

Investigation into the relationship between mindfulness and grit, and the role of meditation
experience in the relationship, across cultures.

By

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Statement of Authorship

The thesis includes write-ups of three studies which have all been submitted for publication. I am the primary author on each paper, having developed the ideas, carried out the studies, conducted and interpreted analyses and authored final articles. Study 1 has been accepted for publication by the *Journal of Individual Differences* (Raphiphatthana, Jose, & Salmon, 2018). Study 2 has been revised and resubmitted to the journal of *Mindfulness*, and Study 3 is currently under review by the journal of *Mindfulness*. I have obtained permission from its respective journal to allow Study 1 to be included in the present thesis.

Study 1 is the accepted version of the following article: Raphiphatthana, B., Jose, P., & Salmon, K. Does Dispositional Mindfulness Predict the Development of Grit? doi: 10.1027/1614-0001/a000252, *Journal of Individual Differences*, © 2018 by Hogrefe Publishing. This version of the article may not completely replicate the final version published in the *Journal of Individual Differences*. It is not the version of record and is therefore not suitable for citation.

Abstract

Mindfulness, namely awareness of present experiences that is non-elaborative and non-judging in nature (Kabat-Zinn, 1994), and *grit*, a combination of perseverance and passion for long-term goals, are psychological constructs that have each received much attention lately in both popular culture as well as the scientific literature. However, to date, no existing studies in the psychological literature have explored the potential relationship between the two constructs. Thus the chief aim of the present thesis was to address this gap in the literature by examining how grit and mindfulness relate to each other over time and in different samples. Additionally, a secondary aim of the present thesis was to illuminate the influence of meditation experience on the relationship between the two constructs. Lastly, since mindfulness and grit have been developed and researched chiefly within the Western context, the thesis also sought to compare how the two constructs are experienced across Western (New Zealand and the U.S.) and non-Western (Thai) cultures.

The main objectives were investigated across three separate studies. Study 1 focused on the relationship between mindfulness and grit within university students from New Zealand (concurrently and longitudinally), while Study 2 addressed the cross-cultural aspect by comparing the relationship between the two constructs across Thai and NZ university students. Study 3, although it also included a cross-cultural comparison across Thai and American community samples, focused on an investigation of the potential moderating role of meditation experience on the relationship between mindfulness and grit in the two investigated cultural groups.

Together, the main results from the three studies revealed that though there are some differences in the associations between the facets of mindfulness and components of grit at the facet level, at the overall construct level, mindfulness and grit, as predicted, were positively and moderately associated across all cultural groups. However, surprisingly, meditation experience was found to be a nonsignificant moderator of the relationship between mindfulness and grit for both Thai and American samples. Nonetheless, the main findings across the three studies imply that mindful individuals tend to also be gritty regardless of cultural background and meditation experience. This finding provides a foundation upon which future research can build on and has great practical potential across organizational, clinical, and educational contexts.

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General Introduction

“Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (World Health Organization, 1946). With this sentiment, the psychological literature has expanded beyond the traditional focus of understanding the etiology of mental illness, and commenced an endeavor to uncover how happiness and wellbeing can be fostered. This motive has given rise to the discipline of positive psychology (or the study of happiness, broadly defined) – a field of research that aims to uplift mundane living to a level of flourishing. Together, the addition of the study of happiness to traditional clinical psychology research will enable psychology as a science to provide a more complete understanding of mental health in the full sense of that term (Seligman & Csikszentmihalyi, 2000).

Within the discipline of positive psychology, dispositional constructs such as mindfulness and grit have garnered considerable interest in the past decade, with research indicating that both of these constructs significantly contribute to wellbeing (Brown & Ryan, 2003; Duckworth, Peterson, Matthews, & Kelly, 2007). However, they are still understudied as they are both relatively new psychological constructs. In particular, a review of the literature shows that no studies have explored the possible relationship that may exist between mindfulness and grit. Thus the suite of studies presented in this thesis aimed to fill this gap in the literature by exploring how these two positive psychological constructs are related to each other. In addition, since both constructs have been developed and chiefly researched within the Western context, another key purpose of the present work was to compare how the two constructs are conceptualised and manifested within and across Eastern and Western cultures.

The present thesis, therefore, holds theoretical and implicational importance as it provides further insight into mindfulness and grit, and their relationship, in a cross-cultural context, and highlights the potential use of mindfulness interventions beyond that of the traditional clinical context. This introduction serves to provide an overview of mindfulness and grit and set a foundation for the three subsequent investigations (Chs. 2, 3, and 4), which are journal submissions that are either published or under review for publication. The backgrounds of mindfulness and grit considered separately in psychological studies will first be outlined, followed by discussion of the potential relationship between the two constructs. The subsequent section discusses mindfulness and grit in a cross-cultural context. And last, a brief description of the main objectives of each of the three studies will mark the end of the general introduction.

Mindfulness

The origin of mindfulness lies within the Eastern tradition of Buddhism. The term *mindfulness* – present-oriented attention that is non-judgmental in nature (Kabat-Zinn, 1994) is a Western construct that attempts to capture the essence of *sati* - a Pali word used in Theravada Buddhism which means to bear in mind or bring to mind. In this tradition, *sati* is one of the main vehicles to enlightenment. It describes the ability to bring mental or physical experiences that are unfolding in the present moment into conscious awareness without subjectivity (Bhikkhu Bodhi, 1984). John Kabat-Zinn, one of the earliest psychologists to introduce the concept of mindfulness into the psychological literature, conceptualized mindfulness as an act of ‘paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally’ (1994, p.4). In other words, staying close to its Buddhist origin, the psychological construct of mindfulness describes an awareness embedded in here-and-now mental/physical activities that is non-evaluative in nature.

Following the introduction of mindfulness into the psychological literature, many theorists, clinicians, and researchers have sought ways to quantify the mindfulness phenomenon in order to study its relations to other well-known aspects of psychological functioning. Several questionnaires have been devised in the past couple of decades to try to capture the elusive and profoundly subjective nature of mindfulness. Most of these questionnaires assess mindfulness as a dispositional construct, and thus by extension, mindfulness has chiefly been studied as a psychological trait within the literature. Consequently, the studies presented in this thesis also examined mindfulness as a psychological trait or disposition.

To date, two types of trait mindfulness questionnaires exist: ones that quantify mindfulness as a single construct and ones that assess mindfulness as a multifaceted construct. The Mindful Attention Awareness Scale (MAAS), developed by Brown and Ryan (2003), was one of the first widely used measures of mindfulness, and it quantifies mindfulness as a one-dimensional construct. The MAAS aims to measure individuals’ tendency to orient attention towards present moment activities in one’s day-to-day life. The measure is constituted by 15 items that are all designed to tap into the present-centered awareness, e.g., ‘I find myself doing things without paying attention’ (negatively worded). Notably, aspects of nonjudgmental attitude are not captured in this measure. In contrast, the Five Facet Mindfulness Questionnaire (FFMQ), developed by Baer, Hopkins, Krietemeyer, Smith, and Toney (2006), quantifies mindfulness as a

complex multi-faceted construct. Within the literature the FFMQ is identified as the most comprehensive questionnaire that measures mindfulness as a multi-faceted construct. In the process of constructing the questionnaire, Baer and colleagues performed exploratory factor analysis (EFA) on items from five independently developed mindfulness questionnaires (MAAS, KIMS, FMI, CAMS-R, and SMQ). Based on the EFA result, which yielded a five-factor solution, Baer and colleagues concluded that dispositional mindfulness is best conceptualised as a construct that encompasses five different sub-components.

