GRIT AS A PREDICTOR OF ILLNESS-RELATED DISTRESS AND PSYCHOSOCIAL OUTCOMES IN COLLEGE STUDENTS WITH A CHRONIC ILLNESS: A PATH ANALYSIS

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Abstract: Objective: Adolescents and young adults (AYAs) with chronic illness are at increased risk for a host of negative psychosocial outcomes, including depression and anxiety. Although studies have shown that illness appraisals (e.g., illness intrusiveness [II], illness uncertainty [IU]) demonstrate consistent associations with such outcomes, fewer studies have examined protective variables. The present study evaluated grit (i.e., perseverance and passion for long-term goals), a novel construct in pediatric psychology, as a protective factor against the untoward effects of illness intrusiveness and uncertainty on psychosocial outcomes in AYAs with chronic illness. Methods: College students with a chronic illness (N=119) completed questionnaires online, including measures of grit, II, IU, depression, anxiety, and emotional well-being (EWB). Results: The overall path analysis demonstrated that increased grit is directly related to decreased depressive/anxious symptoms and increased EWB. Further, analyses indicated that the positive impact of grit on psychosocial outcomes is mediated by illness appraisals (II, IU). Conclusions: This study identified grit as a source of resilience among AYAs with chronic illness. The study expands on the integration of positive psychology and pediatric psychology, by introducing a novel construct to the AYA chronic illness literature, and justifies the need for greater research on the protective role of grit in chronic illness populations.

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CHAPTER I

INTRODUCTION

The field of positive psychology provides a framework for understanding human flourishing that goes beyond the reduction of psychological distress and instead seeks to understand the positive attributes that contribute to optimal functioning. This area of investigation is defined by the study of positive experiences and individual traits, and the mechanisms that facilitate their development (Duckworth, Steen, & Seligman, 2005). Positive psychology aims to evaluate the factors that lead to human flourishing and relies on the assumption that human beings not only desire a life devoid of negative experiences, thoughts, and emotions, but also seek a life filled with purpose, success, and positivity.

Parallel to positive psychology is the field of *positive health*. Positive health is a subdiscipline of inquiry proposed by Seligman (2008) that focuses on biological, subjective, and functional measures of health that emphasize and integrate well-being across the realms of physical, physiological, and psychological functioning. Positive health seeks to determine relationships between mental and physical health in order to identify factors of resiliency, as well as factors that stimulate thriving. To a large extent, this body of literature is focused on the active promotion of healthy behaviors, such as increasing exercise and improving nutrition (Cohen & Pressman, 2006; Diener & Chan, 2011; Howell, Kern, & Lyubomirsky, 2007; Rasmussen, Scheier, & Greenhouse, 2009).

Positive health research has also been directed toward enhancing the lives of those with a chronic illness. In the past decade, there has been a substantial increase in studies examining how

the experience of living with a chronic illness can be altered to improve the psychological functioning of patients. This is of particular concern within populations where physiological functioning may not be completely within a patient's control, such as among individuals with cancer (Moola, Faulkner, White, & Kirsh, 2014; Sansom-Daly, Peate, Wakefield, Bryant, & Cohn, 2012; Willard, Long, & Phipps, 2016). Thus, the field of positive health merges the positive psychology ideology of promoting psychological strength and flourishing, with the overall goal of integrating both psychology and medicine to treat and cure human afflictions.

Theoretical Model

Aspinwall and Pengchit (2013) put forth a succinct model for evaluating how positive psychology constructs may impact health outcomes within the positive health framework. Namely, they propose that the effect of positive phenomena (i.e., concepts based on positive psychology principles) on health is mediated by five pathways, including biological functioning, cognitive appraisals and emotions, coping styles, social development, and health behaviors (See Figure 1). It follows that this model could be applied to predict both physical and psychological well-being within the context of chronic health conditions. Indeed, pediatric and health psychologists have already initiated investigations in this realm by connecting variables such as hope and mindfulness with positive outcomes (Grossman, Niemann, Schmidt, & Walach, 2004; Hullmann, Fedele, Molzon, Mayes, & Mullins, 2014). For instance, predating Seligman's (2008) proposal, health psychologists were already assessing optimism and posttraumatic growth in illness populations, including women with breast cancer and parents of children with cancer (see Aspinwall & Tedeschi, 2010). The literature demonstrates that such positive psychological traits can reliably improve both physical and psychological outcomes (Allison, Guichard, Fung, & Gilain, 2003; Berg, Rapoff, Snyder, & Belmont, 2007; Carver & Antoni, 2004; Mannix, Feldman, & Moody, 2009). However, the extant literature exploring the various pathways proposed by Aspinwall and Pengchit (2013) is very limited. Therefore, further investigation is paramount to fully understand the mechanisms by which positive outcomes are realized.

Grit

Although the field of positive psychology has witnessed rapid growth, the construct of grit is a potentially overlooked construct which has not been explored within the chronic illness context. Grit is an intrapersonal characteristic defined by "passion and perseverance for long-term goals" (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087). It has been shown to be predictive of success in academic endeavors, workplace retention, and personal pursuits (Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014). Grit is also positively related to psychological well-being and protects against distressing symptomology, such as suicidal ideation (Pennings, Law, Green, & Anestis, 2015; Vainio & Daukantaitė, 2015). To date, the only studies within the realm of positive health that have examined the relationship between grit and health outcomes linked grit with greater health-related quality of life (Sharkey et al., 2017), lower Body Mass Index (Thomas, Seiden, Koffarnus, Bickel, & Wing, 2015), and improved rates of exercise behavior in generally healthy populations (Reed, Pritschet, & Cutton, 2013). Thus, there is a need to further explore the potential protective role of grit among those individuals with a chronic illness.

It is clear that the daily management of a chronic illness requires a certain level of perseverance, as many reports show high rates of non-adherence and difficulties following through with medical regimens across a variety of pediatric conditions, and ostensibly a certain level of grit (Drotar, 2000; Lemanek, Kamps, & Chung, 2001; Rapoff, 1999). However, grit encompasses much more than a simple drive to transcend obstacles. The concept contains a necessary component of what has been referred to as passion, or a staunch interest in succeeding, regardless of the goal at hand (Duckworth, Peterson, Matthews, & Kelly, 2007). In the context of chronic illness, success could be interpreted as the ability to manage a chronic illness and to thrive in the face of a burdensome life-threatening or chronic condition.

College Students with Chronic Illness

Due to the particular vulnerabilities of young adults with chronic illness, an examination of grit appears particularly important for this population. In addition to the numerous stressors that many encounter during the transition to adulthood, including financial responsibilities, daily tasks, and increased academic loads in college, young adults with chronic illness must also absorb responsibility for their healthcare management (Brougham, Zail, Mendoza, & Miller, 2009; Compas, Wagner, Slavin, & Vannatta, 1986; Dusselier, Dunn, Wang, Shelley II, & Whalen, 2005; Pai & Schwartz, 2011; Tuchman, Slap, & Britto, 2008). These individuals experience elevated psychosocial and health risks, as they face the demands of navigating an adult healthcare system, managing medications, and adhering to treatment regimens (Pai & Schwartz, 2011; Tuchman et al., 2008). In fact, research has shown that college students with chronic illnesses in particular are at risk for a number of deleterious psychological and social effects which are associated with the management of their condition (Barakat & Wodka, 2006; Fedele et al., 2009; Herts, Wallis, & Maslow, 2014). Further, college students with chronic illness are at risk for anxiety and depression, above and beyond their healthy peers, rendering it important to investigate potential protective factors that can promote well-being in this population (Herts et al., 2014; Tuchman et al., 2008; Wodka & Barakat, 2007). Given these challenges, young adults, specifically college students, with chronic illness are the ideal population to investigate the positive health construct of grit in the realm of chronic illness. Therefore, the present study sought to investigate the role of grit as a source of resilience and a protective factor against negative outcomes in a population of young adults with a chronic illness. Furthermore, this study sought to identify potential mediating factors, which could align with Aspinwall and Pengchit's (2013) model, and add to the understanding of how grit relates to adjustment outcomes in this population.

