is not possible as the model would not be identified. Instead, the models would likely exhibit identical fit if the analyses were accurately performed. The higher-order grit construct may also be problematic because of how scores are calculated. Indeed, the original way for calculating an individual's grit' consisted of a combined score from the two dimensions. However, as Credé (2018) points out, this approach would mean that any combination of the two dimensions is acceptable to constitute grit. That is, someone who is high in interest but low in effort has the same level of grit as someone who is low in interest but high in effort. The very idea that someone could be low in either of the dimensions is contrary to Duckworth and colleague's (2007) argument that an individual who is "gritty" is high in both dimensions. Aggregating an individual's scores does not seem reasonable when research has found differences in the predictable power between the dimensions (e.g., Zissman & Ganzach, 2021). Researchers have also used meta-analysis to determine that consistency of interest and perseverance of effort are distinct facets and thus, should not be aggregated (Credé,

2019; Guo et al., 2019), although other researchers disagree (Jachimowicz et al., 2018; Jachimowicz et al., 2019). When separating the dimensions, perseverance of effort appears to contribute incremental validity in predicting many key outcomes (e.g., academic performance) over and above conscientiousness, whereas consistency of interest does not (Credé et al., 2017). Taken together, these findings suggest that if grit is utilized, it is recommended to measure the facets separately (with particular attention to perseverance of effort) and pay attention to those individuals who are high in both dimensions, as these individuals would best represent the grit construct (see Credé, 2018).

The Measurement of Grit

Duckworth and colleagues (2007) proposed an initial measurement of grit that consisted of 12 items, six for each dimension. This article is noteworthy because it utilized different samples across six studies, including, adults 25 years old or older, undergraduate students at an Ivy League college, Cadets at the United States Military Academy (USMA), and Scripps National Spelling Bee finalists. Further research by Duckworth and Quinn (2009) created a shorter version of the measure, which they labeled Grit-S, and tested the differential predictive validity between the interest and effort dimensions. In an online sample of adults 25 and older, Grit-S was found to negatively relate to the number of lifetime career changes (controlling for age and the Five-Factor Model; Duckworth & Quinn, 2009). Both the original and the shortened versions of the grit scale remain popular, although the shortened version has become more popular in international studies (van Zyl et al., 2020).

When grit is assessed utilizing Duckworth and colleagues' (2007) original scale consisting of 12 self-report items, results have shown that the overall measure generally produces acceptable internal consistencies that are above .70 (Duckworth et al., 2007; Duckworth & Quinn, 2009; Georgoulas-Sherry & Hernandez, 2022; Kelly et al., 2014). When researchers separate the grit scale into the consistency of interests and perseverance of effort dimensions, internal consistencies are also generally acceptable, although the internal consistency of the perseverance of effort dimension is often found to be slightly lower than the consistency of interest dimension (Georgoulas-Sherry & Hernandez, 2022; Kelly et al., 2014). Indeed, in a study of 1,310 West Point cadets, the internal consistency for the overall scale was .85 and the dimensions produced internal consistencies of .84 and .78 for the consistency of interests and perseverance of effort dimensions, respectively (Kelly et al., 2014).

Regarding the Grit-S scale, Duckworth and Quinn (2009) conducted a series of validation studies on various samples. In one study, four samples were utilized, three of which included adult samples of West Point Cadets from 2008 and 2010, and Ivy League undergraduate students. Although internal consistency was acceptable across all samples for the overall grit scale, when the dimensions were separated, the internal consistencies for both of the West Point samples were not acceptable for the persistence of effort dimension ($\alpha = .60$ and $.65$, respectively). However, in another study of 1,554 adults over 25 years old, the Grit-S scale and its perseverance of effort and consistency of interest dimensions all had internal consistencies within an acceptable range ($\alpha = .82$, $.70$, and $.77$, respectively). Providing further support for the Grit-S measure, a study of 293 U.S. university professors revealed an acceptable internal consistency for the overall Grit-S measure ($\alpha = .92$; Khan et al. 2021) and a study of 181 U.S.

employees produced an acceptable internal consistency for the perseverance of effort dimension ($\alpha = .89$), although the consistency of interest dimension was not examined (Probst et al., 2021).

In spite of the current research available on the grit construct, researchers report that there is still a lack of psychometric literature examining the Grit-O (original) and Grit-S (shortened) measures (see van Zyl et al., 2020). Indeed, although internal consistencies generally reveal that the Grit-O measure and Grit-S measures (and oftentimes their dimensions) produce acceptable reliability, further research that has been completed on the factor structure of the grit measures has revealed conflicting findings that cast doubt on the measurement of grit. For example, in a sample of U.S. individuals, parallel analysis of the Grit-S measure revealed a unidimensional factor structure, which was replicated in subsequent analyses (Gonzalez et al., 2019). Research outside of the United States on both the Grit-O and Grit-S (e.g., Kim & Lee, 2015) measures has also revealed different factor structures than identified by Duckworth and colleagues (2007), but these findings should be considered with caution, as grit may be culture-bound (Disabato et al., 2018 as cited by van Zyl et al., 2020). These issues considered, past findings of the reliability and validity of the Grit-O measure (Duckworth et al., 2007) in comparison to the Grit-S measure have led some researchers to suggest the Grit-O measure is superior (e.g., Weston, 2014). What remains clear, however, is that researchers continue to doubt the measurement of grit and more research is needed to determine if the construct is distinct or duplicative.

Validity Evidence

Construct Validity

Many studies have examined the relationship between grit and other theoretically unrelated and related variables to better understand the variable's construct validity (e.g., Duckworth et al., 2007; Ponnock et al., 2020). In the next sections, I identify the key variables within grit's nomological network, as well as a variety of other variables connected to the construct (for additional review, see Dugan et al., 2019). The Appendix presents a summary of the variables connected to grit.