To this end, the FFMQ is designed to capture five related components that are argued to capture aspects of the overall construct of mindfulness. Baer et al. (2006) define the five factors as the following: 1) observing – the tendency to notice present-moment mental or physical experiences, 2) acting with awareness – the ability to sustain attention to present moment activities instead of behaving automatically while attention is focused elsewhere, 3) non-judging – a non-evaluative and objective stance towards one's thoughts and feelings, 4) non-reactivity – the ability to let thoughts and feelings pass by without getting entangled or distressed by them, and finally 5) describing – the use of language to label thoughts and feelings. These aspects of mindfulness were previously examined separately by different questionnaires, therefore, in comparison to its predecessors, the FFMQ arguably provides a more comprehensive picture of mindfulness. Thus it was the chosen measure in the present studies to examine dispositional mindfulness.

The Importance of Meditation Practice in Cultivating Mindfulness

As previously mentioned, the origin of mindfulness is embedded in Buddhist tradition. In this tradition, meditation is commonly practiced as a way to cultivate mindfulness. Mindfulness meditation comes in various forms, e.g., walking or sitting; regardless, all forms of mindfulness meditation aim to achieve the same goal – to cultivate awareness of the present moment internal/external activities that is non-elaborative and nonjudgmental. Practitioners in the West have adapted these techniques and principles to develop various mindfulness interventions, e.g., the Mindfulness Based Stress Reduction intervention (MBSR, Kabat-Zinn, 1990), with the purpose of ameliorating physical and mental ill-health.

The most common technique used by Western mindfulness interventions is sitting meditation. Typically, in a meditation session, participants will be instructed to anchor their attention to somatic sensations of their breathing. When attention wanders away from one's

breath and gets involved with thoughts and feelings, individuals are instructed to just merely take notice of this inner dialogue and return attention to one's breathing. By repeating this process each time a thought or an emotion enters awareness, practitioners learn to reshape their relationship with their inner dialogue and over time practitioners are able to de-identify with their thoughts and feelings and recognize them as ephemeral phenomenon that arise and pass away. This de-identification is argued to provide more space between thoughts/feelings and action which enables individuals to act more reflectively rather than automatically (Kabat-Zinn, 1990; Segal, Williams & Teasdale, 2002; Shapiro, Carlson, Astin, & Freedman, 2006).

Given its great potential in ameliorating and enhancing psychological functioning, numerous studies have sought to investigate outcomes of mindfulness interventions. Such studies have demonstrated that mindfulness interventions are able to reduce negative psychological symptoms, e.g., depression, anxiety, and stress, while enhancing psychological wellbeing (Carmody & Baer, 2008; Grossman, Niemann, Schmidt, & Walach, 2004). These benefits of mindfulness interventions have been shown to be mediated by increased dispositional mindfulness levels as a result of meditation practice (Carmody & Baer, 2008; Nyklicek & Kuijpers, 2008). This set of findings provides confidence that mindfulness meditation is an effective tool in enhancing dispositional mindfulness which has been empirically shown to bring about many advantageous psychological outcomes. A number of studies have sought to compare psychological outcomes between meditators and non-meditators, and they demonstrate that individuals who practice meditation regularly in their everyday life, i.e., not as part of an intervention, exhibit greater dispositional mindfulness and positive psychological outcomes while reporting lower levels of negative psychological symptoms relative to non-meditators (Baer et al., 2008; Brown & Ryan, 2003, De Bruin, Topper, Muskens, Bogels, & Kamphuis, 2012).

Grit

Defined as passion and perseverance for long term goals, grit has become a hot topic of discussion in positive psychology. Duckworth et al. (2007) sought to understand why, despite having equal intelligence, some people are more successful than others. They proposed the concept of grit – a non-cognitive trait that describes tenacity and stamina in which one pursues his or her long-term goals. To further elaborate, they posit that grit is comprised of two essential

components, one being the ability to sustain interest in the same goal for a long period of time, while the other describes persistence of effort which one exercises to achieve the long-term goal.

Duckworth et al. (2007) distinguishes grit from conscientiousness, one of the Big Five personality traits that has been given consensus in the psychological literature as an important contributor of success, by highlighting its long-term approach. The authors argue that conscientiousness describes individuals who are thorough, self-controlled, hard-working, and reliable. Though these characteristics may result in completion of tasks at hand, they do not necessarily reflect the person's tendency to achieve long-term super-ordinate goals. They claim that grit differs in its emphasis on long-term stamina rather than short-term intensity. The gritty individual not only finishes tasks at hand but pursues a given aim over years (Duckworth et al. 2007, p. 1089). In their early investigation, they found that grit was a significant predictor of various achievements, e.g., educational achievements, competitive outcomes, and military retention, above and beyond IQ and conscientiousness. Following the original study, several other studies have demonstrated similar findings – that grit is a significant predictor of success within different domains, e.g., academic achievement and personal life pursuits such as work and marriage (Duckworth & Quinn, 2009; Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014).

Since grit is still a relatively new concept in the literature, and given its demonstrated benefits, we believe there is value in its further exploration. More specifically, the present thesis is concerned with an interest in the antecedents of grit, which is another area that has yet to be fully explored within the literature. Only a few correlates of grit have been highlighted, i.e., motivation orientation towards engagement and meaning (Von Culin, Tsukayama, & Duckworth, 2014), and the growth mindset (Hochanadel, & Finamore, 2015). Given the lack of research in this area, the work in the present thesis aimed to examine mindfulness as a potential correlate and antecedent of grit.

The Possible Relationship between Grit and Mindfulness

Duckworth advocates that goals that gritty individuals pursue with long-term stamina tend to be ones that have intrinsic value (Duckworth, 2016). This sentiment coincides with self-determination theory, which posits that people put more effort in and display higher levels of perseverance when they are doing what they love and find meaning in than when they are being purely incentivized by external means such as monetary reward (Ryan & Deci, 2000). Linking this theory to the construct of mindfulness, there is growing evidence that mindfulness provides a

platform for individuals to behave in ways that reflect more closely to their intrinsic values. As discussed by Deci, Ryan, Schultz, and Niemiec (2015), ‘when people are aware of what is truly occurring internally and externally, they are more able to make choices and engage in behaviors that are compatible and authentic’ (p. 118). Supporting this claim, a number of studies have demonstrated that a mindful person is more likely to exhibit intrinsic aspirations and are less susceptible to external rewards (e.g., Brown & Kasser, 2005; Brown, Kasser, Ryan, Linley, & Orzech, 2009). In this light, mindfulness may enhance grittiness by encouraging individuals to pursue goals that are inherently important to them. Indeed, Strick and Papies (2017) found that after a mindfulness exercise, individuals demonstrated a preference to pursue goals that were affiliated with their prior assessed implicit goals.

Moreover, mindfulness may also provide an important foundation for grit by enhancing self-regulation. Self-regulation is a complex, multi-faceted, process that enables people to control or dictate their responses (Bandura, 1991; Baumeister & Heatherton, 1996). It is well documented that mindful interventions enhance individuals’ ability to self-regulate. Particularly within the clinical context, many studies have shown that after mindfulness interventions, patients are able to better inhibit maladaptive behavior such as substance abuse (Bowen et al., 2009) and obesity-related eating behavior (O’Reilly, Cook Spruijt-Metz, & Black, 2014). Shapiro et al. (2006) proposed that mindfulness may enhance self-regulation through the process of ‘reperceiving’. They theorize that by clearly and objectively observing thoughts and feelings, individuals come to realize that they are just phenomena that arise and pass away. They argue that this shift in perspective creates a mental space between thoughts/feelings and automatic ‘knee-jerk’ behavior. This space allows room for cognitive flexibility and enables individuals to choose how they respond to their thoughts and feelings rather than acting reflexively. Indeed, dispositional mindfulness has been shown to be positively associated with cognitive flexibility (Moore & Malinowski, 2009), and negatively associated with impulsive behavior (Peters, Erisman, Upton, Baer, & Roemer, 2011).