Although the extant literature on predictors of distress or well-being among college students with chronic illness is limited, at least two clear predictors of negative psychological

adjustment have been determined in this population. These constructs include the cognitive appraisal mechanisms of illness uncertainty and illness intrusiveness. Illness uncertainty has been defined as a cognitive experience within the circumstances of illness in which outcomes are unpredictable, and the illness is characterized by ambiguity (Pai et al., 2006). Extensive research has shown consistent associations between illness uncertainty and negative adjustment outcomes, including depression and anxiety within adolescent and young adult chronic illness populations (Carpentier, Mullins, & Van Pelt, 2007; Hoff, Mullins, Chaney, Hartman, & Domek, 2002; Mullins, Chaney, Pace, & Hartman, 1997). Illness intrusiveness, which has also been implicated as a risk factor for young adults with chronic illness, is a cognitive appraisal mechanism that reflects the extent to which illness factors impede the ability to participate in daily valued activities (Devins, 2010; Mullins, Cote, Fuemmeler, Jean, Beatty, & Paul, 2001). Illness intrusiveness is associated with increased depressive and anxious symptoms, as well as reduced health-related quality of life (Carpentier et al., 2007; Mullins, Cote, Fuemmeler, Jean, Beatty, & Paul, 2001). Although these predictors have been identified as targets for psychosocial interventions in order to reduce risk, it is also important to ascertain protective factors, such as grit, that could be targeted to bolster resilience.

Study Aims

Thus, the current study aimed to fill the gap in understanding grit as it relates to physical and mental health by evaluating grit as a potential resilience factor against depression and anxiety and as a contributor to psychological well-being among young adults with chronic illness. In addition, the current study sought to examine the possible mediating role of illness uncertainty and illness intrusiveness in this relationship. The following aims are the focus of this initial examination of grit in a chronic illness population.

1) To assess the association between grit and psychological distress and well-being in young adults with chronic illness. It is predicted that, after controlling for demographic variables, higher grit, indicating greater perseverance, will be associated with lower

depressive and anxious symptoms, and greater (or higher levels of) emotional well-being. Since previous research has shown that grit is related to depression and well-being, it is hypothesized that this relationship will hold true within a population of college students with chronic illnesses (Pennings et al., 2015; Vainio & Daukantaitė, 2015).

2) To assess the relationship between grit and cognitive appraisals of illness, including illness intrusiveness and illness uncertainty. It is predicted that higher levels of grit will predict lower levels of both illness intrusiveness and illness uncertainty.
3) To evaluate the main and mediating effects of cognitive appraisals on grit and psychological distress and well-being. It is hypothesized that grit will have direct and indirect effects through illness uncertainty and illness intrusiveness on symptoms of depression and anxiety, as well as emotional well-being.

CHAPTER II

REVIEW OF THE LITERATURE

The History of Positive Psychology

Contemporary positive psychology is defined as "the scientific study of positive experiences and positive individual traits, and the institutions that facilitate their development" (Duckworth, Steen, & Seligman, 2005, p. 630). However, the study of positive phenomena and human flourishing predates this formal definition by nearly a century and is often considered to have originated in America with William James (Taylor, 1996). His theoretical orientation, identified as radical empiricism, contained his argument that the subjective experiences of the individual must be studied in addition to objective measures, if one seeks to examine human thriving (Rathunde, 2001). James questioned why some individuals could function optimally, while others were unable to reach their full potential, which earned him a principal role in the development of a field that seeks to determine and improve those characteristics that allow individuals to flourish.

The actual term "positive psychology" first appeared in Abraham Maslow's book, entitled Motivation and Personality (1954). Maslow reflected on the state of psychological inquiry and concluded that researchers focused nearly exclusively on the negative side of experience, which led to learning a great deal about human suffering, failure, and frailties. However, he also noted that the field was lacking a thorough understanding of the positive

aspects of human characteristics and experience, a sentiment later echoed by Martin Seligman (1998) in his presidential address to the American Psychological Association. Along with other preeminent psychologists, such as Carl Rogers, Maslow worked to break from Freud's psychoanalytic view of psychology, which concentrated on treating mental illness, and transition to a field of humanistic psychology (Linley, Joseph, Harrington, & Wood, 2006).

Humanistic psychology is a clear precursor to positive psychology, which focuses on the study of the whole person and emphasizes themes of self-actualization and attaining one's full capacity for optimal functioning (Linley et al., 2006). Rather than centering on disorders or dysfunction, humanistic psychology aimed to understand human achievement, laying the foundation for a field that synthesized the study of both pathology and flourishing, in order to examine how to capitalize on human strengths and improve the lives of all people (Linley et al., 2006).

After introducing positive psychology as the theme of his American Psychological Association (APA) presidency, Martin Seligman, in collaboration with Mihaly Csikszentmihalyi (2014) proposed three pillars of positive psychology as primary concerns for future research endeavors: positive subjective experiences, positive institutions, and positive individual traits. The pillars coincide with James' emphasis on subjective experience (Gable & Haidt, 2005) and Maslow's theory that basic human needs must be supported by thriving communities and environments (Froh, 2004). Although Seligman and Csikszentmihalyi intended to distance themselves from the "unscientific" methods of humanistic psychology and pursue a field of research based on the view that mental health is more than just the absence of illness, the connection between the two psychological perspectives has gradually become more accepted.

Positive psychology research has focused broadly on understanding constructs of well-being and thriving, as well as on the development of interventions and treatments based on the principles of positive psychology. For example, Seligman's work on well-being focused on the mechanisms that lead to both objective and subjective well-being (Schueller & Seligman, 2010).

In a sample of more than 13,000 adults, Schueller and Seligman (2010) found that individuals who seek happiness through engagement in enjoyable and engrossing activities or through finding purpose in their life tend to report higher levels of subjective well-being. Additionally, these individuals demonstrate greater objective well-being, as measured by education and occupational achievement. Thus, their study bolstered the understanding of human flourishing by suggesting that the key to well-being is a focus on engagement and meaning in life, which includes a focus on long-term goals and ultimate fulfillment.

In recent decades, positive psychology researchers endeavored to facilitate research into positive human experiences by expanding the available tools and distinguishing newly measured constructs from previously accepted ones. For instance, the PERMA-Profiler was a measure developed as an examination of Seligman's (Seligman, 2011) concept of flourishing, which is based on the five pillars of well-being, namely positive emotion, engagement, relationships, meaning, and accomplishment (Butler & Kern, 2016). Importantly, other researchers aimed to differentiate these new measures from other well-accepted concepts. Scheier and colleagues (1994) demonstrated the discriminant validity of a measure of optimism by showing that optimism is significantly associated with depressive symptoms, even when controlling for the personality trait of neuroticism, as well as other characteristics that were considered to be indistinguishable from optimism.

As the literature expanded and an understanding of the function of positive traits grew, an interest in taking a positive approach to intervention began to emerge. Kabat-Zinn's (2006) Mindfulness-Based Stress Reduction (MBSR) program is a clear example of how this literature was translated into positive interventions. MBSR focuses on the innate human capacity for mindfulness and aims to improve well-being by increasing the clarity of one's experience and fostering greater awareness of and engagement in moment-to-moment experience. This process coincides with Seligman's (2010) findings of the importance of seeking meaning in life and engagement. Strengths-based Cognitive Behavioral Therapy also embodies an assumption of

positive psychology, that individuals with psychological distress seek not only the reduction of symptoms, but also an increase in positive experiences (Duckworth et al., 2005; Padesky & Mooney, 2012). This model of intervention aims to identify an individual's intrapersonal strengths, which can be utilized to facilitate resiliency by generalizing skills from one aspect of life to coping in other areas (Padesky & Mooney, 2012). Thus, the positive psychology framework enables therapists to capitalize on positive human experiences and traits to employ interventions that extend beyond the treatment of distressing symptoms and begin to cultivate a greater capacity for flourishing.

Positive Health: Applying Positive Psychology Concepts to Health Populations

Building on his assertion that the field of psychology as a whole must draw attention to the study of optimal psychological functioning, Seligman (2008) put forth the field of positive health. He suggested that, analogous to positive psychology, positive health should strive to understand the underlying characteristics and mechanisms of optimal human health. The goals of positive health, according to Seligman (2008), were to improve longevity, prognoses, and mental health, and to decrease the cost of healthcare, with an emphasis placed on the identification of positive factors that contribute to these outcomes.