Cognitive Ability

Cognitive ability, which is operationalized in a variety of ways (e.g., Armed Forces Qualifying Test), is often recognized as the best predictor of job performance (Schmidt & Hunter, 1998). Duckworth and colleagues (2007) proposed that cognitive ability is mostly distinct from grit, but there may reasonably be some overlap between the constructs because grit is thought to explain why individuals who are less intelligent sometimes perform better than those who are more intelligent (i.e., grit could moderate the relationship between intelligence and performance). In a meta-analysis of 21 studies with a total sample of 11,513 participants, Credé and colleagues (2017) found support for the suggestion that cognitive ability and grit were distinct constructs ($\rho = .05$, $SD\rho = .12$). Although the number of studies that separated the two dimensions of grit ($k = 5$, $N = 2,204$) was much smaller than those who used a combined grit score, these analyses also showed a nearly nonexistent relationship between cognitive ability and grit, with consistency of interest exhibiting a corrected correlation of .00 ($SD\rho = .00$) and perseverance of effort exhibiting a corrected correlation of -.01 ($SD\rho = .04$), respectively. In her own longitudinal study across 10 years of cadets at the United States Military Academy (West

Point), Duckworth and colleagues (2019) found that cognitive ability exhibited a small negative correlation with grit ($r = -.07$). Coupled together, these findings suggest that cognitive ability and grit are likely distinct constructs. However, very little, if any, research has examined the potential overlap between these constructs using confirmatory factor analysis (see Credé, 2017).

Conscientiousness

As grit is often modeled as a personality trait, it is reasonable to suggest that it may be related to other personality traits, such as conscientiousness from the Five-Factor Model. Grit is thought to theoretically differ from other similar personality traits like conscientiousness because it concerns endurance, whereas conscientiousness does not (Duckworth & Quinn, 2009). That is, someone who is high in grit is thought to persist even when their goals are challenging and take a long time to accomplish. This theoretical rationale is relatively weak, however, when the facets of conscientiousness are examined, as Credé and colleagues (2017) report that grit's emphasis on striving towards long-term goals is similar to Costa and McCrae's (1992) definitions for two of the facets of conscientiousness, achievement striving (i.e., a desire for achievement) and self-discipline (i.e., completing tasks in spite of challenges). Further, Duckworth and Quinn's (2009) theoretical arguments about achievement striving are not substantiated with evidence. Indeed, the authors use a measure of conscientiousness and argue that the large correlation they observed is due to the overlap between the achievement striving facet of conscientiousness and grit, but they do not directly analyze this facet in their analyses. This approach is not entirely surprising, as it is common to measure personality at the factor-level instead of the facet-level. Furthermore, most of the literature examining grit and achievement has modeled achievement as an outcome that grit predicts (e.g., Muenks et al., 2017), instead of analyzing achievement striving and the overlap it may have with grit. That said, it does present an interesting challenge for the grit construct because if grit and achievement striving are non-distinct, this would mean that the achievement-striving predicts actual achievement, a rational, but unsurprising, finding. More facet-level analyses are needed to better understand the differences between these constructs.

Further complicating the issue of discriminant validity, many studies have found robust correlations between grit and conscientiousness. For example, in a study of 1,554 adults who were 25 and older, Duckworth and Quinn (2009) found large correlations between grit and conscientiousness ($r = .77$), as well as between the dimensions of grit (consistency of interest and perseverance of effort) and conscientiousness ($r = .64$ and $r = .74$, respectively). When correcting for unreliability in the measurement of grit and conscientiousness in Duckworth and colleagues' (2007; 2009) work, researchers estimate that the correlations may be as high as $r = .97$ (Credé et al., 2017). That said, a meta-analysis that examined the relationship between grit and conscientiousness ($k = 22$, $N = 18,826$) revealed a corrected correlation of $.83$ ($SD\rho = .07$). When separating the two dimensions of grit, consistency of interest exhibited a smaller relationship with conscientiousness ($k = 8$, $N = 4,967$, $\rho = .61$, $SD\rho = .17$) than the relationship between perseverance of effort and conscientiousness ($k = 8$, $N = 4,967$, $\rho = .83$, $SD\rho = .14$; Credé et al., 2017), although both correlations were large. Taken together, these large correlations suggest that there may not be much difference between grit and conscientiousness at the higher-order level. However, the dimension-level measurement of grit may be useful.

A faction of researchers have argued that grit is simply another case of the jangle fallacy', which describes the phenomenon of labeling a construct as new and different from others simply

because it has a different name (Credé, 2018; Credé et al., 2017; Ponnock et al., 2020). In this case, researchers have argued that grit is simply a repackaging of conscientiousness. Ponnock and colleagues (2020) found some evidence of this assertion by identifying large overlaps between grit and conscientiousness through multidimensional item response theory (MIRT) confirmatory factor analysis. However, these findings should be considered with caution because the sample consisted of adolescents instead of adults and thus, need to be replicated. That said, the robust correlations and non-distinct factor structure suggest that there may be considerable overlap between the conscientiousness and grit constructs, which is not extremely surprising as Duckworth herself indicated that she thought grit was “a member of the conscientiousness family” (Kamenetz, 2016).

The large overlap between conscientiousness and grit perhaps detracts a bit from the newness of the construct, but it does not mean the construct has no use in predicting valuable outcomes. Indeed, although the overlap will limit incremental validity (Credé et al., 2017), Duckworth and Quinn (2007) still found that grit contributed to educational attainment over and above conscientiousness. Meta-analytic results also revealed that grit contributed incremental variance in predicting some outcomes (e.g., college GPA) but not others (e.g., high school GPA), after controlling for conscientiousness (Credé et al., 2017). Thus, the large overlap should not be taken as a sign to abandon the construct altogether. Instead, it may suggest a need to more deeply examine where the overlaps between grit and conscientiousness occur and what clearly contributes to grit predicting outcomes over and above conscientiousness in some cases but not others. A closer examination of the dimensions of grit may be a good area to begin this investigation.

The Remaining Variables within the Five-Factor Model

A myriad of other personality variables have been proposed to overlap with grit, but these variables tend to exhibit smaller correlations and thus, can be more easily discriminated from grit in comparison to conscientiousness. For example, the remaining four factors in the Five-Factor Model (FFM), Openness to experience, extraversion, agreeableness, and neuroticism (emotional stability), have been connected to grit. In a study of 1,554 participants aged 27 years and older, the original grit measure exhibited a robust correlation with neuroticism ($r = -.37$), but moderate correlations with agreeableness ($r = .23$) and extraversion ($r = .19$), and a small correlation with openness to experience ($r = .07$; Duckworth & Quinn, 2009). When analyses targeted the separate dimensions of grit, the perseverance of effort dimension generally exhibited larger correlations with the remaining factors of the Five-Factor model in comparison to the consistency of interest dimension. Indeed, the perseverance of effort dimension exhibited a large negative correlation with neuroticism ($r = -.42$), and moderate correlations with agreeableness ($r = .25$), extraversion ($r = .26$), and openness to experience ($r = .14$). In comparison, consistency of interest exhibited a robust negative correlation with neuroticism ($r = -.32$), moderate correlations with agreeableness ($r = -.18$) and extraversion ($r = .12$), and a small negative correlation with openness to experience ($r = -.02$; Duckworth & Quinn, 2009). In addition, the correlation between grit (either at the higher-order level or at the dimension-level) and neuroticism was considerably larger than the other remaining factors. This may be one of the reasons the neuroticism factor has received the most attention (after conscientiousness) when examining the relationship between grit and the Five-Factor Model. A meta-analysis of 14 studies consisting of 14,501 participants also revealed a substantial correlation between grit and