This role of self-regulation has important implications for grit as during the pursuit of long-term goals, the person will likely encounter short-term goals that are hedonically pleasant but conflict with the long term goal. For example, consider the following scenario: Mark’s long term goal is to achieve a GPA of 4.0. His finals are coming up but he has been invited to a friend’s party over the weekend. If Mark were able to mindfully observe his urge to go and have

fun, this mental activity may delay him from automatically saying yes and allow room for a more reflective and adaptive response – i.e., to choose to stay at home and study for his finals.

Therefore, mindfulness may lay a foundation for grit by protecting individuals from being distracted by short-term temptations and remaining faithful to working towards long-term goals.

Additionally, mindfulness may also help individuals to better regulate their negative thoughts and emotions when faced with setbacks and failures. By understanding that thoughts and feelings are not inherent to the person that experiences them, individuals may be able to de-identify from such negative experiences and become less impacted by them. As shown by a study by Ramel, Goldin, Carmona, and McQuaid (2004), mindfulness interventions are effective at reducing negative cognitive content and perceived stress (also see Carmody & Baer, 2007). This shift in perspective may enable individuals to utilise a more adaptive strategy in order to cope with negative experiences. For instance, Weinstein, Brown, and Ryan (2009) found that mindful individuals tend to use positive reappraisal more frequently and report less frequent use of avoidant coping strategies. Therefore, given that mindful individuals are able to better cope with stress and negative thoughts, they may also be less likely to be discouraged by setbacks and continue to pursue their long-term goals. Indeed, dispositional mindfulness has been shown to be positively associated with task persistence (Evans, Baer, & Segerstrom, 2009).

Lastly, mindfulness interventions have been shown to enhance positive psychological outcomes such as self-compassion (Birnie, Speca, & Carlson, 2010), which may further buffer individuals from the negative self-talk that arises with setbacks/failures and provides protection from giving up. In addition, mindfulness interventions have been shown to promote hope (Sears & Kraus, 2009; Shapiro, Brown, Thoresen, & Plante, 2011). This dynamic has important implication for grit, as hopefulness has been discussed as an important outlook of a gritty person. In her book, Duckworth highlights that grit paragons hold the belief that ‘our own efforts can improve our future’ (Duckworth, 2016, p. 169). She advocates that such a hopeful stance helps individuals to overcome setbacks and avoid a sense of helplessness as they believe that with effort and hard work they will improve and develop the ability to overcome adversities. Hope, as discussed by Duckworth, has been empirically studied long before grit. Snyder et al. (1991) defined hope as ‘a cognitive set that is based on reciprocally derived sense of successful (a) agency (goal-directed determination) and (b) pathways (planning of ways to meet goals)’ (p. 571). In a nutshell, hopeful individuals are confident in their ability to achieve their goals and

believe that they are able to strategise ways to achieve them. Though the relationship between grit and hope has not been extensively researched, one study conducted by Pina-Watson, Lopez, Ojeda, and Rodriguez (2015), found the two constructs to be positively associated.

Snyder (1994) suggested that meditation may help to cultivate hope. He contends that meditation calms the mind, which allows one to disengage from stressors. This process consequently enables individuals to orient attention away from the stressors towards pathways thinking. “Instead of beginning to worry and ruminate about themselves, higher-hope people *concentrate* on the situation at hand to see what needs to be done.” (Snyder, 2000, p. 59). Supporting this notion, Munoz et al. (2016) demonstrated that mindfulness meditation interventions led to higher levels of hope and this relationship was mediated by the reduction in stress. Relatedly, Sears and Kraus (2009) also found that reduction in cognitive distortions, i.e., irrational beliefs such as “to be a worthwhile person I must be thoroughly competent in everything I do”, mediated the benefits of mindfulness meditation on hope.

Since hope has been highlighted by Duckworth as an important outlook of high grit individuals, and given mindfulness interventions’ effectiveness at increasing hope, it is plausible that hope may be one of the potential mechanisms in which mindfulness relates to grit. Therefore, although there may be several mechanisms at play underlying this potential relationship, as discussed in this section (e.g., self-regulation, intrinsic motivation, and self-compassion), the present thesis particularly focused on the possible role of hope as it has been highlighted as an important factor for grit.

How are Grit and Mindfulness Experienced across Different Cultures?

Mindfulness. Despite its Eastern roots, mindfulness has been intensively studied within the Western population recently. Ironically, very few studies have examined the concept within Eastern countries, particularly those that are heavily influenced by Buddhism. One of the very few studies that has examined mindfulness cross-culturally was conducted by Christopher, Charoensuk, Gilbert, Neary, and Pearce (2009). Since Buddhism is the de facto state religion of Thailand, Christopher and colleagues chose to examine how mindfulness is experienced by Thai university students compared to American students. Since mindfulness originated from Buddhism, they expected Thai university students to endorse higher levels of mindfulness relative to their American counterpart. To their surprise, they found no difference in the overall mindfulness level, as measured by the MAAS, a unidimensional assessment of trait mindfulness,

between the two cultural groups. This finding is also similar to a related study conducted by Christopher, Christopher, and Charoensuk (2009).

As noted above, the MAAS is limited because it is unidimensional, however, Christopher et al. (2009) also included another mindfulness measure, the KIMS, in their study. The KIMS (Baer, Smith, & Allen, 2004) is a predecessor of the FFMQ, and includes facets similar to the five eventually identified in the FFMQ. Since the KIMS measures four different facets of mindfulness, the authors were able to compare level of endorsement of these four mindfulness facets across the cultural groups. Upon comparison at the facet level, they found that American students reported higher levels of accepting without judgment relative to the Thai students. These findings suggest that for the overall construct, mindfulness levels appeared to be similar across Thais and Americans, however, differences between the two cultures emerged when investigated at the facet level. Therefore, this contrasting set of findings motivates researchers to investigate at the facet level as doing so may reveal interesting insights that may be masked when mindfulness is examined at the overall construct level.

Though the above discussed studies have provided some interesting insight into cross-cultural comparisons of mindfulness, they used mindfulness measures such as the MAAS which has been critiqued because it only focuses on the attentional aspect of mindfulness, and the KIMS which has been shown to manifest weak psychometric characteristics (Christopher et al., 2009a; 2009b). Therefore, there is a need for a multidimensional measure that is culturally valid for assessing mindfulness. Since the FFMQ has been argued to be the most comprehensive mindfulness measure to date, it is of interest to the field to investigate its use across cultures. Previous studies have examined the construct validity of the FFMQ in Chinese (Deng, Liu, Rodriquez, & Xia, 2011) and Japanese samples (Sugiura, Sato, Ito, & Murakami, 2012), and they have found it to exhibit similar associations with positive and negative psychological constructs as are found in the West. However, they did not conduct measurement invariance testing on the FFMQ across their studied cultural groups.