One such construct that has been evaluated in this context is that of optimism. Optimism has been defined as an individual's general expectation for good outcomes (Van Allen et al., 2016). Research has shown that the trait of optimism is one such positive psychology concept that is consistently associated with longevity and lower risk of mortality (Chapman, Roberts, & Duberstein, 2011). Lower rates of optimism have also been linked to greater mortality and disease progression in a variety of populations, including those with cancer and cardiovascular disease (Chapman et al., 2011). Specifically, regardless of engagement in known behavioral risk factors for cardiovascular disease, such as smoking and poor nutrition, optimism is associated with greater cardiovascular health and protection against disease (Boehm & Kubzansky, 2012). Positive psychological well-being, which is characterized by traits such as optimism and positive

affect, or the experience of pleasurable moods and engagement, has also shown stable connections with Seligman's (2008) positive health outcomes. A meta-analytic review of the literature found that positive psychological well-being is associated with reduced mortality in healthy and disease populations alike, and that the findings are consistent across well-controlled studies (Chida & Steptoe, 2008). Another review demonstrated that optimism and positive affect also contribute to short-term outcomes of symptom and pain reduction, and that these effects are typically stronger than the effects of negative affect on physical health (Cohen & Pressman, 2006).

Importantly, longitudinal studies have found a link between the core positive psychology concept of subjective well-being and longevity in a large sample of healthy individuals, whereas negative emotions had no significant effects on mortality (Diener & Chan, 2011; Xu & Roberts, 2010). Other longitudinal investigations have also linked positive emotions to reduced mortality or slower disease progression in populations with chronic illness, such as diabetes and HIV (Ickovics et al., 2006; Moskowitz, Epel, & Acree, 2008). Similar findings have been reported in pediatric chronic illness populations as well, with factors such as hope and optimism predicting treatment adherence and positive psychological adjustment in asthma, cancer and sickle cell disease (Berg, Rapoff, Snyder, & Belmont, 2007; Mannix, Feldman, & Moody, 2009; Pence, Valrie, Gil, Redding-Lallinger, & Daeschner, 2007).

It follows that the second aim of Seligman's positive health proposal (2008) is to translate these positive psychological factors, now known to be associated with positive outcomes, into targets for intervention. Thus, researchers began to apply positive psychology-based intervention techniques to chronic illness populations in order to alleviate adjustment difficulties following a diagnosis or treat medical regimen adherence problems. For instance, mindfulness-based stress reduction programs have been designed to reduce distress in adult patients diagnosed with cancer. Randomized controlled trials of the Mindfulness-Based Cancer Recovery program have demonstrated that breast cancer patients in the program experienced a greater reduction in stress

symptoms than those patients in control conditions (Carlson et al., 2013). Initial studies have also provided support for mindfulness-based stress reduction programs in pediatric populations, such as children with chronic pain (Jastrowski Mano et al., 2013). Additionally, interventions aimed at developing optimism have shown positive effects on emotional well-being and adjustment to a chronic illness (Last, Stam, Onland-van Nieuwenhuizen, & Grootenhuis, 2007; Lee, Robin Cohen, Edgar, Laizner, & Gagnon, 2006).

Although the field of positive health has grown substantially over the last decade, there is still a great deal to be learned. Research on a variety of positive psychology concepts within the context of health remains limited, and the adaptation of positive psychology-based interventions to address adjustment to diagnoses and the specific concerns of those with medical conditions is advancing slowly. Nevertheless, the current evidence for the positive effect of these factors and interventions suggests the need for greater and more expansive investigations into concepts that are prominent in the field of positive psychology, but have yet to be transferred into the study of chronic illness populations.

The Positive Psychology Construct of Grit

Grit, defined as perseverance and passion for long-term goals, is one of the positive psychology constructs that has not yet been explored within a chronic illness context (Duckworth, Peterson, Matthews, & Kelly, 2007). It may, however, have an important protective role. The construct of grit was developed and initially tested across several academic and professional populations and was hypothesized to be a crucial personal attribute for success, beyond the influence of intellectual abilities (Duckworth et al., 2007). Duckworth and colleagues (2007) describe the gritty individual as someone who resolutely strives to accomplish goals and remains dedicated over the course of years, regardless of the challenges that are encountered.

Grit Scale Development

Duckworth and colleagues (Duckworth, Peterson, Matthews, & Kelly, 2007) sought to develop and validate a questionnaire that adequately assessed the construct of grit, while also

distinguishing it from other noncognitive personality traits. Additionally, they aimed to create a scale that was clearly domain general in nature and predictive of success across multiple goals. They conducted a series of studies with adults to assess the internal reliability and factor loadings of 27 possible items assessing grit. This resulted in a validated 12-item grit measure with two subscales termed "perseverance of effort" and "consistency of interest" (Duckworth et al., 2007). The predictive validity of the measure was then tested in relation to educational attainment and GPA scores. Results of the validation studies aligned with the hypothesized association and suggested that those with higher grit scores had both higher educational attainment and higher GPA scores (Duckworth et al., 2007). The research also demonstrated that grit was related to, but provided incremental predictive value above, the Big Five personality trait of conscientiousness, as well as SAT scores, which were used as a proxy-measure of intelligence (Duckworth et al., 2007).

Subsequently, the authors revisited the original grit scale in the hope of identifying a shorter and more psychometrically rigorous measure. Duckworth and colleagues (2009) identified the subset of items with the highest predictive validity, which still maintained the two-factor structure, and created a new eight-item short grit scale that retained adequate internal consistency. The researchers repeated the methods of their initial validation studies and found that the short grit scale was a more efficient measure of grit that maintained predictive validity of academic and professional success, and continued to be distinguishable from related personality traits, such as conscientiousness. They also determined that grit appeared to be a relatively stable trait over time (Duckworth & Quinn, 2009). In this series of studies, an informant version of the short grit scale was also validated, indicating that friends and family could reliably assess an individual's grit score (Duckworth & Quinn, 2009). Thus, a validated brief measure of grit was developed, which includes both a perseverance of effort and a consistency of interest subscale, and has sparked further research into the nature of grit and how grit levels relate to success in different disciplines (Duckworth & Quinn, 2009).

Grit and Academic Success

Research has demonstrated associations between grit and positive academic outcomes in a variety of populations. One study found that grit, specifically the perseverance of effort subscale, was predictive of first year college GPA, even when SAT scores were included in the model (Chang, 2014). Other studies have indicated that higher grit is associated with higher GPA in non-traditional doctoral students, and at elite universities (Cross, 2014; Duckworth et al., 2007). The effect of grit has also been evaluated among diverse samples. For instance, an examination of the impact of grit on the academic success of black male students at a predominantly white university found that grit added incremental predictive validity in grades achievement, above standard predictors of academic success (Strayhorn, 2014). Grit has also been tested in relation to attainment of specific academic goals, and has been found to be reliably predictive of final rank in the national spelling bee, with grittier students going further in the competition (Duckworth et al., 2007).

Grit and Professional and Personal Success

Not only is grit related to the success of students, but it is also linked with the retention and effectiveness of their teachers. In an initial study by Robertson-Kraft and colleagues (2014), grit was evaluated among elementary, middle, and high school novice teachers in low-income communities. A number of teacher characteristics, such as college GPA and leadership ratings, along with estimated grit scores were examined. They found that grit was the only variable that could reliably predict which teachers stayed in the classroom and did not quit, as well as which teachers would be the most effective, based on student achievement scores (Robertson-Kraft & Duckworth, 2014). Another study found that grit contributed significantly to military performance among West Point cadets, and only grit predicted retention across the 4-year period of college at West Point (Kelly, Matthews, & Bartone, 2014). This study also distinguished grit from hardiness, a construct similarly related to resilience and performance in stressful situations. Both grit and hardiness separately contributed to the variance in commitment to the cadet basic

training, and only grit significantly predicted the long-term persistence across all 4 years of military training (Bartone, 2007; Kelly et al., 2014).

A foundational study in the grit literature aimed to demonstrate widespread connection between grit and retention by assessing the influence of grit across four different populations (Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014). Using both longitudinal and cross-sectional designs, the studies tested the predictive validity of grit and associations between grit and retention among soldiers, sales representatives, high school students, and married couples. Across all four studies, the researchers found that individuals who reported higher grit were more likely to stick to their commitment (i.e., completion of an army selection course, retention of a company's sales personnel, graduation from high school, and continuation of marriage) than their lower grit counterparts (Eskreis-Winkler et al., 2014). The authors described grit as a facet of conscientiousness, a broader grouping of similar traits, but reliably demonstrated that grit predicted variance in successful outcomes above and beyond conscientiousness. Thus, this study provided an extensive basis for the understanding of how grit relates to personal and professional perseverance across diverse samples of individuals.