emotional stability ($\rho = .41$, $SD\rho = .04$; Credé et al., 2017). The authors explained that the negative affective states that are common in individuals who are low in emotional stability (or high in neuroticism) may lead to a loss of interest in the current activity the individual is engaged in. Over time, losing interest in various activities and goals may be seen as inconsistency of interests (Credé et al., 2017).

Resilience and Hardiness

Resilience and hardiness also appear to fall within the nomological network of grit, likely due to a key overlap in perseverance and toughness' in the constructs. Some researchers have even argued that grit represents the jangle fallacy' here as well, in that it is just a rebranding of resilience or hardiness. However, researchers have identified a number of distinctions between the constructs.

Resilience has been defined in a variety of ways (see Southwick et al., 2014), but key to most definitions is overcoming adversity via adaptation (Robertson-Kraft & Duckworth, 2014). Grit is thought to differ from resilience in that it focuses on long-term persistence towards interests (Robertson-Kraft & Duckworth, 2014). Although resilience does indeed have a component of persistence, the definitions do not state that an individual needs to be focused on a particular interest for an extended amount of time. Hardiness, in comparison, has been proposed to refer to an individual's mental toughness (Maddi et al., 2012). One difference between resilience and hardiness is that resilience can be characterized as a personality trait, an outcome, or a process, whereas hardiness is typically only classified as a personality trait (Ledford et al., 2021). Hardiness is thought to differ from grit in that it focuses on a more general, consistent state of endurance, whereas grit is concerned with endurance towards a specific long-term goal (Ledford et al., 2021).

Because of the proposed overlaps between resilience, hardiness, and grit, it is common for research to attempt to distinguish each of these constructs from one another. These analyses have mostly consisted of simple correlation comparisons and confirmatory factor analyses. Indeed, a study of 1,205 Cadets from the United States Military Academy examined correlations between grit, hardiness, and resilience to determine if the constructs, or any of their facets (e.g., consistency of interest) correlated with each other (Georgoulas-Sherry & Kelly, 2019). Although they did find significant correlations amongst grit, hardiness, and resilience, the researchers expanded their analysis using confirmatory factor analysis (CFA) to determine the best fitting model for examining resilience, hardiness, and grit. Based on these analyses, resilience, hardiness, and grit, were found to be best modeled when they each represented a separate latent factor. Thus, grit was found to be empirically distinct from resilience and hardiness (Georgoulas-Sherry & Kelly, 2019). Furthermore, a study of 353 Navy SEAL candidates found that although grit and resilience ($r = .86$) and grit and the commitment component of hardiness ($r = .70$) were strongly correlated, confirmatory factor analysis revealed that they were distinct constructs (Ledford et al., 2021). These authors argued that although grit, resilience, and hardiness theoretically overlap, they each appeared to target a different component of the overall construct of perseverance. Finally, using a more general sample of high school students and adults, a meta-analysis suggested that grit, resilience, and hardiness were not the same construct, although these authors modeled hardiness as a representation of trait-level resilience (Caza et al., 2020). The implication of these three articles is that grit, resilience, and hardiness should not be used

synonymously. Additionally, researchers that wish to target perseverance may want to take pieces from each of these constructs in order to capture a more comprehensive measure of perseverance.

Additional Variables Related to Grit

A smaller selection of research has proposed additional variables that are suggested to overlap with grit. For example, Meriac and colleagues (2015) argued that grit conceptually overlaps with work ethic because both constructs represent a relationship between effort and performance. This relationship was supported, as the hard work dimension of work ethic was related to the perseverance of effort dimension of grit, both representing considerable effort. That said, the consistency of interest dimension of grit was not significantly related to proposed dimensions of work ethic. Further, the sample of 322 employed students showed that work ethic was significantly and strongly correlated with grit ($r = .44$), but that grit contributed unique variance in predicting stress over and above work ethic. Work ethic, in comparison, contributed unique variance in predicting turnover intention and job satisfaction over and above grit. Taken together, the results of this study suggests that work ethic and grit are related, but distinct variables.

Motivation variables have also been related to grit, especially intrinsic motivation and persistence. Intrinsic motivation is defined as enthusiasm to seek out new challenges and experiences and learn (Ryan & Deci, 2000). It is not surprising that intrinsic motivation has been proposed to overlap with grit, as both constructs appear to target an individual's focus on overcoming challenges (Dugan et al., 2019). Some researchers have even made the argument that intrinsic motivation is a functional requirement of the ideal type of grit' (Almeida, 2016, p. 580). That is, an individual cannot consistently carry on without being intrinsically motivated, or passionate, about their interest. However, researchers have argued that intrinsic motivation is different from grit because the former includes the affective component of enthusiasm or desire (Miao et al., 2007 as cited by Dugan et al., 2019). This affective component seems a plausible explanation for correlations between grit and intrinsic motivation, which have shown to be significant, but not excessively robust. Indeed, in a study of 489 Colombian university students, intrinsic motivation was correlated more strongly with consistency of interest ($r = .25$) in comparison to perseverance of effort ($r = .11$), although neither correlation suggests a large overlap between the constructs (Lozano-Jimenez et al., 2021). These results should be viewed with caution, however, because it is still unclear if grit is a culture-bound construct. This topic area is also in great need of additional research because most studies focus on academic (e.g., Lozano-Jimenez et al., 2021) and/or minor samples (e.g., Zhao et al., 2018), and present a variety of oftentimes conflicting findings. Further research examining intrinsic motivation and grit in working samples would greatly benefit this literature.