Testing for measurement equivalence is a very important preliminary step in cross-cultural investigation. Cheung and Rensvold (2002) argue that without determining whether the measure is responded to in a similar way by two or more cultural groups, it is impossible to know if differences found between cultural groups reflect true cultural differences or response biases. Typically, three types of invariances are tested for: configural, metric and scalar

invariance. Configural invariance is essential as it tests whether the basic structure of the construct is replicated by both cultural groups (i.e., acceptable model fit in both samples). Metric invariance tests for equivalence of item loadings across groups. Equivalence at this level suggests that each of the items' association with their specific factor are in the same direction and of similar strength across groups. This type of invariance is essential if the latent construct is to be used to associate with other psychological constructs within the cultural groups (i.e., associations between facets of mindfulness with facets of grit). Lastly, scalar invariance tests for equivalence of items' intercepts across groups. Only once this step is met can latent mean differences be examined across groups because it is imperative to ensure that the items in both groups exhibit the same intervals and zero points. This level of invariance must be demonstrated before reliable mean group differences can be computed (i.e., do Thais and New Zealanders differ in their overall level of grit?).

Given the lack of measurement invariance testing of mindfulness measures in the cross-cultural context, the present thesis aimed to address this gap in the literature by examining measurement invariance of the FFMQ across Thai, NZ and American samples. Results from these analyses will provide important theoretical, empirical and implicational insight into the utilization of FFMQ in a cross-cultural context.

Grit. In regard to academic outcomes, Asian Americans have been shown to achieve higher grades than their European American counterparts (e.g., Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987; Kao & Thompson, 2003). Zhang and Carrasquillo (1995) explained this superior academic performance in the light of Confucianism – a philosophy that places value on perseverance and hardworking ethics, which strongly influences Eastern traditions, particularly the native and expat Chinese cultures. The socialization of Confucian ideas, namely that success is achieved by hard work and perseverance, tends to be passed down from parents to their children in many Asian cultures. As shown by Jose and Bellamy (2012), Asian children's perseverance is driven by their parents' encouragement of the growth mindset.

The growth mindset is an influential concept developed by Carol Dweck (1999). She noticed that when faced with setbacks or failures, some children do not give up while others do. In searching for an explanation underlying this phenomenon, she discovered variations in the beliefs that children hold regarding the acquisition, maintenance, and development of intelligence and cognitive skills generally. She categorized this range into two basic sets of

belief, one describing the belief that intelligence is a fixed attribute, i.e., success is attained due to one's inherent ability (the fixed mindset), and the second belief assumes that intelligence is malleable, i.e., one's cognitive abilities can be enhanced through effort and hard work in order to attain success (the growth mindset, Dweck, 1999). Decades of research have shown a robust finding that individuals who exhibit a fixed mindset tend to also display helplessness, in other words give up when faced with setbacks, whilst those individuals who endorse a growth mindset tend to persevere and exercise their best effort to overcome obstacles (e.g., Blackwell, Trzesniewski, & Dweck, 2007, Hong, Chiu, & Dweck, Lin, & Wan, 1999).

Grit has been discussed to be related to the growth mindset. Snipes, Fancsali, and Stoker (2012) have argued that the growth mindset may be the foundation upon which grit is developed. A gritty person is someone who sustains interest in long term goals and consistently puts effort towards achieving that goal despite setbacks and failures. This description of a gritty person very much overlaps with characteristics of individuals with a growth mindset. Therefore, it is reasonable to link these two concepts and identify their commonalities (for further discussion see, Hochanadel, & Finamore, 2015; Laursen, 2015; Perkins-Gough, 2013). Since grit and the growth mindset seem to be conceptually interlinked, and the growth mindset has been shown to be endorsed by individuals from cultures influenced by Confucianism, it is possible that individuals from such cultures may exhibit higher levels of grit. As grit is a relatively new construct, it has yet to be fully explored across cultures. Therefore, the present study aimed to address this gap in the literature by examining grit within Thai, NZ and American cultural groups.

The Studies that Constitute the Present Thesis

Three studies, one per chapter, will address various and specific issues and gaps in the literature that have been described in the general introduction. General outlines of each study are given below:

Study 1: The aim of the first study was to determine the nature of the relationship between mindfulness and grit within a sample of NZ university students, using both cross-sectional and longitudinal analyses. In particular, we sought to determine whether mindfulness leads to greater grit over time, whether grit leads to greater mindfulness over time, both of these possibilities, or neither. We expected to find mindfulness to be an antecedent of grit over time.

The study also included a consideration of the role of hope as a mediator in the relationship between the two constructs.

Study 2: Following the empirical verification of a moderate positive relationship between mindfulness and grit in Study 1, Study 2 aimed to examine the two constructs and their relationship in a cross-cultural context. Specifically, the first aim was to examine measurement invariance of the FFMQ and the Grit Scale across Thai and NZ university students, and the analyses involved latent mean comparisons of the constructs across the two groups. The second aim of the study was to compare the relationship between the two constructs, both at the overall construct level and at the facet level, across the two cultural groups. We intended to determine whether these relationships varied in strength between the cultural groups. These examinations were unprecedented in the literature, therefore findings from such analyses were thought to provide new and interesting insights into how the relationship between mindfulness and grit is manifested in different cultures.

Study 3: Against the backdrop of Studies 1 and 2, which utilised university students as participants, Study 3 aimed to examine levels of mindfulness and grit, and their relationship, in community samples in different countries. Specifically, measurement invariance was conducted to examine equivalence of the FFMQ and the Grit Scale across Thai and American community samples (adults). Further, Study 3 also sought to determine the moderating role in which meditation experience may have on the relationship between mindfulness and grit. Study 3 was broken down into two sections. The first section compared the relationship between mindfulness and grit across American meditators and non-meditators, and thereby examined the potential influence of meditation experience on the relationship between mindfulness and grit within the American culture. The second section examined potential cultural influence on the relationship between mindfulness and grit by comparing groups of Thai and American meditators. Lastly, the study also aimed to examine whether meditation experience had a similar influence on the relationship between the two constructs within the Thai culture, as was found with the American culture.

STUDY 1: Does Dispositional Mindfulness Predict the Development of Grit?

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Abstract

Grit, i.e., perseverance and passion for long term goals, is a novel construct that has gained attention in recent years (Duckworth, Peterson, Matthews, & Kelly, 2007). To date, little research has been performed with the goal of identifying the antecedents of grit. Thus, in order to fill this gap in the literature, self-report data were collected to examine whether mindfulness, a mindset of being-in-the-present in a nonjudgmental way, plays a role in fostering grittiness. Three hundred and forty-three undergraduate students completed an on-line survey once in a cross-sectional study, and of these, seventy-four students completed the survey again 4.5 months later. Although the cross-sectional analyses identified a number of positive associations between mindfulness and grit, the longitudinal analysis revealed that the mindfulness facets of acting with awareness and non-judging were the most important positive predictors of grit 4.5 months later. This set of findings offers implications for future grit interventions.

Does Dispositional Mindfulness Predict the Development of Grit?

Grit, which has been defined as perseverance and passion for long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007), is a recently developed concept that has received an increasing amount of attention from scholars over the last several years. It encompasses two facets, one emphasizing consistency of interest in long term goals and the other emphasizing persistence of effort in pursuing those long term goals. It has been identified as an important contributor to success within different domains, such as academic contexts and personal life pursuits such as work and marriage (e.g., Duckworth et al., 2007; Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014).

However, as grit is still quite a new concept within the literature, its incremental benefits over and beyond other previously established constructs, i.e., conscientiousness, is still controversial. Duckworth argues that grit is distinct from its sibling, conscientiousness, by its core component – the stamina in which one pursues long-term goals (Duckworth et al., 2007). In her studies, she has shown that grit does indeed exhibit incremental predictive ability of academic success and retention in United States Military Academy West Point cadets, over and above IQ and conscientiousness (Duckworth et al., 2007). On the other hand, a recent meta-analysis (Credé, Tynan, & Harms, 2016) has shown otherwise; that grit did not demonstrate incremental predictability above that of conscientiousness.