Grit and Well-Being

The use of grit as a measure of success has expanded over time to include investigations of grit as a predictor of a variety of other outcomes, such as emotional well-being. In a study of undergraduate students, affect and grit were tested as predictors of happiness and life satisfaction (Singh & Jha, 2008). Stepwise regression analyses suggested that grit accounted for a significant amount of the variance in both life satisfaction and happiness, even when accounting for both positive and negative affect (Singh & Jha, 2008). Another study investigated the relationship between grit and well-being in samples of students and non-students (Vainio & Daukantaitė, 2015). In this investigation of nearly 600 university-aged individuals, researchers found grit to be positively related to psychological well-being, satisfaction with life, and harmony in life. The researchers also identified two significant mediators of these relationships, namely sense of

coherence and authenticity (Vainio & Daukantaitė, 2015). Although these specific mediators are beyond the scope of this review, this study importantly suggests that there may be other untapped mechanisms through which grit influences well-being.

The relationship between grit and well-being has also been explored within diverse contexts. A study in a non-Western culture demonstrated slightly different results, with a lack of correlation between the two factors of grit in their sample of Filipino high school students (Datu, Valdez, & King, 2016). Although this difference does have important, yet unexplored implications for the understanding of grit across cultures, the results still suggested that the perseverance of effort subscale was associated with flourishing and positive engagement in a unique context (Datu et al., 2016). The role of grit among general surgery residents has also been tested, in context of the frequent report of burnout, or extreme occupational distress, among this special population (Salles et al., 2014). The authors concluded that higher grit was predictive of greater psychological well-being and less burnout at a later point, indicating that the grit scale could be a useful tool for screening for those who may be at risk due to low grittiness (Salles et al., 2014). Although the literature is still in the early stages, these studies collectively provide growing evidence for a relationship between grit and psychological well-being.

Importantly, the research relating grit to physical well-being is nearly nonexistent. The only known studies of grit within the context of health and physical well-being suggests that grit is a positive predictor of moderate and high intensity exercise, whereas conscientiousness did not show significant predictive validity, and that grit relates to lower Body Mass Index (Reed, Pritschet, & Cutton, 2013; Thomas, Seiden, Koffarnus, Bckel, & Wing, 2015). This single study leaves a large gap in the understanding of how grit could possibly relate to success with the context of health and illness.

Mediators of Grit

As more is uncovered about grit's association with positive outcomes, particularly in relation to academic and professional success, research has turned toward an exploration of the

mechanisms through which grit affects outcomes, as well as ways to promote the development of grit in individuals. To date, no effective intervention to develop or promote grit has been tested, but there is some understanding of behaviors and attitudes that may be important mediators between grit and positive outcomes. As previously mentioned, one study found perspectives of sense of coherence and authenticity to significantly mediate the relationship between grit and psychological well-being (Vainio & Daukantaitė, 2015). "Deliberate practice", or engagement with activities that are inherently more effortful and less enjoyable, has also been found to mediate the relationship between grit and success (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011). This finding suggests that those who are gritty may achieve success because they possess the ability to commit to behaviors that are more effective for reaching their long-term goals, but are less rewarding in the short-term. Research on mediators between grit and psychological outcomes is lacking, however one study found that grit, along with gratitude, acted as a protective factor for suicidal ideation through its positive effect on finding meaning in life (Kleiman, Adams, Kashdan, & Riskind, 2013).

Although much is still unknown about how grit relates to positive outcomes, especially outcomes of physical and mental well-being, a theoretical model proposed by Aspinwall and Pengchit (2013) is a useful framework for organizing investigations of possible mediators. The model suggests that positive phenomena, or constructs within the positive psychology field, such as grit, influence outcomes of well-being through five pathways, including biological functioning, cognitive appraisals and emotions, coping styles, social development, and health behaviors. Examination of potential mediators that align with these categories would be valuable, as they may explain an important link between grit and success within the domain of health and well-being.

Illness Uncertainty and Illness Intrusiveness as Mediators Between Grit and Well-Being

Illness uncertainty and illness intrusiveness are two well-known risk factors for psychological distress that have come to the forefront of the literature on chronic illnesses,

particularly in research on adolescents and young adults. Both predictors correspond to the "cognitive appraisals and emotions" pathway of the Aspinwall and Pengchit (2013) model. Although precipitants of these predictors, including grit, are not yet well understood, the relationship between illness uncertainty, illness intrusiveness and adjustment to chronic illness has been extensively studied and the results across medical conditions are robust. Each of these constructs will be discussed briefly below.

Illness Uncertainty

Illness uncertainty has been defined in a variety of ways, but is best understood as a complex cognitive experience that occurs when an individual cannot determine the meaning of an illness-related event (Mishel, 1988). It includes emotions experienced when there is ambiguity within the context of an illness, including situations in which symptoms or outcomes are unpredictable, there is a lack of information regarding the condition or the treatment, or the meaning of the illness and the possible outcomes are unclear (Pai et al., 2006; Steele, Aylward, Jensen, & Wu, 2009).

This cognitive appraisal has been shown to be associated with negative adjustment outcomes, such as depressive and anxious symptoms, across a wide range of populations. Research has demonstrated links between global psychological distress and illness uncertainty in adolescents with Type 1 Diabetes and adolescents with cancer (Hoff, Mullins, Chaney, Hartman, & Domek, 2002; Neville, 1998). Parents or caregivers of children with cancer appear to also experience illness uncertainty, which negatively contributes to the parent's own traumatic experience of their child's illness (Tackett et al., 2016). Studies have also found strong relationships between illness uncertainty and negative adjustment in adult populations, such as individuals with multiple sclerosis (Mullins, Cote, Fuemmeler, Jean, Beatty, & Paul, 2001). Further, it is posited that illness uncertainty is a particularly important predictor of anxious and depressive symptomology among college students, such as those with asthma and allergies. This may be in part due to the significant changes in a student's daily routine as they transition to

college and the possibility for increased uncertainty as they become primarily responsible for managing their health during this time (Carpentier, Mullins, & Van Pelt, 2007; Mullins, Chaney, Balderson, & Hommel, 2000; Mullins, Chaney, Pace, & Hartman, 1997).

Illness Intrusiveness

A second cognitive appraisal, illness intrusiveness, is defined as the extent to which one's illness interferes with the ability to engage in valued life activities (e.g., Devins, 2010; Mullins, Cote, Fuemmeler, Jean, Beatty, & Paul, 2001). This predictor is characterized by an individual's perception of how noticeably their condition affects their involvement in every-day life and has evidenced strong relationships with adjustment outcomes across populations. Additionally, certain aspects of one's illness have been shown to consistently contribute to illness intrusiveness, including illness severity and intensity of treatment, while factors such as psychosocial intervention and medical management contribute to reductions in illness intrusiveness (Gerald M. Devins, 2010).

Similar to illness uncertainty, higher perceived illness intrusiveness relates to increased psychological distress among adults with a variety of health conditions, including multiple sclerosis, and college students with asthma (Mullins, Cote, Fuemmeler, Jean, Beatty, & Paul, 2001; Mullins et al., 2007). Importantly, having a chronic illness that impedes on daily functioning or requires assistance from others during the adolescent and young adult years can be particularly distressing, due to the disruption in self-sufficiency during this transitionary period (i.e., transition to adulthood, transition to college), in which autonomy would typically increase (Devins, 2006; Wagner et al., 2003). Devins and colleagues (1992) suggest that illness intrusiveness is also an important predictor of depressive symptoms among adults with rheumatoid arthritis, but that younger adults appear to be more susceptible to depressive symptoms as a function of the negative cognitive experience. A study of youth with juvenile rheumatic disease found that children who perceive their illness to be more intrusive also experience greater depressive symptoms, especially when their parents are experiencing

psychological distress (Wagner et al., 2003). Other populations negatively impacted by illness intrusiveness include adults diagnosed with irritable bowel syndrome and women diagnosed with breast cancer (Bloom, Stewart, Johnston, & Banks, 1998; Dancey, Hutton-Young, Moye, & Devins, 2002). Thus, the literature consistently shows that the cognitive experience of illness intrusiveness is highly related to reduced well-being across numerous conditions and age groups.