Persistence is another motivation variable that generally refers to an individual's determination to achieve their goals, despite obstacles (Welker & Carre, 2014). It is not unexpected that persistence and grit have been proposed to overlap, because one of the grit dimensions is perseverance of effort, which describes an individual's continuous investment of time and energy in order to achieve their goal. That said, a majority of the literature investigating the overlap between persistence and grit has been conducted in academic environments, instead of work environments, which makes it difficult to make conclusions about working samples. One

such study of 152 students in their last year of secondary school found using exploratory factor analysis (EFA) that the persistence of effort dimension of grit loaded onto the same factor as the motivation/persistence measure utilized in the study (Christensen & Knezek, 2014). Further complicating the study of persistence, some authors have reported that academic performance has been commonly used as a proxy for persistence (Bazelais et al., 2016). Taken together, these findings suggest that persistence and the perseverance of effort dimension of grit may overlap, but since proxy measures are utilized for persistence, the variable may be encompassed and better measured via grit.

Predictive Validity

At its inception, grit was proposed to predict success over and above salient, historic predictors, such as cognitive ability (Duckworth et al., 2007). Duckworth even claimed that grit “beats the pants off IQ, SAT scores, physical fitness and a bazillion other measures” in an interview with the New York Times (Scelfo, 2016). Hyperbole aside, this statement is a misrepresentation of the predictive validity of grit in that incremental validity does not mean that one factor is a better predictor of another, just that it contributes additional variance to the prediction of an outcome. In the case of grit, studies have revealed incremental validity over and above variables like conscientiousness (Credé et al., 2017), but these results are sometimes contradictory, and vary by the measure of grit (e.g., dimension-level) and the specific criterion (e.g., academic success versus job performance). In the next sections, I have separated the outcomes into those that target academic achievement (e.g., college GPA) and those that target workplace phenomenon (e.g., attrition).

Academic Achievement

In the case of grit, meta-analytic findings have shown that grit exhibits moderate relationships with GPA ($k = 37$, $N = 12,601$, $\rho = .17$, $SD\rho = .10$) and general academic performance ($k = 39$, $N = 13,141$, $\rho = .18$, $SD\rho = .11$; Credé et al., 2017). Comparably, standardized tests, such as the SAT, have been estimated to correlate with academic performance at roughly $\rho = .50$ (Sacket et al., 2012, as cited by Credé et al., 2017). Furthermore, when investigating the incremental validity of grit after controlling for conscientiousness, grit contributes almost no unique variance in predicting GPA and general academic performance (Credé et al., 2017).

In spite of past findings that show grit contributes little incremental variance in predicting outcomes of interest, researchers have suggested that perhaps the predictive power of grit is nested in the dimension-level measurement. Indeed, a meta-analysis revealed that when overall grit and conscientiousness were added to models, grit did not contribute to predicting academic performance or high school GPA over and above conscientiousness and contributed very little variance in predicting college GPA over and above conscientiousness. When the dimensions of grit were separated, however, perseverance of effort accounted for additional variance in high school GPA, college GPA, and overall academic performance over and above conscientiousness, whereas the consistency of interest dimension failed to contribute meaningful incremental variance (Credé et al., 2017). In terms of academic outcomes, it may be reasonable for researchers and practitioners to focus on the perseverance of effort dimension, but more research

is needed to determine which outcomes produce differences when examining overall grit and dimension-level grit.

Workplace Outcomes

Additional research that explores grit's power in predicting work outcomes is still needed. Indeed, a majority of the research on grit has focused on academic performance, which may be a main reason why meta-analyses targeting grit have examined academic performance, but not work outcomes (see Credé et al., 2017; Lam & Zhou, 2022). However, there have been individual papers that have examined grit's impact on the work environment and key work outcomes (e.g., Robertson-Kraft & Duckworth, 2014).

Job Performance. Several studies have investigated grit's role in predicting job performance. A study of 154 teachers found that teachers with higher ratings of grit (based on resume ratings) were also rated as more effective by their regional supervisors (Robertson-Kraft & Duckworth, 2014). Furthermore, grit was important to predicting teacher effectiveness over and above leadership experience, as rated from interviews (Robertson-Kraft & Duckworth, 2014). That said, studies have not always revealed that grit is a meaningful predictor of performance. Indeed, a study of working adults found that after the Five-Factor model was added to the analysis, grit contributed little to the prediction of in-role performance (Ion et al., 2017).

Extending to the military context, a study of USMA Cadets found that grit did not predict first-year performance, but hardiness did (Maddi et al., 2012). In a follow-up study that measured the full four years of training (instead of only the first-year experience of cadets), hardiness did a better job of predicting performance than grit (Maddi et al., 2017). Furthermore, USMA uses various measures of performance in Cadets, and two important indicators are military and physical GPA, which refer to the grades that cadets receive on military and physical examinations. Duckworth and colleagues (2019) found that cognitive ability was a more robust predictor of military and physical GPA than grit, although the authors did not partial-out the effect of conscientiousness when examining grit, so we cannot determine if conscientiousness accounts for all of the minimal variance that grit contributed to predicting military and physical GPA. Finally, Gilson and colleagues (2017) conducted a study on 220 Reserve Officer Training Program (ROTC) cadets at three shared training sites and found that the Short Grit scale exhibited a negligible and nonsignificant relationship with cadre-rated performance. That is, the short grit scale did not significantly relate to cadets' performance on 19 leadership dimensions, as rated by cadre. Taken together, these results show that more research is needed to better assess the nature of the relationship between grit and job performance. Specifically, research extending beyond Cadets would be useful to better understanding this relationship in a military context.

Attitudes and Behaviors. Research on grit has expanded beyond performance dimensions into workplace attitudes and behaviors (e.g., job satisfaction), with a variety of findings. In examining correlational findings, a study of rural nurses found that grit was significantly related to job satisfaction and engagement (Sellers et al., 2019). Grit has also been significantly correlated with affective commitment ($r = .52$) (Probst et al., 2021), overall organizational commitment, and constructive voice behavior (Nisar et al., 2020).

A considerable number of studies have also focused on retention-related attitudes and behaviors, likely due to Duckworth and colleagues' (2007) findings that grit predicts cadet retention. Although turnover intention, defined as an individual's attitude towards leaving their job, organization, or profession, is not a measure of actual employee turnover, meta-analytic results have shown that the two variables are strongly correlated (Steel & Ovalle, 1984). As such, it is reasonable to examine the relationship between grit and turnover intention. In a multiphasic study of 300 working adults, grit was significantly negatively correlated with turnover intentions ($r = -.45$), such that higher grit was associated with lower turnover intentions (Probst et al., 2021). Similarly, grit was significantly negatively correlated with turnover intention in a study of 295 employed students, although the magnitude of the correlation was considerably smaller than found in then Probst and colleagues' study (Meriac et al., 2015). Unfortunately, an adequate meta-analysis examining grit with turnover intention or other job-related variables does not currently exist, likely due to the focus of researchers on academic samples and outcomes (e.g., student retention) as well as a lack of overlap within study variables. Additional individual research studies in working samples would perhaps make the relationship between grit and turnover intention easier to synthesize.