It is important to acknowledge that the incremental validity of grit is still an ongoing debate in the literature; however, regardless, grit has still been shown to exhibit desirable outcomes, and therefore it is worth further examination. The present study concerns another important issue that has garnered very little research. It aims to address the question ‘what makes an individual gritty?’ by providing some insight into the antecedents of grit. Though the consensus on the distinction between grit and conscientiousness is still unestablished empirically, for the purpose of the study, we are utilizing Duckworth’s conceptualization of grit which separates it from conscientiousness. Thus, the present research focused on the potential role of dispositional mindfulness, i.e., present-oriented attention, in cultivating grittiness. Mindfulness was originally defined as an act of “paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 1994, p. 4). Due to its subjective quality, self-report is the chief method currently being used to measure dispositional mindfulness within the literature.

The Five Facets of Mindfulness Questionnaire (FFMQ), developed by Baer, Smith, Hopkins, Krietemeyer, and Toney (2006), is the most comprehensive measure of dispositional mindfulness proposed to date. Baer and colleagues compiled items from existing mindfulness questionnaires and performed an exploratory factor analysis (EFA) in order to identify clusters of items across measures. The analysis revealed a five-factor solution, suggesting that dispositional mindfulness may best be assessed by soliciting self-reports on five distinct factors. These five facets include: observing - the process of noticing or attending to mental or physical experiences; describing - the use of language to label one's internal experiences; acting with awareness - the ability to attend to one's present activities; non-judging - the use of a nonevaluative point of view towards one's thoughts and feelings; and non-reacting - the ability to let thoughts and feelings come and go without becoming entangled in them.

Dispositional mindfulness has been shown to exhibit many positive outcomes. For instance, Weinstein, Brown, and Ryan (2009), through laboratory-based stress-induction, daily diary, and two longitudinal studies, found that dispositional mindfulness significantly predicted lower levels of perceived stress and usage of avoidance coping strategies, while predicting higher usage of adaptive coping strategies. This set of findings suggests that mindful individuals are able to cope with stressful situations well, which may have implications for our understanding of grit. Duckworth has argued that a 'gritty' person is an individual who perseveres in working towards their long-term goals despite failure and adversity (Duckworth et al., 2007). Dispositional mindfulness may therefore set a foundation upon which grittiness can be developed by helping individuals to successfully cope with stressful situations and by enabling them to persevere and work through obstacles in order to reach their long term goals.

Moreover, when working towards long-term goals, temptations and distractions will likely arise, namely momentary salient goals that provide immediate gratification and slow down or block long-term goals. Thus self-control is required to resist these lower-level goals in order to successfully pursue higher-order long-term goals (Baumeister, Heatherton, & Tice, 1994). Since mindfulness interventions have been shown to improve self-control, e.g., self-control was found to increase from pre- to post-intervention, and was significantly higher in comparison to a control group (Canby, Cameron, Calhoun, & Buchanan, 2015, also see Frieze, Messner, & Schaffner, 2012), mindfulness may therefore lay the foundation for grit. In particular, it may aid individuals to be more aware when conflicting goals arise and function to dissuade individuals

from automatically choosing a more hedonically pleasant option that would detract from long-term goals.

Although possible links may exist between mindfulness, self-regulation and grit, the present study was designed to examine another mechanism that links mindfulness to grit. In her book, Duckworth (2016) accentuates the importance of hope. “Grit depends on a different kind of hope, it rests on the expectation that our own efforts can improve our future.... the hope that gritty people have has nothing to do with luck and everything to do with getting up again” (Duckworth, 2016, p. 169). However, to date, the relationship between hope and grit has not been explicitly studied. Given the importance of hope in the discussion of grit, we aimed in the present study to examine the role of hope in the relationship between dispositional mindfulness and grit.

Potential Mediator

As previously mentioned, dispositional mindfulness and mindfulness interventions have been shown to be related and to yield many positive outcomes. One particular outcome that is of interest in the present case is hope, which has been found to increase as a result of mindfulness intervention (Sears & Kraus, 2009; Shapiro, Brown, Thoresen, & Plante, 2011). Hope is defined as “a cognitive set that is based on a reciprocally derived sense of successful (a) agency (goal-directed determination) and (b) pathways (planning of ways to meet goals)” (Snyder et al., 1991, p. 571). In other words, a hopeful person is someone who believes that he or she can achieve their goals and can devise plans in order to achieve their goals. In this light, hope is goal attainment-oriented and resonates with Duckworth’s description of hope that is important to grit – “the expectation that our own efforts can improve our future” (Duckworth, 2016, p. 169). Similar to grit, hope has been found to predict better academic performance and athletic outcomes (Curry, Snyder, Cook, Ruby, & Rehm, 1997; Maree, Maree, & Collins, 2014).

Since hope is concerned with individuals’ motivation and belief in their ability to plan strategies for achieving their goals, it is reasonable to assume that individuals with such a positive goal-oriented attitude would also be more likely to persist in their interest and effort in working towards their long term goals (i.e., be gritty). Though the literature that links grit to hope is very limited, one study showed a significant and positive association between grit and hope within Mexican American adolescents ($r(181) = .48$, Piña-Watson, López, Ojeda, & Rodríguez, 2015). Since hope is fostered by mindfulness practice (as cited above) and is also

associated with grit, it is possible that hope may play a mediating role between mindfulness and grit. That is, mindfulness may set a foundation for a hopeful goal-achievement attitude, which, in turn, may cultivate an increase in grittiness.

Research Hypotheses

Based on the arguments given above, several hypotheses were posed. First, it was hypothesized that dispositional mindfulness would positively predict grit both cross-sectionally and longitudinally. Second, at a deeper level, since the mindfulness facets of acting with awareness, non-judging, and non-reacting have been shown to be stronger predictors of emotion regulation skills (e.g., positive reappraisal) and positive psychological outcomes than the facets of observing and describing (e.g., Cash & Whittingham, 2010; de Bruin, Topper, Muskens, Bogels, & Kamphuis, 2012), it was hypothesized that these three particular mindfulness facets would positively and significantly predict the two components of grit. This hypothesis was examined both cross-sectionally and longitudinally. In addition, we expected to find (Hypothesis 3) that a third variable, namely, hope, would mediate the proposed relationship between dispositional mindfulness and grit.

Concurrent Relationships

Method

Participants and procedure.

Term 1 course. Three hundred and forty-three undergraduate students (260 females, 81 males, 2 information missing) aged between 18 and 31 years and older ($M_{\text{age}} = 21.14$), from a mid-sized university in New Zealand, completed an online survey during a lab session as part of their second year Research Methods course in Term 1. The survey consisted of self-report measures of dispositional mindfulness, hope, and grit, and other psychological constructs irrelevant to the present study. The students' ID was kept in confidentiality in order to match data between Term 1 and Term 2.

Term 2 course. Two hundred and forty-nine undergraduate students (191 females, 58 males) aged between 19 and 60 ($M_{\text{age}} = 22.90$) completed an online survey during a lab session as part of their third year Research Methods course in the subsequent academic term. The survey administered at Term 2 was identical to the one utilized in Term 1.

Measures.