Adjustment to Chronic Illness Among College Students

As previously mentioned, adolescents and young adults with chronic illnesses are particularly at risk for negative adjustment outcomes as they transition to college. Recent literature has suggested that emerging adults are at a critical developmental period in terms of physical, neurological and social development, as well as establishment of long-term health behaviors (Arnett & Jensen, 2000; Lansing & Berg, 2014; Sawyer et al., 2012). Those individuals who transition to college will experience new academic, financial, and relational demands and strains, which are frequently distressing for all college students (Brougham, Zail, Mendoza, & Miller, 2009; Compas, Wagner, Slavin, & Vannatta, 1986; Dusselier, Dunn, Wang, Shelley, & Whalen, 2005). Additionally, moving away from home to an entirely novel environment can also increase depressive symptomology by elevating feelings of loneliness and decreased social support (Brandy, Penckofer, Solari-Twadell, & Velsor-Friedrich, 2015; Mounts, Valentiner, Anderson, & Boswell, 2006).

College students with chronic illnesses are uniquely challenged, as they must take on additional healthcare responsibilities, which could include tasks such as scheduling appointments, picking up and managing prescriptions, and monitoring their health. Furthermore, these students frequently must learn to navigate a new adult-centered healthcare system, and form new relationships with physicians as they transfer out of pediatric clinics, while simultaneously navigating their new college environment (Tuchman, Slap, & Britto, 2008). During this period, young adults also often experience a reduction in parental involvement in healthcare as they gain medical autonomy, which can have detrimental effects on healthcare management (Casillas,

Kahn, Doose, Landier, & Bhatia, 2010). The combination of these difficulties has been shown to elevate risk for anxious and depressive symptoms, reduced quality of life, and more missed school days for college students with chronic illnesses as compared to healthy peers (Carpentier et al., 2007; Herts, Wallis, & Maslow, 2014; Wodka & Barakat, 2007).

Recent research has evidenced a strong connection between cognitive appraisals, such as illness uncertainty and illness intrusiveness, and the negative adjustment outcomes experienced by college students with chronic illness (Carpentier et al., 2007; Mullins et al., 2000; Mullins et al., 1997). However, less is known about factors that may protect against poor psychological outcomes or that may influence how college-aged individuals experience their chronic illness. Consideration of Aspinwall and Pengchit's (2013) model would suggest that positive phenomena should be tested in this manner as possible resiliency factors. The literature on the positive intrapersonal characteristic of grit suggests that this construct may have a protective effect on well-being through cognitive appraisals. Therefore, an investigation of the influence of grit on depressive and anxious symptomology, as well as emotional well-being, aligns well with this theoretical model. Testing the relationship between grit and adjustment outcomes, mediated by the cognitive appraisals of illness uncertainty and illness intrusiveness, will potentially provide further evidence to support this framework. Due to the known relationships between grit and well-being in undergraduate samples of healthy youth, as well as the relationship between cognitive appraisals and symptomology in young adults with chronic illness, an initial investigation of this relationship among college students with chronic illnesses is warranted.

Summary

Positive psychology aims to study optimal human functioning, which provides a valuable framework for investigating human resilience in the face of difficulties (Duckworth et al., 2005). The complementary field of positive health directs the focus toward understanding and developing positive factors that contribute to well-being and resiliency within the context of health behaviors and illness (Seligman, 2008). It has been proposed that positive factors may

influence mental and physical health outcomes through a set of interrelated pathways, including cognitive appraisals (Aspinwall & Pengchit, 2013). The intrapersonal characteristic of grit, defined as perseverance and passion for long-term goals, may be one such positive factor that affects psychological adjustment and emotional health (Duckworth et al., 2007). Although the literature shows that grit is highly predictive of psychological well-being and protects against distress, it has not yet been considered within the positive health context among chronic illness populations (Pennings, Law, Green, & Anestis, 2015; Vainio & Daukantaitė, 2015). Consistent with Aspinwall and Pengchit's (2013) model, the cognitive variables of illness uncertainty and illness intrusiveness may play a role in mediating the relationship between grit and adjustment outcomes within chronic illness. Research has shown that both illness uncertainty and illness intrusiveness are risk factors for poor psychological adjustment among individuals with chronic illness, but research on the factors that protect against these appraisals and negative outcomes is limited (Gerald M. Devins, 2010; Hoff et al., 2002; Mullins et al., 1997; Wagner et al., 2003). In particular, there is robust literature suggesting that college students with chronic illness are at a unique risk for negative adjustment outcomes and the negative experiences of uncertainty and intrusiveness (Carpentier et al., 2007; Mullins, Cote, Fuemmeler, Jean, Beatty, & Paul, 2001). Thus, the proposed study aims to evaluate grit as a protective factor against the untoward effects of illness intrusiveness and illness uncertainty on psychological adjustment outcomes among young adults with chronic illness.

CHAPTER III

METHODOLOGY

Participants and Procedures

One hundred and nineteen college students (Mage = 21.13 years, SD = 5.45) with a self-reported chronic illness were recruited from a large Midwestern university via an online survey system. Students consented to the study and filled out all questionnaires online. All students who completed questionnaires were compensated with course credit, which is a requirement of many undergraduate courses. The study was approved by the Institutional Review Board and all procedures adhered to the American Psychological Association's ethical guidelines.

Measures

Demographic Characteristics

Demographic information, including age, sex, ethnicity, education level, and medical condition was collected. Due to sample sizes and or the purpose of statistical analyses, ethnicity was collapsed into a dichotomized variable (i.e., white and non-white) and education was collapsed into a dichotomized variable (i.e., underclassmen, which refers to freshmen and sophomores, and upperclassmen, which refers to juniors and seniors), as has been done in similar studies (Sharkey et al., 2017).

Short Grit Scale

The Short Grit Scale is an 8-item self-report Likert scale questionnaire that measures an individual's ability to persevere and sustain passion for long-term goals (Duckworth & Quinn, 2009). The scale includes items such as "I finish whatever I begin". An average of the items is

calculated to form the grit score, with higher scores indicating higher levels of grittiness. Previous research has indicated the Grit Scale has good reliability and validity (Duckworth & Quinn, 2009). In the present study, internal consistency of the measure was adequate and consistent with the literature (α = .77).

Center for Epidemiological Studies Depression scale (CES-D)

The CES-D is a 20-item self-report Likert scale measure of depressive symptomology (Radloff, 1977). A sum score of the items is calculated and higher scores on the questionnaire represent a greater degree of depressive symptomology. Previous research has indicated the CES-D has strong reliability and validity (Radloff, 1977; Hann, Winter, & Jacobsen, 1999) The internal consistency of the measure was excellent in the present study, and was consistent with the literature (α = .93).

Zung Self-Rating Anxiety Scale (SAS)

The SAS is a 20-item self-report Likert scale measure of anxious symptomology (Zung, 1971). The items are summed to create a raw score, which is then converted to an anxiety index for comparison. Higher scores on the questionnaire indicate higher levels of anxiety. Previous research has indicated the SAS has good reliability and validity (Zung, 1971). In the current study, the internal consistency of the measure was good, and was consistent with the literature (α = .86).

Rand SF-36 Health Survey (SF-36)

The SF-36 is a 36-item self-report Likert scale measure assessing health-related quality of life across eight domains (Hays, Sherbourne, & Mazel, 1993). The emotional well-being subscale (EWB), calculated by a normed scoring method, was utilized in this study as a measure of positive emotional well-being. Previous research has indicated that overall the Rand SF-36 Health Survey has good reliability and validity (Hays, Sherbourne, & Mazel, 1993). In the present study, internal consistency of the subscale was good (α = .87).

Illness Intrusiveness Ratings Scale (II)

The Illness Intrusiveness Ratings Scale is a 13-item, self-report instrument, which assesses Illness Intrusiveness, or the appraisal of the degree to which an illness interferes with valued life activities, on a 7-point Likert scale (Devins, 2010). Previous research has indicated the Illness Intrusiveness Ratings Scale has excellent reliability and validity (Devins et al., 2001; Devins, 2010). The measure had excellent internal consistency ($\alpha = .93$) in the current study, which was consistent with the literature.