Although correlational findings are useful to examine, it is also important to understand the incremental validity grit adds to the prediction of key variables. That is, grit may exhibit a strong correlation with an outcome variable, but if another variable already accounts for the prediction of the outcome, grit does not meaningfully contribute to this outcome. For example, work ethic contributed incremental validity in predicting job satisfaction and turnover intention over and above grit (Meriac et al., 2015). Dissertation research examining turnover in U.S. public elementary school teachers found that when job stress and teacher self-efficacy were added into the same hierarchical linear regression model, grit was a nonsignificant predictor (McKee, 2020). Furthermore, grit contributed little incremental validity in predicting job satisfaction, organizational citizenship behavior, and counterproductive work behavior, over and above the Five-Factor model in a sample of 170 working adults (Ion et al., 2017).

Attrition, Retention, and Completion. Grit has also been related to actual workplace attrition and retention. For example, a study of 154 participants revealed that teachers who had lower ratings of grit were less likely to be retained throughout the school year (Robertson-Kraft & Duckworth, 2014). Furthermore, a study of 442 sales representatives of a vacation ownership corporation found that grit predicted long-term workplace retention over and above other predictors (e.g., conscientiousness; Eskreis-Winkler et al., 2014). However, it is important to note that retention was assessed only 6 months after grit and the sample of employees had an average of 12.34 years of sales experience ($SD = 10.73$ years), so it is possible that the measure of retention is not a good indicator of "long-term" retention in this sample.

Similar to workplace attrition, research has also attempted to link grit to attrition, retention, and completion of challenging career programs (i.e., USMA, medical residency programs; e.g., Salles et al., 2017). Theoretically, researchers have proposed that grit should relate to lower attrition in these programs because individuals higher in grit will be motivated to persevere and “stick it out,” even in difficult circumstances. This determination is particularly relevant in a military context. A study of first-year cadets in the United States Military Academy provided support for this argument, finding that grit predicted first-year retention (Maddi et al., 2012). Interestingly, this study utilized grit and hardiness as predictors, and found that both of these variables contributed unique variance in the prediction of retention. However, when the criterion was later expanded to include all four years of the program, hardiness was found to predict retention, but when grit was added to the model, neither hardiness nor grit produced incremental variance in predicting retention (Maddi et al., 2017). The authors suggest this is likely due to the large correlation between hardiness and grit, which constrains the hierarchical regression analysis.

Research has also often found grit to be a solid predictor of graduation from challenging career programs. A large-scale longitudinal study of 11,258 cadets at USMA found that grit predicted graduation from “Beast Barracks” (the first summer of training) over and above cognitive ability, although these results were modest (Duckworth et al., 2019). Similarly, Duckworth and colleagues (2019) found that individuals higher in grit were more likely to graduate from USMA. Another longitudinal study of USMA Cadets found that individuals higher in the perseverance of effort dimension of grit were more likely to graduate (Kelly et al., 2014). Expanding beyond USMA, a study of candidates in an Army Special Operations Forces (ARSOF) selection course found that grit predicted retention over and above other key predictors, such as cognitive ability (Eskreis-Winkler et al., 2014). That said, results have not always found that grit predicts graduation in these programs. For example, in a study of 670 Ranger School candidates, grit did not significantly predict graduation (Benedict et al., 2022). The authors rationalized that the mean level of grit in this sample was notably high, so ceiling effects may have contributed to this nonsignificant finding. The authors also argued that Ranger School may not have represented the long-term goal pursuit that grit defines because of its shorter timeline than USMA, but this does not explain the significant findings at the summer labeled “Beast Barracks,” since the duration of these career programs are similar (two months during Ranger School versus roughly three months during Beast Barracks).

Taken together, these findings present a complex, often contradictory picture of grit’s power to predict attrition, retention, and program completion. Indeed, in some cases, grit shows to have modest power in predicting retention over other key variables (e.g., conscientiousness; Duckworth et al., 2019), but in other cases it does not (Maddi et al., 2017). Meta-analysis of the military context literature may help resolve some of the disputes between studies and help researchers better understand how grit is related to attrition, retention, and program completion. However, meta-analyses will need to consider many potential moderators within the military literature, such as service (e.g., Army, Navy), Active Duty status, school program (e.g., United States Military Academy or Reserve Officer Training Corps), and whether an individual enlisted or joined as a commissioned officer. The examination of these military specific moderators, along with other general moderators, may be crucial, as moderators could be responsible for producing some of the contradictory findings between studies. One such general moderator that may impact the efficacy of grit is time. Grit is thought to be perseverance towards long-term

goals, but what constitutes “long-term” is not clarified by Duckworth and colleagues (see Morell et al., 2021). Indeed, it is possible that grit is more salient when pursuing more proximal goals in the military context (e.g., first-year retention and 24-day ARSOF course), whereas hardiness is more salient when pursuing more distal goals, as it refers to generalized perseverance. This does not explain why some authors have found that grit predicted Cadet retention in the four-year USMA program (e.g., Duckworth et al., 2019; Kelly et al., 2014), however. That said, these authors have argued that the first year at USMA is very strenuous in comparison to the other years, so perhaps it is grit that helps these individuals overcome the most strenuous hurdle of the program, but it is the more general variable of hardiness that keeps cadets persisting throughout the entire program.

Summary of Predictive Validity Findings

To summarize the current research on the predictive validity of grit, research has shown that grit has value in predicting performance and attrition, retention, and program completion, although effects are oftentimes small. Indeed, although some findings show that overall grit contributed little unique variance in the prediction of outcomes of interest, small effects can still be valuable, especially in the case of personality measures of constructs like grit, which are generally less costly and time-consuming than some other selection tools (e.g., structured interview). However, these small effects need to be considered in conjunction with additional variables that may already be in a prediction model, such as conscientiousness, whereby grit may contribute even less incremental validity (Credé et al., 2017).