Five Facet Mindfulness Questionnaire – Revised (FFMQ-R). The revised version of the 32-item version of the Five Facet Mindfulness Questionnaire (FFMQ-SF: Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011) was used to examine the five facets of mindfulness. The revised version used in this study (described in Raphiphatthana, Jose, & Kielpikowski, 2015) improved on the previous version by ensuring that each subscale contained the same number of items (5 items per subscale), and the same number of positively and negatively worded items (3 positively and 2 negatively worded items per subscale). Participants responded to each item, e.g., “I notice the smells and aromas of things” by indicating how true each item is for them, using a 5-point Likert scale that ran from 1 (*never or very rarely true*) to 5 (*very often or always true*). After reverse-coding certain items, facet scores were computed by averaging the scores of the individual items for each facet. A high facet score indicates higher levels of endorsement of that particular facet. The original version and the 32-item version of the FFMQ have been shown to have good psychometric properties and good internal reliability with Cronbach’s alpha values for all facets being greater than .70 (Baer et al., 2008; Bohlmeijer et al., 2011). The FFMQ-R used in the present study manifested similar and equally acceptable psychometric properties as the original version (Mason, 2014; Raphiphatthana et al., 2015).

The Grit Scale. The 12-item Grit scale, devised by Duckworth et al. (2007), was used to examine levels of grit in the current sample. The scale consists of two subscales: *consistency of interest* which contains 6 reverse-coded items, e.g., “My interests change from year to year”, and *perseverance of effort* which contains 6 positively worded items, e.g., “I am diligent”. Participants responded to the items using a 5-point Likert scale running from 1 (*not at all like me*) to 5 (*just like me*). The overall grit score is computed by averaging the scores of the individual items after reverse-scoring the consistency of interest items. Higher scores indicate higher levels of endorsement of grit. The grit scale has been shown to manifest good internal consistency for the overall scale ($\alpha = .85$) and for each factor (consistency of interest, $\alpha = .84$; perseverance of effort, $\alpha = .78$, Duckworth et al., 2007).

Results

Factor structure of the FFMQ-R and the Grit Scale. Similar to the original validation studies (Baer et al., 2006; Duckworth et al., 2007), confirmatory factor analysis using item parcels (groups of items) was conducted to verify the structure of the FFMQ-R and the Grit Scale

in the present study. The analysis revealed that the FFMQ-R factor structure tested with Term 1 data yielded good model fit values: $\chi^2/df = 2.51$; CFI = .93; TLI = .91; RMSEA = .07; SRMR = .05. Similarly, the Grit Scale also yielded acceptable model fit values: $\chi^2/df = 1.23$; CFI = .99; TLI = .99; RMSEA = .07; SRMR = .03. These results suggest that the proposed five-factor structure for the FFMQ-R and the two-factor structure for the Grit Scale were supported. For the Term 2 dataset, the FFMQ-R also yielded acceptable model fit values: $\chi^2/df = 2.52$; CFI = .92; TLI = .90; RMSEA = .08; SRMR = .06. Similarly, the Grit Scale also yielded good model fit values: $\chi^2/df = 1.94$; CFI = .98; TLI = .97; RMSEA = .06; SRMR = .04.

Descriptive statistics and correlations. As presented in Table 1, almost all of the five mindfulness facets illustrated good internal consistency, with four factors yielding Cronbach's alphas exceeding .70, with the exception of the acting with awareness factor which yielded an alpha approaching .70 (T1 $\alpha = .67$, T2 $\alpha = .68$). Likewise, the two grit facets also yielded Cronbach's alphas exceeding .70, which indicated good internal consistency of the factors. In addition, we conducted two one-way MANOVAs to determine whether there are any gender differences in regards to the overall levels of mindfulness and grit for the two separate time points. The analysis revealed no significant gender differences for both mindfulness and grit in both time points (Wilk's $\Lambda_s = .99$ and $.98$, $F_s(2, 338)$ and $(2, 243)$, $F_s = 1.11$ and 1.25 , $ps > .25$, $\eta_p^2 = .006$ and $.010$). In terms of the correlations between mindfulness and grit, as predicted in Hypothesis 1, the overall construct of mindfulness was found to be significantly associated with the overall construct of grit at both Term 1 ($r(334) = .46$, $p < .01$) and Term 2 ($r(249) = .43$, $p < .01$). Moreover, bivariate correlations between the facets of the two constructs illustrated that all of the mindfulness facets, apart from observing, yielded positive and significant associations with both of the grit facets in Term 1. Similar correlations were found at Term 2, except that observing was, in this case, found to be positively associated with perseverance of effort.

Table 1

Concurrent Datasets: The Bivariate Correlations, Cronbach's Alphas, and Descriptive Statistics of the Five Facets of Mindfulness and the Two Components of Grit for Terms 1 and 2

	1	2	3	4	5	6	7
1. FFMQ (Des)		.38**	.46**	.18**	.46**	.23**	.31**
2. FFMQ (Non-r)	.28**		.53**	0.11	.37**	.18**	.32**
3. FFMQ (Non-j)	.35**	.55**		.24**	.40**	.26**	.36**
4. FFMQ (Obs)	.15**	.15**	.17**		.26**	-0.09	.19**
5. FFMQ (Act-a)	.38**	.35**	.37**	.30**		.32**	.32**
6. Grit (Consistency)	.21**	.26**	.25**	-0.08	.37**		
7. Grit (Perseverance)	.32**	.35**	.40**	.11	.43**	.41**	
Term 1 α	.83	.83	.74	.71	.67	.75	.83
Term 1 Mean (SD)	3.08 (0.85)	2.99 (0.88)	3.32 (0.76)	3.68 (0.7)	3.28 (0.62)	2.75 (0.77)	3.54 (0.65)
Term 2 α	.83	.83	.78	.73	.68	.77	.74
Term 2 Mean (SD)	3.10 (0.82)	3.08 (0.84)	3.36 (0.76)	3.69 (0.7)	3.35 (0.58)	2.81 (0.68)	3.55 (0.6)

Note. Term 1 correlations are presented in the bottom left half of the correlation matrix while Term 2 correlations are presented in the top right half of the matrix. * $p < .05$. ** $p < .01$.

Did facets of mindfulness predict facets of grit?

Term 1 dataset. To test Hypothesis 2, two path models were performed in which the five mindfulness facets predicted the two grit facets, with covariances between the predictor variables and the error terms of the dependent variables taken into account. The resulting path model, analysed in AMOS (Arbuckle, 2006) and as shown in Figure 1, illustrates that all of the five facets of mindfulness, except observing, positively predicted at least one of the two components of grit. More specifically, and as predicted, acting with awareness predicted higher levels of both consistency of interest ($\beta = .37, p = .001$) and perseverance of effort ($\beta = .28, p = .001$), and likewise, non-reacting predicted higher levels of both consistency of interest ($\beta = .16, p = .002$) and perseverance of effort ($\beta = .13, p = .02$). However, non-judging only positively predicted one component of grit, namely perseverance of effort ($\beta = .18, p = .002$), and similarly, describing

only predicted higher levels of perseverance of effort ($\beta = .10, p = .05$). Contrary to prediction, observing negatively predicted consistency of interest ($\beta = -.20, p = .001$). The non-significant pathways have been pruned from the fully saturated model, thus the present model only shows significant pathways, which yielded good model fit values: $\chi^2/df = 1.32$; CFI = .99; TLI = .99; RMSEA = .03; SRMR = .02.

Term 2 dataset. The same analysis was performed with the second concurrent dataset, and paths of very similar strength were obtained. To more stringently test the possibility of equivalence between the two courses, we performed equality constraints, using a chi-square test with 1 *df*, on all paths between both the two courses, and we found no significant differences between the two models at $p < .05$. On this basis, we concluded that these concurrent relationships were reasonably robust and reliable.