Mishel's Illness Uncertainty Scale (IU)

The Illness Uncertainty Scale is a 23-item self-report Likert scale questionnaire, which assesses Illness Uncertainty, the cognitive experience when the meaning of illness-related events is ambiguous (Mishel, 1981). Previous research has indicated the Illness Uncertainty Scale has strong reliability and validity (Mishel, 1981). In the present study, internal consistency was excellent and consistent with the literature ($\alpha = .91$).

Overview of Analyses

First, bivariate correlations were conducted to assess the presence of significant relationships between all variables of interest. Next, multiple hierarchical linear regressions were conducted to address aims 1 and 2, which hypothesized that grit would predict outcome measures of psychological distress, and intermediate predictors of illness appraisals. Demographic characteristics (i.e., age, sex, ethnicity, and education level) were entered in the first step of each regression and grit was entered in the second. The primary outcomes of aim 1 were depression, anxiety, and emotional well-being, while the primary outcomes of aim 2 were illness uncertainty and illness intrusiveness.

To examine the interrelationships between the variables of interest, path analysis, a specific type of Structural Equation Modeling which allows multiple hypothesized pathways to be simultaneously estimated in one model, was employed. The path model was tested using Mplus version 7.4 with full information maximum likelihood. Grit was entered as an exogenous variable and illness uncertainty, illness intrusiveness, depression, anxiety, and emotional well-being were

entered as endogenous variables. Demographic characteristics were estimated on all endogenous variables to control for their effects. All direct and indirect effects of grit were estimated in the model (See Figure 2).

CHAPTER IV

RESULTS

Descriptive Statistics

The present sample was primarily Caucasian (79.0%), female (73.1%), and in their freshman year of college (42.0%). Demographic characteristics of the current sample are present in Table 1. The participants reported significant distress, with 62.18% of the sample indicating depressive symptomology above the clinically concerning cut-off for the CES-D, 31.9% of the sample reporting anxious symptomology above the screening cut-off for the SAS, and 66.4% of the sample reporting lower EWB than a normative sample (Hays, Sherbourne, & Mazel, 1993; Lewinsohn, Seeley, Roberts, & Allen, 1997; Zung, 1971). Means and standard deviations of all variables of interest are reported in Table 2.

Aims 1 and 2

To preliminarily examine relationships between demographic variables and all variables of interest, bivariate correlations were conducted. Partial correlations, controlling for demographics, were conducted for the relationships between Grit, II, and IU, due to detectable sex differences in reporting. Grit was significantly correlated with all outcomes of interest (i.e., EWB, SAS, CES-D) and both mediators (i.e., II and IU). The correlation matrix can be found in Table 3.

A hierarchical linear regression was conducted to better ascertain the relationship between grit and depressive symptoms (CES-D). Demographics were entered in Step 1 and did not contribute significantly to the variance in CES-D ($p > .05$). Grit was added in Step 2 and

resulted in an overall significant model, with grit predicting 9.6% of the variance in depressive symptoms among college students with a chronic illness ($F(5,112) = 3.92$, $p < .01$). A hierarchical linear regression with anxiety (SAS) as the outcome was conducted. The demographic variables were entered first and did not produce a significant model ($p > .05$). Grit was entered at Step 2, and the overall model was significant ($F(5,112) = 5.00$, $p < .001$), with grit accounting for 11.0% of the variance anxious symptomology. A hierarchical linear regression with EWB (SF-36) as the outcome, was conducted, with demographics entered in Step 1 and grit entered in Step 2. The demographic variables did not account for a significant portion of the variance in EWB ($p > .05$). Grit significantly predicted 16.1% of the variance in EWB, and the overall model was significant ($F(5,113) = 5.30$, $p < .001$. The analyses indicate that when controlling for demographics, grit protects against depression and anxiety and is associated with greater EWB, consistent with the hypothesis of Aim 1.

To evaluate Aim 2, two hierarchical regressions predicting IU and II were conducted, with demographic characteristics entered in Step 1 and grit entered in Step 2. Demographic characteristics did not account for a significant portion of the variance in IU ($p > .05$). Grit significantly accounted for 3.9% of the variance in IU, and the overall model was significant ($F(5,112) = 1.85$, $p < .05$). In a hierarchical regression with II as the outcome, demographic characteristics were entered in Step 1 and accounted for 8.6% of the variance in II ($F(4,113) = 2.66$, $p < .05$). Grit was entered second, and significantly accounted for an additional 4.5% of the variance in II ($F(5,112) = 3.39$, $p < .01$). Consistent with our hypotheses, these significant models suggest that higher levels of grit relate to lower levels of the cognitive appraisals of IU and II.

Aim 3

Model Specification

Path analysis was used in the current study to estimate a model with 10 manifest variables, and 45 freely estimated parameters identified via a priori hypotheses. 5,000 bias-

corrected bootstrapped samples were utilized to test conditional and indirect effects, based on current recommendations (Fritz & MacKinnon, 2007). Analyses were conducted using MPlus version 7.4 and maximum likelihood estimation (Muthen & Muthen, 2015). Missing data was minimal and handled via listwise deletion. Refer to Figure 2 for a visual representation of the overall model.

Path Analysis

A fully saturated model was estimated with arbitrarily perfect fit (x2(35) =448.792, p < .001; CFI = 1.00, TLI = 1.00; SRMR = 0.00; RMSEA = 0.00), due to the a priori hypothesis that the direct effects of grit on the outcomes of interest would remain significant in the presence of the mediating variables, due to the other complementary pathways suggested by Aspinwall and Pengchit (2013), which were not measured in the current study.

While controlling for demographics, grit had a significant direct effect on depressive symptoms (= -0.18, SE = 0.06, 95% BC [-30, -0.06]), and on anxiety symptoms (= -0.17, SE = 0.06, 95% BC [-0.30, -0.05], such that higher grit was associated with lower self-reported depressive and anxious symptoms. Grit also had a significant direct effect on EWB (= .30, SE = .08, 95% BC [0.14, 0.44]), such that higher levels of grit related to higher levels of EWB. While controlling for demographics, grit also had a significant direct effect on II (= -.22, SE = .10, 95% BC [ ]), and IU (= -0.21, SE = 0.11, 95% BC [ ]), such that higher grit was directly associated with lower II and IU. Path estimates are summarized in Table 4.

Paths mediated by II and IU, between grit and the outcomes of depressive symptoms, anxious symptoms, and EWB were also estimated. Results indicated that grit had an indirect effect on depressive symptoms through IU (= -0.08, SE = 0.04, 95% BC [-0.18, -0.02]) and through II (= -0.07, SE = 0.03, 95% BC [-0.15, -0.02]). Grit also had an indirect effect on anxiety symptoms through IU (= -0.08, SE = 0.05, 95% BC [-0.19, -0.01]) and II (= -0.07, SE = 0.04, 95% BC [-0.16, -0.02]). Lastly, results indicated that grit had an indirect effect on EWB through IU (= 0.08, SE = 0.04, 95% BC [0.04, 0.17]) and II (= 0.04, SE = 0.03, 95%

BC [0.03, 0.11]). These results suggest that among college students with chronic illness, the relationship between grit and psychological distress or well-being is partially accounted for by cognitive appraisal mechanisms.

CHAPTER V

DISCUSSION

Study Review

The current study evaluated the role of a novel construct, grit, as a source of resilience among college students with chronic illness, an underrepresented and uniquely challenged population. This study expands on previously limited literature linking grit and positive health outcomes (Sharkey, 2017; Reed, Pritschet, & Cutton, 2013; Thomas, Seiden, Koffarnus, Bckel, & Wing, 2015). The current findings indicate that grit serves as a protective factor, as increased grit was directly related to both decreased depressive and anxious symptomology. Higher grit was also directly related to increased EWB, suggesting that grit not only protects against negative adjustment outcomes, but also promotes positive outcomes. Importantly, this finding aligns with the primary tenet of positive health, which asserts that well-being, beyond the absence of negative symptoms, is a valued objective (Seligman, 2008).