Current research findings are limited by a lack of data outside of the academic sphere as well as conflicting findings. Further research that investigates workplace outcomes of grit, as well as potential moderators of grit (e.g., time) could help better understand the predictive validity of grit. Additionally, meta-analysis could contribute to understanding the role of grit in the work environment, if enough studies were available. Finally, it is important to note that there were many studies that examined the relationship between grit and workplace outcomes but could not be explored further in this research note because they were cross-sectional, and thus not predictive in nature (e.g., Dugan et al., 2019; Kim et al., 2019). For example, in a study 147 salespeople, grit was positively related to job performance, job satisfaction, and job embeddedness (Dugan et al., 2019). Future research on grit should focus on longitudinal or multiphasic analyses to better contribute to understanding the predictive validity of grit.

Applicability of Grit to the U.S. Military

Grit has become of increasing interest to military services, likely due to the proposed relationships between the construct and outcomes of interest to the military, namely performance and retention (Duckworth et al., 2019; Robertson-Kraft & Duckworth, 2014). Retention is of particular interest to the military services because of their internal ascensions systems. That is, although other organizations can hire leaders for advanced roles, military services must train leaders from entry-level to advanced leadership roles. Because each leader must be advanced through the promotional system, it takes considerable effort, time, and monetary resources to ensure that the necessary number of servicemembers have advanced to fill the required senior leadership roles. It is thus advantageous to the military services to select the best candidates who likely to succeed and be retained in the military. In this section, I will discuss of the implications

of grit research to the U.S. Military, with emphasis on military samples when they were available.

Potential Benefits of Grit to Military Services

Grit has been proposed to be related to many outcomes that are advantageous to the military. In a predictive validation study of grit, 677 Army Special Operations Forces (ARSOF) candidates were evaluated to determine if grit predicted successful course completion (Eskreis-Winkler et al., 2014). Analyses controlling for general intelligence, physical fitness, age, and years of schooling showed that individuals who were one standard deviation higher in grit had higher odds of completing the ARSOF course. Furthermore, in a study of 758 candidates from the Special Forces Assessment and Selection (SFAS) process, Beal (2010) found that grit predicted selection for Special Forces training over and above physical fitness, performance event measures, and IQ scores, but incremental validity was small. Thus, Beal (2010) recommended that grit be used as a supplemental measure within selection procedures. Relatedly, Farina and colleagues (2019) conducted a study of 800 Special Forces Assessment and Selection Course participants and found that intelligence indicators explained a larger proportion of variance than grit in predicting SFAS selection outcome, but that grit significantly accounted for approximately 1% of variance in prediction SFAS selection outcome. Although 1% of variance is a small proportion, it may have practical significance to the military services because grit measures are not very costly to administer or score. That is, because grit is a Likert-style measure that can be easily added to existing personality measures and scored using simple means, it is possible that the minor cost would be worth the additional 1% of predictive power. However, as many other Likert-style measures, grit can also be easily faked (Butz et al., 2019; Gerhards & Gravert, 2015). That is, potential applicants can intentionally and falsely inflate their grit score in order to appear to be a better candidate. Although advances in testing technology to mitigate faking exist and could be utilized in grit questionnaires (e.g., force choice format; Cao & Drasgow, 2019), other researchers have proposed a grit effort task in place of a questionnaire (Gerhards & Gravert, 2015), which would likely be considerably more costly than a questionnaire. Future research is needed to explore the cost and benefit of grit to the military services and the methods of examining this construct.

Interestingly, grit research has also expanded outside of performance and attrition to examine additional military outcomes, including injury, moral competence, and mental health. In a multiphasic study of 2,275 U.S. Army trainees, individuals higher in grit exhibited a 20 to 30 percent lower odds of self-reported musculoskeletal training injuries (Heaton et al., 2022). When divided into dimensions, individuals who reported higher levels of dimension-level grit had lower odds of lower extremity and back injuries during training, and the perseverance of effort dimension showed lower odds of experiencing any injury in comparison to the consistency of interest dimension. Training injuries are of particular interest to the military services because these injuries may lead an otherwise committed and quality servicemember to leave or be medically discharged from the military.

Virtual reality tools have also been utilized in US military university samples to model the impact of grit on moral competence in combat-like environments (Georgoulas-Sherry & Hernandez, 2022). Results revealed that grit exhibited a statistically significant relationship with moral competence that suggested that individuals who are higher in grit tend to exhibit higher

moral competence. This is important to military populations because it suggests that grit may serve as a resource that individuals can harness to make morally competent decisions even in challenging environments (Georgoulas-Sherry & Hernandez, 2022).

Furthermore, in a study of 1,350 male Marine recruits, grit was also negatively associated with depression symptoms ($r = -.476, p < .01$), such that individuals higher in grit exhibited fewer depression symptoms (Lovering et al., 2015). This suggests that grit could serve as a protective factor against depression. That said, these results only present correlational findings so additional research is needed to determine grit's ability to lessen the symptoms of mental illness. Grit serving as a protective factor has been examined in Veteran samples as well, with results indicating that grit was significantly negatively correlated with history of suicide attempt ($r = -.08$), homelessness ($r = -.12$), and arrest ($r = -.06$). This suggests that individuals higher in grit tend to exhibit less suicide attempts, homelessness, and arrests (Edwards et al., 2022). Taken together, these findings suggest that grit may present benefits to the military both during and after service, although more research is needed to further clarify these relationships and examine if assessments already utilized by the military capture grit. That is, it remains unclear if grit will provide incremental validity over and above current military assessments.

Grit also presents a potential benefit to the military services due to its potential for developmental intervention. Indeed, Loftus and colleagues (2020) argued that grit can be developed and improved, although the baseline of grit is still important due to the difficulty in teaching it. Although grit is often modeled as a personality variable, which is thought to be relatively static, resilience is often modeled similarly, and yet resilience training exists and has been shown to be relatively effective. Indeed, in a sample of Soldiers who participated in a postdeployment resilience training, several health outcomes (e.g., physical health symptoms) were improved 6 months after the training (Foran et al., 2012). That said, very little scientific research about training grit exists. An exception is a study on 24 professional soccer players, with a self-selected control group of 5 and an experimental group of 19 (Rhodes et al., 2018). This study utilized functional imagery training (FIT), which combines motivational interviewing and goal-oriented mental imagery with the objective of increasing intrinsic motivation towards a specific goal (e.g., weight loss). Although the research found that grit was improved by the FIT, the study should not be generalized because of its small sample and self-selected control group. Additional support of the malleability of grit lies in researchers' suggestions that it could be experimentally manipulated (e.g., Hernandez et al., 2020; Kalia et al., 2018), although research carrying out this recommendation still remains slim (an exception is Chen & Caza, 2018). Thus, theory suggests that the potential for training grit offers an opportunity for the Army to select for individuals higher in grit while simultaneously training individuals who are lower in grit. However, empirical findings are few and far between and an untested theory is a costly venture for the military services to invest in. Therefore, it may be more advantageous for military services to wait for additional research to determine if grit can *actually* be trained to produce long-term benefits or invest in other types of better-tested trainings that may produce similarly advantageous outcomes (e.g., resilience training).