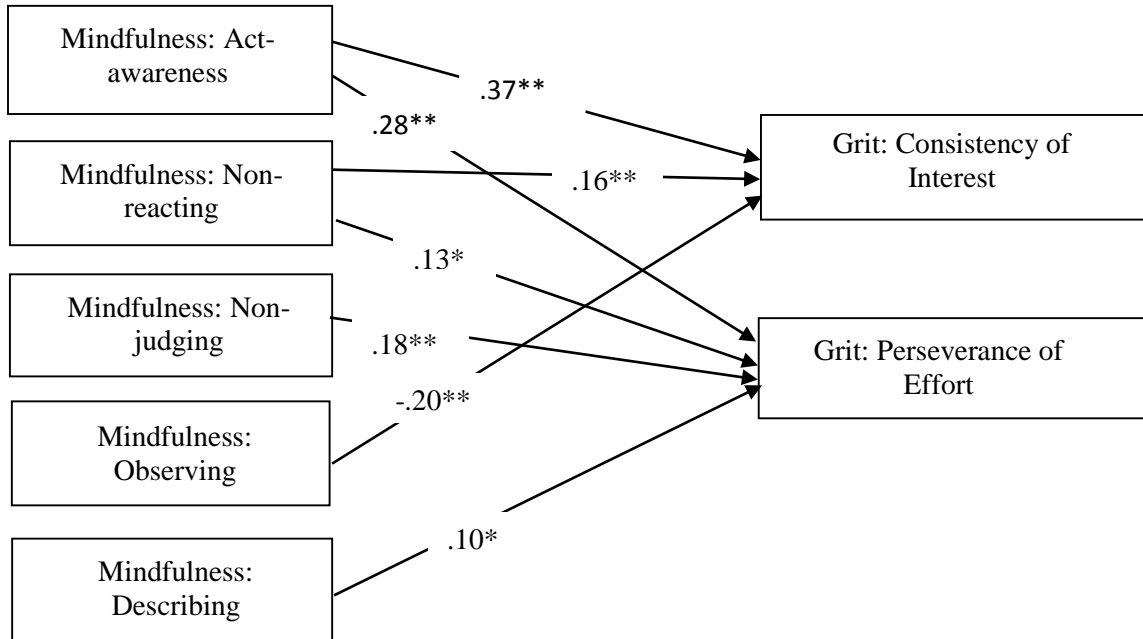


Figure 1. Path model: The significant relationships between the five facets of mindfulness and the two components of grit. *Note.* Standardized beta weights are super-imposed on each path, with * $p < .05$ and ** $p < .01$. The covariances between predictor variables and error terms were omitted from the model for the sake of clarity.

Longitudinal Dataset

Cross-sectional analyses demonstrated largely anticipated relationships between the five facets of mindfulness and the two components of grit. However, because these relationships are concurrent, we cannot determine whether mindfulness predicts higher levels of grit over time or

vice versa. Therefore, we conducted longitudinal analyses with overlapping data obtained from students who enrolled in both classes. In addition, by examining the relationship of mindfulness and grit over time, we are able to investigate whether a third variable, i.e., hope, might play a role in mediating the relationship, and thus provide further insight into how mindfulness and grit are related.

Method

Participants and procedure. Due to the structure of the psychology curriculum in this university, most students do not take both of these research methods courses in the same year. However, a subsample of students did, i.e., 74 undergraduate students (60 females, 14 males), aged between 18 and 60 ($M_{\text{age}} = 25.3$), and although this sample was considerably smaller than the concurrent datasets, it was used to test longitudinal relationships between the variables studied here because it was deemed large enough to identify a moderate to large effect size (Cohen, 1992). Four and a half months elapsed between the assessments at T1 and T2.

Measures.

The Hope Scale. The 8-item Hope scale, devised by Snyder et al. (1991), was used to measure hope in this study. The scale consists of two subscales: agency (goal-directed determination) which contains 4 items, e.g., “I energetically pursue my goals”, and pathways (planning) which also contains 4 items, e.g., “There are lots of ways around any problem”. Participants responded to each item regarding how true each item is for them using a 4-point Likert scale from 1 (*definitely false*) to 4 (*definitely true*). The overall hope score is computed by averaging the scores of the 8 individual items, while the facet scores are computed by averaging the scores from items that are specific to the facet. Higher scores indicate higher endorsement of overall hope or of the particular facet. The hope scale has been shown to yield good psychometric properties as well as good internal reliability for the overall scale (α s have ranged from .74 to .84), and for each subscale: agency (α s have ranged from .71 to .76) and pathways (α s have ranged from .63 to .80; Snyder et al., 1991).

Results

Descriptive statistics and correlations. Descriptive statistics, bivariate correlations, and Cronbach’s alphas for all variables at T1 and T2 for the longitudinal sample are provided in Table 2. Almost all variables yielded Cronbach’s alphas exceeding .70, apart from the observing facet at T2 which yielded a Cronbach’s alpha approaching .70 ($\alpha = .67$). In regards to gender

differences, similar to the concurrent study, the repeated measures MANOVA revealed no significant gender differences in the overall levels of dispositional mindfulness and grit (Wilk's $\Lambda_s = .995$, $F(2, 70) = .19$, $p > .80$, $\eta_p^2 = .005$). Moreover, as noted with the concurrent datasets, the bivariate correlations illustrated that most of the five facets of mindfulness positively correlated with the two components of grit, both at T1 and T2. However, several exceptions were noted. Observing at both time points was not associated with either of the grit components, and non-judging at T1 yielded no association with consistency of interest at T2.

Table 2

Longitudinal Dataset: Correlations, Cronbach's Alphas, and Descriptive Statistics of the Five Facets of Mindfulness and the Two Components of Grit over Terms 1 and Term 2

	2	3	4	5	6	7	8	9	10	11	12	13	14	α	Mean (SD)
1. Des (T1)	.73**	.29*	.33**	.50**	.49**	.30**	.20	.58**	.49**	.35**	.36**	.54**	.48**	.81	3.10 (0.90)
2. Des (T2)		.36**	.37**	.48**	.48**	.20	.09	.56**	.61**	.40**	.47**	.41**	.45**	.79	3.08 (0.85)
3. Non-r (T1)			.70**	.54**	.40**	.12	.09	.53**	.46**	.46**	.37**	.38**	.36**	.83	3.01 (0.89)
4. Non-r (T2)				.45**	.51**	.13	.08	.46**	.34**	.35**	.26*	.41**	.41**	.84	3.12 (0.85)
5. Non-j (T1)					.64**	.17	.33**	.46**	.46**	.29*	.22	.43**	.48**	.74	3.33 (0.74)
6. Non-j (T2)						.10	.25*	.39**	.45**	.28*	.35**	.40**	.41**	.79	3.44 (0.75)
7. Obs (T1)							.63**	.42**	.20	.10	.13	.19	.17	.72	3.66 (0.71)
8. Obs (T2)								.30*	.23*	.01	-.03	.17	.23	.67	3.78 (0.68)
9. Act-a (T1)									.73**	.57**	.55**	.53**	.54**	.73	3.30 (0.67)
10. Act-a (T2)										.49**	.51**	.42**	.47**	.76	3.37 (0.69)
11. Consist (T1)											.73**	.43**	.40**	.82	2.88 (0.78)
12. Consist (T2)												.35**	.35**	.82	2.84 (0.74)
13. Pers (T1)													.77**	.79	3.56 (0.70)
14. Pers (T2)														.76	3.62 (0.61)

Note. T1 and T2 refer to Term 1 and Term 2. * $p < .05$; ** $p < .01$.