The overall path analysis demonstrated that the positive impact of grit on psychological outcomes is partially a function of its influence on reducing negative illness appraisals (i.e., IU and II). This study identified grit as a factor that is associated with lower levels of both II and IU, and protects against the untoward effects these appraisals, which have been substantiated by previous studies (Carpentier, Mullins, & Van Pelt, 2007; Hoff, Mullins, Chaney, Hartman, & Domek, 2002; Cote, Fuemmeler, Jean, Beatty, & Paul, 2001; Mullins, Chaney, Pace, & Hartman,

1997). Thus, the findings foster a more nuanced understanding of the relationship between cognitive appraisals and psychological outcomes in college students with chronic illness, and provide support for the cognitive pathway of Aspinwall and Pengchit's (2013) model for the relationship between positive phenomena, such as grit, and health outcomes. The direct effects of grit on depressive/anxious symptomology and EWB, which remained significant in the presence of the mediating variables, also suggest the existence of the other complementary pathways proposed in the theoretical model, and indicate the need for assessment of additional mechanisms that might influence the relationship between grit and mental health outcomes. For instance, future research could evaluate the additive or interactive effect of social support or coping strategies on the existing model, in an effort to better understand how grit operates.

Clinical Implications

Furthermore, the present study was consistent with the literature, which indicates that adolescents and young adults with a chronic illness are at risk for clinically concerning depressive and anxious symptomology, as well as reduced well-being (Barakat & Wodka, 2006; Fedele et al., 2009; Herts, Wallis, & Maslow, 2014). Approximately one third to two-thirds of the current sample reported symptomology that exceeded screening cut-offs, highlighting the need to identify risk and resilience factors, with the ultimate goal of developing effective interventions to address the needs of this population. Thus, future investigations should translate the evidence supporting the positive role of grit into interventions aimed at fostering perseverance and passion among college students who are struggling to cope with their illness. Indeed, research shows that building positive states alleviates depression, and future research might reveal that building grit can reduce such negative symptomology for young adults with a chronic illness (Seligman, Rashid, & Parks, 2006; Seligman, Steen, Park, & Peterson, 2005). Currently, an empirically supported grit-based intervention does not exist, but it has been theorized that cognitive-behavioral techniques, such as cognitive restructuring to address distorted expectancies for success, or values-based interventions, such as Acceptance and Commitment Therapy, might

cultivate grit by helping individuals to align their actions and thoughts with the valued long-term goal of successfully managing a chronic illness (Sharkey et al., 2017; Eskreis-Winkler, Gross, & Duckworth, 2016). Although the present study focused on psychological distress and well-being as the outcomes of interest, interventions may also aim to improve medical outcomes, such as medication adherence, by targeting grit. Previous research has demonstrated a connection between grit and healthcare management skills among healthy college students, but the influence of grit on medical outcomes must be tested among pediatric illness populations to better facilitate intervention development (Sharkey, 2017).

Alternatively, assessing grit may be more appropriately utilized as a screening process for identifying those at risk for negative outcomes, or even to assist in determining the most advantageous treatment plans. For example, if a college student with a chronic illness presents with depressive symptomology and a high grit score, they may be likely to benefit from cognitive techniques that require a great deal of practice and determination, whereas a more behaviorally-focused treatment might be of larger benefit to a student with lower levels of grit. Certainly, greater research is needed to test these hypotheses and to better understand the clinical implications of grit as a source of resilience.

Limitations

The findings of the current study are promising, but they must be considered in light of several limitations. First, causal conclusions cannot be assumed due to the study's cross-sectional design. Longitudinal assessments within the health context are necessary to more fully ascertain the influence of grit. Generalizability of the present findings are also limited, as our sample was not very ethnically diverse. Although the heterogeneity of the diagnoses in our sample could be considered to have bolstered the generalizability of our findings across illness groups, the role of grit should still be tested among specific diagnostic populations. In particular, as our study relied on self-report measures and lacked information regarding illness severity, the current results may not generalize to clinic-based populations. Although the current study provides support for the

role of grit among young adults with chronic illnesses, the developmental trajectory of grit is not well-established, and as such, investigations of grit in younger pediatric populations is needed.

Conclusion

Despite these limitations, the current examination broadens the understanding of the role of grit within the context of health and illness. Taken together, the findings suggest that grit is an understudied source of resilience among college students with chronic illness, and has the potential to be a target of intervention focused on aiding those who are struggling to manage a chronic illness. Future research is warranted to explore the role of grit in reducing distress and promoting well-being among pediatric illness populations.

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APPENDIX A. TABLES

Table 1. Demographic Characteristics (*N* = 119)

Characteristic	*N(%)*
Ethnicity	
Caucasian	94 (79.0%)
African American	4 (3.4%)
Hispanic	4 (3.4%)
Native American	7 (5.9%)
Asian	3 (2.5%)
Multi-Racial	7 (5.9%)
Age – Mean (SD)	21.16 (5.47)
Sex	
Female	87 (73.1%)
Grade Level	
Freshman	50 (42.0%)
Sophomore	30 (25.2%)
Junior	18 (15.1%)
Senior+	21 (17.6%)
Chronic Illness Examples	
Asthma and Allergies	67 (56.3%)
Gastrointestinal Disorders	23 (19.3%)
Type 1 Diabetes	8 (6.7%)
Other	21 (17.7%)

Table 2. Measure Average Total Scores and Standard Deviations

Measures	Mean	SD
Grit	03.28*	00.64
CES-D	20.37†	12.61
SAS	42.05†	10.22
EWB	58.12*	22.63
IU	61.45	16.86
II	37.45	18.14

Note: CES-D= depressive symptoms scale, SAS = anxiety symptoms scale, EWB = emotional well-being scale, IU = illness uncertainty, II = illness intrusiveness
*†Above screening clinical cut-off, *Below community mean*

Table 3. Bivariate Correlations

Variables	1	2	3	4	5	6
1. Grit	-					
2. CES-D	-.29**	-				
3. SAS	-.28**	.80***	-			
4. EWB	.37***	-.83***	-.75***	-		
5. IU	-.28*†	.57***	.63***	-.53***	-	
6. II	-.30*†	.59***	.61***	-.43***	.57***	-
7. Age	.13	-.09	-.03	-.02	.12	-.03
8. Sex	.18*	.12	.27**	-1.3	.24**	.18*
9. Ethnicity	.08	.02	.05	.05	.00	-.06
10. Grade Level	.06	-.19*	-.03	.07	.17	.01

Note: CES-D= depressive symptoms scale, SAS = anxiety symptoms scale, EWB = emotional well-being scale, IU = illness uncertainty, II = illness intrusiveness

*$p < .05$, **$p<.01$, ***$p<.001$

† Partial correlations are reported, controlling for demographic variables

Table 4. Structural Equation Model Path Estimates

Pathway	Estimate	Lower Bound	Upper Bound
Grit → IU	-0.208*	-0.404	-0.034
Grit → II	-0.219*	-0.412	-0.011
Grit → CES-D	-0.176**	-0.297	-0.063
Grit → IU → CES-D	-0.078*	-0.179	-0.002
Grit → II → CES-D	-0.065*	-0.148	-0.015
Grit → SAS	-0.174**	-0.297	-0.045
Grit → IU → SAS	-0.084*	-0.188	-0.001
Grit → II → SAS	-0.073*	-0.161	-0.015
Grit → EWB	0.297***	0.144	0.443
Grit → IU → EWB	0.076*	0.004	0.174
Grit → II → EWB	0.039*	0.003	0.110