Research on grit in military samples has also motivated researchers to investigate if grit is related to military service. In a sample of U.S. college students, Wilson and colleagues (2021) found that military service was positively associated with grit. However, this research is cross-sectional, so it remains unclear if individuals higher in grit are drawn to the military or military

service increases an individual's grit. Grit has been modeled as both a personality variable and a resource that can be improved with training. It is therefore possible that both options are true. That said, longitudinal research is needed to further explore this relationship and its potentially cyclical nature.

Further military research has combined grit with other related constructs to form new variables that may be practically useful to military services. For example, the U.S. Army utilized focus groups and interviews to create items that largely overlapped grit, hardiness, initiative, and will into two measures called initiative and perseverance (Aude et al., 2018). This combination of variables is not altogether surprising because the grit construct consists of two dimensions, consistency of interest and perseverance of effort. The perseverance of effort dimension fits within the perseverance measure, and it is this dimension that appears key to Army interests. Future research about these new composite variables should explore predictor-outcome relationships to explore if these measures help streamline the selection process by creating shorter, more effective predictors.

Potential Downsides of Grit to Military Services

In spite of the positive findings related to grit in servicemember samples, not all research has produced significant outcomes. For example, a study of 220 ROTC cadets at three shared training sites found that the Short Grit Scale exhibited a nonsignificant, negligible relationship with performance ($r = .04$; Gilson et al., 2017). Interestingly, the authors suggested that grit may be more impactful when individuals have more autonomy and need more sustained effort, but this has not been directly tested. This theory of autonomy interacting with grit is of heightened interest to military samples because positions offer various levels of autonomy to a variety of different ranks. That is, Gilson and colleagues' research might suggest that grit may differentially predict outcomes in various ranks. Furthermore, since the research was conducted on ROTC cadets, who typically have less autonomy than commissioned officers, it is possible that grit may be less important for predicting early career performance but may have more of an impact on later career performance. That said, this rationale is contradictory to research that showed grit was a significant predictor of retention of first-year cadets, but not a significant predictor when the criterion was expanded to include all four years of the program, whereby cadets would be more senior (Maddi et al., 2012; Maddi et al., 2017). Future research needs to further investigate the relationship between grit and performance at various stages of one's career.

International research on grit in military samples also revealed that grit was not significantly related to attrition of recruits from the Royal Netherlands Marine Corps training. Indeed, odds ratios revealed attrition rates of 1.01 for consistency of interest and 1.07 for perseverance of effort, both nonsignificant in the sample of 270 recruits (Dijkema et al., 2022). Although it is possible that cross-cultural differences may account for U.S. and Dutch grit-attrition relationships, it is likely that military training in both countries will consist of some similar practices and expectations. Therefore, these nonsignificant findings should be considered so it is better understood that grit does not always have significant relationships with outcomes of interest.

Researchers have also gone beyond presenting nonsignificant findings to suggest that there may even be negative effects of grit, although the literature in this area is still developing (see Datu, 2021 for additional review). Namely, researchers have suggested that grit can become maladaptive when individuals continuously invest effort even when a situation is not possible to overcome. Although this line of research mainly focuses on the perseverance of effort dimension of grit, it is limited due to the very specific focuses in current research. For example, a study examining musician students in Poland found that students who were more likely to become addicted to over-practicing were also more likely to develop maladaptive grit via perseverance (Czerwinski et al., 2022). In this case, developing maladaptive grit (modeled as maladaptive perseverance) was unlikely, except for students with a disposition to addiction. That said, two experimental studies on adult samples found that individuals high in grit continued to work on a task, sinking further efforts into the task even when they were failing (Lucas et al., 2015). These individuals also completed fewer problems in timed rounds than those lower in grit because they were persistent to solve unsolvable problems. Finally, a time-lagged study of 293 U.S. university professors directly explored the potential relationship between grit and work goal process and found an inverted u-shaped curve via polynomial regression analysis (Khan et al., 2021). Grit and work goal process had a curvilinear relationship, such that grit and work goal progress generally increased together when grit was lower, but when grit was higher, work goal progress actually decreased. This is counter to the assumptions from earlier research (e.g., Robertson-Kraft & Duckworth, 2014), which would suggest that higher grit should be associated with more positive outcomes. Although none of these three studies were conducted on military samples, the potential for a dark side of grit does encourage that some caution should be applied before conceptualizing grit as universally positive. Furthermore, the findings of the latter two studies may suggest an imbalance between effort and accomplishment. That is, individuals who are higher in grit may be able to invest more energy and effort into their goals, but their increased effort may not always be associated with increasing accomplishments, or there may be diminishing returns from increasing efforts. In a military situation, investing effort even when a situation is unwinnable may have dire consequences. Future research needs to further explore the potential costs of maladaptive grit and high grit specifically in military contexts.

Conclusion

Research exploring the nomological network of grit has generally found that the construct correlates with but is empirically distinct from several key variables of interest, including cognitive ability, resilience, hardiness, and four of the five factors from the Five-Factor Model of personality (i.e., Openness to experience, agreeableness, extraversion, and neuroticism, but not conscientiousness). Conscientiousness, however, exhibits such a robust correlation with grit that researchers question the variable's empirical distinction. That is, the considerable overlap between grit and conscientiousness, including findings of non-distinct factor structures, suggest that grit may be a component of conscientiousness. This view is supported by Duckworth's claim that grit is "a member of the conscientiousness family" (Kamenetz, 2016). That said, the overlap between grit and conscientiousness does not explain why several studies have found that grit still meaningfully contributes to the prediction of outcomes over and above conscientiousness (e.g., Credé et al., 2017). It is possible that perhaps some measures of conscientiousness may be construct deficient, and thus, including a measure of grit may help better predict constructs of interest.