Note. *$p < .05$, **$p<.01$, ***$p<.001$

APPENDIX B. FIGURES

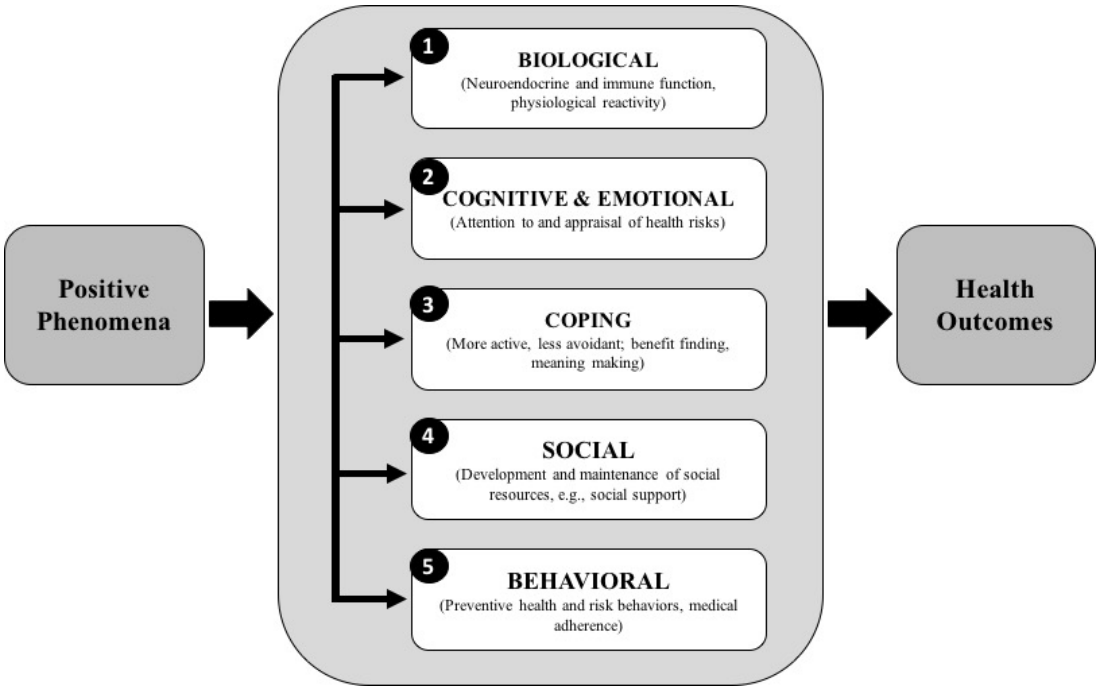

Figure 1. Theoretical model for pathways through which positive phenomena affect health outcomes via Aspinwall and Pengchit (2013).

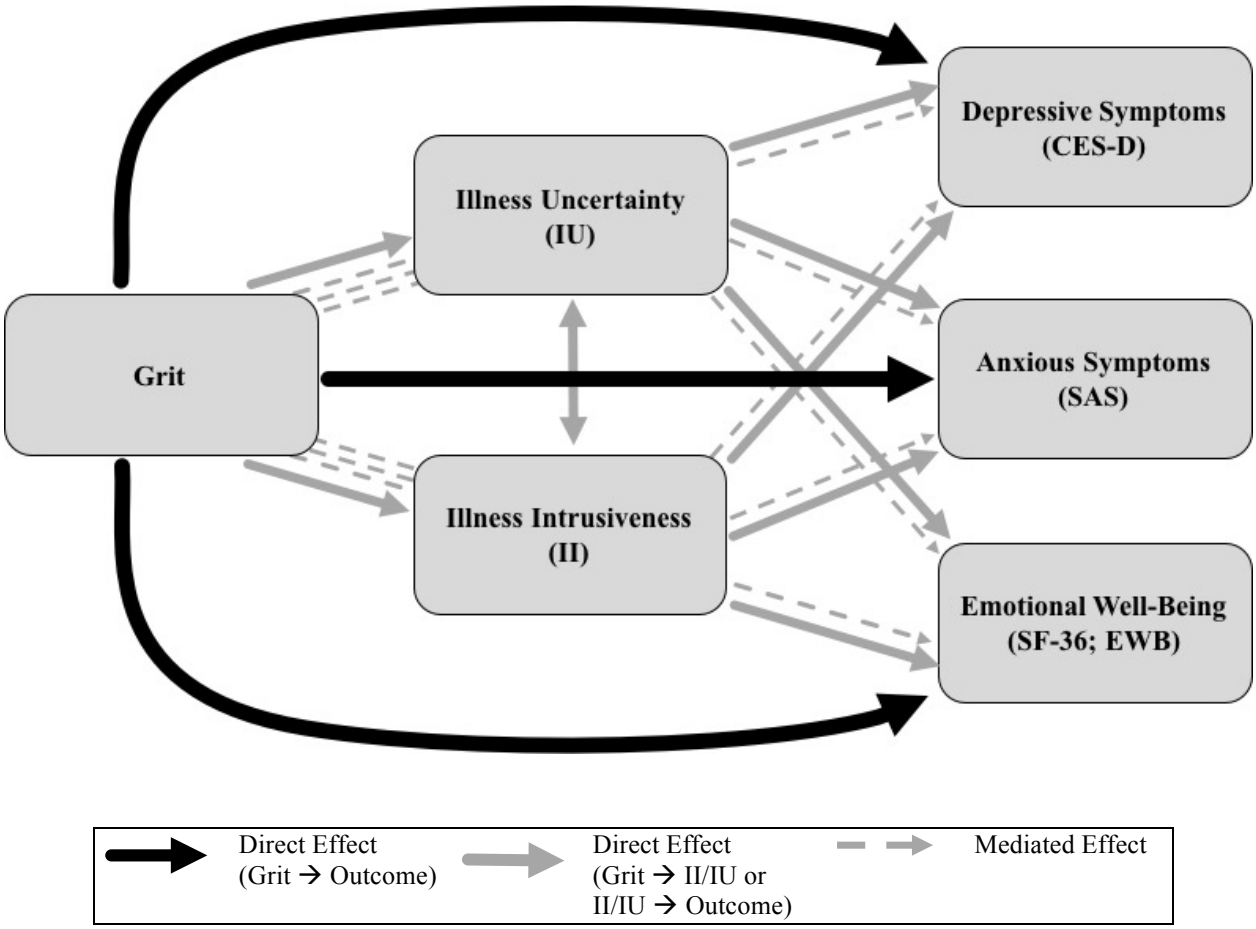

Figure 2. Path analysis model representing the direct and mediating effects of grit on depressive symptoms, anxious symptoms, and emotional well-being through illness uncertainty and illness intrusiveness.
Note. Demographic variables were controlled for in the model, but are not depicted for ease of interpretation.

Oklahoma State University Institutional Review Board

Date:	Friday, September 25, 2015	Protocol Expires:	10/7/2016
IRB Application No:	AS1385		
Proposal Title:	Examination of the Psychosocial Impact of Chronic Illness on College Students		
Reviewed and Processed as:	Exempt **Modification**		

Status Recommended by Reviewer(s) **Approved**

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The requested modification to this IRB protocol has been approved. Please note that the original expiration date of the protocol has not changed. The IRB office MUST be notified in writing when a project is complete. All approved projects are subject to monitoring by the IRB.

☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

The reviewer(s) had these comments:

Modification to 1) add Christina Sharkey and Dana Bakula as Co-PIs and remove Alayna Tackett, 2) add Grit Scale, ICQ, CPI, Stigma Scale Revised, IUS, TRAQ, 3) add the Single-Item Literacy screener, 4) add Inflammatory Celiac Disease, Epilepsy, IBD and IBS as options to chronic illness question, 5) remove scale on nicotine exposure and the Health Locus of Control, 6) utilize logic in Qualtrics to ensure that illness specific questionnaires are not given to those who state they do not have a chronic illness and 7) update the consent form

Signature :

Hugh Crethar, Chair, Institutional Review Board

Friday, September 25, 2015
Date

VITA

CHRISTINA MARIE SHARKEY

Candidate for the Degree of

Master of Science

Thesis: GRIT AS A PREDICTOR OF ILLNESS-RELATED DISTRESS AND PSYCHOSOCIAL OUTCOMESI N COLLEGE STUDENTS WITH A CHRONIC ILLNESS: A PATH ANALYSIS

Major Field: PSYCHOLOGY

Biographical:

Education:

Completed the requirements for the Master of Science/Arts in Clinical Psychology at Oklahoma State University, Stillwater, Oklahoma in July, 2017.

Completed the requirements for the Bachelor of Science/Arts in Psychology, with Honors at Georgetown University, Washington, DC in May, 2017.

Experience:

Graduate Research Assistant and Study Coordinator, Pediatric & Health Psychology Lab, Department of Psychology, Oklahoma State University
Supervisor: Larry L. Mullins, Ph.D.

Pediatric Oncology Student Training Fellow, Neuropsychology Division, Children's National Health System, Washington, DC
Supervisor: Kristina K. Hardy, Ph.D.

Undergraduate Research Intern, Diabetes Research Team, Children's National Health System, Washington, DC
Supervisor: Randi Streisand, Ph.D., and Maureen Monaghan, Ph.D.

Professional Memberships:

Phi Kappa Phi Honor Society
Society of Clinical Child & Adolescent Psychology, Division 53
American Psychological Association, American Psychological Association of Graduate Students
Psychology Graduate Student Association, Oklahoma State University
Society of Pediatric Psychology, Division 54
Psi Chi International Psychology Honor Society