In terms of predictive validity evidence, grit has been shown to relate to indicators of academic performance relatively well, and also has been shown to relate to workplace outcomes such as retention in USMA Cadets (Duckworth et al., 2019; Kelly et al., 2014). Grit also has the potential to contribute to military services but should be viewed with caution due to a current lack of generalizable studies and conflicting findings in research. Indeed, it is possible that grit may be a useful predictor of continuance, but less is known about the potential for maladaptive grit. In addition, there is currently a lack of studies that examine grit in the workplace environment and do so in a longitudinal or multiphasic manner. Thus, further research is needed to better understand the predictive validity of grit, especially concerning workplace outcomes. However, what remains clear is that although Duckworth and colleagues (2007; 2009) have identified a variable that may be useful, especially in a military context, the predictive power of grit often falls short of construct developers' claims (see Scelfo, 2016).

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*An asterisk is utilized for articles in this review that address grit.

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Appendix

Summary of Variables Connected to Grit

Variable	Definition	Theoretical Overlap	Empirical Findings
Cognitive Ability	The combination of a variety of cognitive skills that generally capture one's ability to learn. It generally consists of quantitative, verbal, and technical aptitude (Schmidt, 2012).	Cognitive ability is thought to be related to grit because the original intention of grit was to explain why those who were less intelligent sometimes perform better than those who were more intelligent (Duckworth et al., 2007).	Research has found that cognitive ability and grit are generally distinct (Credé et al., 2017).
Conscientiousness	A personality variable that generally consists of four facets, 1) self-control, 2) industriousness, 3) responsibility, and 4) orderliness (Eisenberg et al., 2012). Roberts and colleagues (2009; c.f. Eisenberg et al., 2012) also included a propensity to follow rules within their definition.	Grit has been proposed to overlap with conscientiousness because of the shared focus on striving toward long-term goals (Credé et al., 2017). The facets of conscientiousness (e.g., achievement striving, self-discipline) are of particular focus within the literature.	Research has shown that conscientiousness and grit exhibit robust correlations, but some authors have argued that this is due to the achievement striving facet of conscientiousness (Duckworth & Quinn, 2009). It is currently unclear if achievement striving and grit are empirically distinct.
Openness to Experience	A personality variable that generally refers to an individual's desire for novelty and change (McCrae & Costa, 2008).	The theoretical overlap between grit and openness has not been readily explored. Studies often focus on correlational findings.	Correlations are generally small. Coupled with the lack of theoretical logic, research suggests these variables are empirically distinct.
Extraversion	A personality variable describing the range of the social stimulation an individual prefers, from none to a lot (Costa et al., 1991).	The theoretical overlap between grit and extraversion has not been readily explored. Studies often focus on correlational findings.	Correlates between grit and agreeableness are moderate. Coupled with the lack of theoretical logic, research suggests these variables are empirically distinct.
Agreeableness	A personality variable describing the range of interpersonal behavior, from	The theoretical overlap between grit and agreeableness has not been	Correlates between grit and agreeableness are moderate. Coupled with the lack of theoretical logic,

	antagonistic to compassionate and trusting (Costa et al., 1991).	readily explored. Studies often focus on correlational findings.	research suggests these variables are empirically distinct.
Neuroticism	A personality variable describing a general propensity towards negative affective states, such as distress (McCrae & Costa, 2008).	Researchers have proposed that the negative affective states common in those high in neuroticism would make individuals more likely to lose interest and fail to continue activities (Credé et al., 2017).	Grit and neuroticism generally exhibit robust negative correlations, particularly when the perseverance of effort dimension is utilized (Credé et al., 2017; Duckworth & Quinn, 2009). These variables overlap but are proposed to be distinct.
Resilience	A personality trait, outcome, or a process, that generally refers to overcoming adversity via adaptation (Ledford et al., 2021; Robertson-Kraft & Duckworth, 2014)	Resilience includes persistence, but it does not specify a goal or interest (Robertson-Kraft & Duckworth, 2014). Researchers have suggested grit and resilience are part of a higher-order perseverance construct (Ledford et al., 2021).	Grit and resilience are strongly correlated, but multiple studies have revealed that they are empirically distinct (Georgoulas-Sherry & Kelly, 2019; Ledford et al., 2021).
Hardiness	A personality trait referring to an individual's mental toughness and endurance (Maddi et al., 2012).	Hardiness is thought to differ from grit because it focuses on a more general state of endurance, instead of endurance towards a specific goal. Researchers have suggested grit and hardiness are part of a higher-order perseverance construct (Ledford et al., 2021).	Grit and hardiness significantly and strongly correlate, but CFA revealed they are different (Ledford et al., 2021) and research has shown that hardiness and grit differentially predict outcomes (e.g., performance; Maddi et al., 2012).
Work Ethic	An individual difference variable referring to one's overall work values and orientation towards hard work and completing tasks. Some key dimensions of work ethic include self-reliance, hard work, and delay of gratification (Meriac et al., 2015; Miller et al., 2002)	Researchers have proposed that work ethic and grit overlap because they both focus on the relationship between effort and performance (Meriac et al., 2015).	Grit and work ethic are significantly correlated with each other, but they differentially predict various outcomes (Meriac et al., 2015).

Intrinsic Motivation	Eagerness towards seeking new challenges, experiences, and learning opportunities (Ryan & Deci, 2000)	Researchers have proposed that intrinsic motivation is a requirement of grit (Alameida, 2016), but the variables are thought to differ because intrinsic motivation contains the affective requirement of enthusiasm, whereas grit does not definitionally or operationally contain zest towards one's goals (Miao et al., 2007 as cited by Dugan et al., 2019).	Intrinsic motivation correlated more strongly with the consistency of interest dimension of grit in comparison to perseverance of effort, but correlations are generally small (Lozano-Jimenez et al., 2021).
Persistence	An individual difference variable that describes one's determination and refusal to let obstacles stop them from achieving their goals (Welker & Carre, 2014).	Persistence and the perseverance of effort dimension of grit have similar definitions and may be both targeting an individual's general propensity to persist through difficult situations.	EFA showed that persistence overlapped with the perseverance of effort dimension of grit (Christensen & Knezek, 2014). However, this literature is complicated by a lack of studies in working samples and proxy measures of persistence (e.g., academic performance) (Bazelais et al., 2016).