Did facets of mindfulness predict facets of grit (and vice versa)? First, a residualised cross-lag path model was constructed with the two overall variables of grit and mindfulness across the two times of measurement. Figure 2 shows that overall mindfulness predicted an increase in overall grit over time ($\beta = .18, p = .04$), whereas no such significant relationship was found from overall grit to overall mindfulness ($\beta = .07, p = .37$). This result suggests that mindfulness more powerfully influenced the development of grit over time than did grit influence the development of mindfulness over time.

We then further explored the relationships between mindfulness and grit by examining how facets of grit and mindfulness affected each other over time. Similar to the previous models, this model also takes into account the covariance of the associations between T1 variables and T2 error terms. After the process of pruning non-significant relationships, the truncated model (see Figure 3) yielded good model fit indices: $\chi^2/df = .58$; CFI = 1.00; TLI = 1.00; RMSEA = .001; SRMR = .05. Stability coefficients for all variables proved to be statistically significant, as expected. More relevant for present concerns, we identified two significant cross-lag coefficients that linked mindfulness at T1 to grit at T2. Specifically, acting with awareness at T1 predicted higher levels of consistency of interest at T2 ($\beta = .23, p = .01$), and non-judging at T1 predicted higher levels of perseverance of effort at T2 ($\beta = .16, p = .04$).

We also considered the reverse direction, i.e., whether either of the two grit components served as predictors of the mindfulness facets over time. Only one significant relationship was found, namely perseverance of effort at T1 predicted higher levels of non-reacting at T2 ($\beta = .17, p = .05$). Thus, the longitudinal sample allowed the identification of several facet-level relationships between mindfulness and grit over time (see Figure 3).

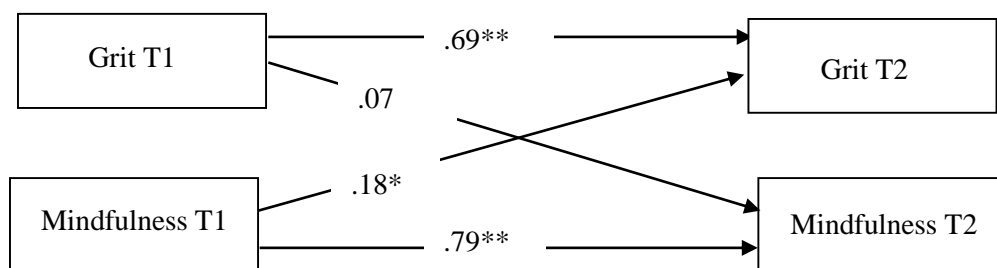


Figure 2. Longitudinal path model of the overall mindfulness construct and the overall grit construct predicting each other 4.5 month later. *Note.* Standardized beta weights are superimposed on each pathway, with * $p < .05$ and ** $p < .01$. Covariances of the concurrent associates between T1 variables and T2 error terms were omitted from the model for the sake of clarity.

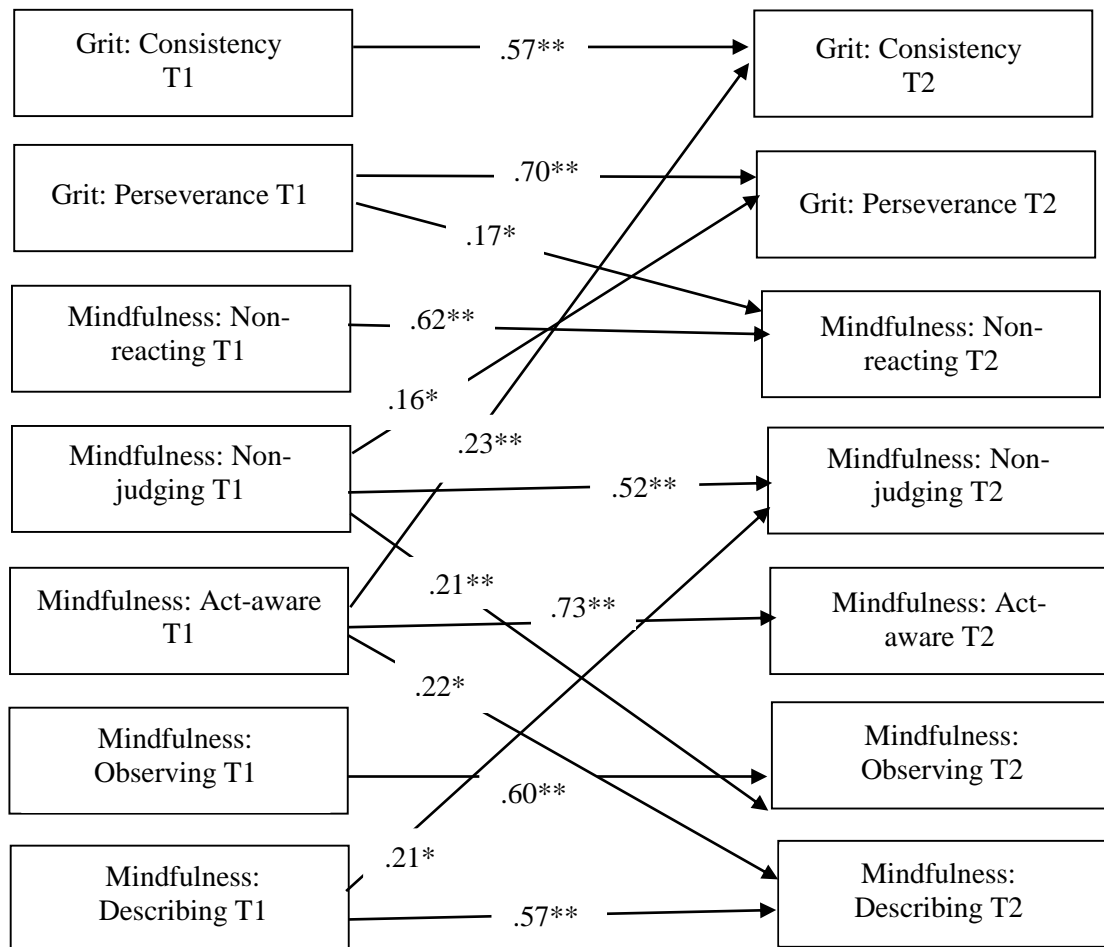


Figure 3. Longitudinal path model of the five mindfulness facets and the two components of grit predicting each other 4.5 month later. *Note.* Standardized beta weights are super-imposed on each pathway, with * $p < .05$ and ** $p < .01$. Covariances of the concurrent associates between T1 variables and T2 error terms were omitted from the model for the sake of clarity.

Research question: did hope mediate the influence of mindfulness on grit over time? In an effort to identify potential mediators of the mindfulness to grit relationship, we proposed that hope (Snyder et al., 1991), which is composed of two facets: agency (goal-directed determination) and pathways (planning), might function to explain, at least partially, how mindfulness predicts increases in grit over time (Hypothesis 3).

Factor structure of the Hope Scale. Confirmatory factor analysis was conducted to determine the structure of the Hope Scale. Results revealed that the two-factor structure of the Hope Scale mostly yielded acceptable model fit indices for both Term 1: $\chi^2/df = 4.50$; CFI = .93; TLI = .90; RMSEA = .10; SRMR = .05; and Term 2: $\chi^2/df = 2.83$; CFI = .96; TLI = .94; RMSEA = .09; SRMR = .05. The two components, agency and pathways, both yielded good internal reliability ($\alpha = .85$). The two components were also significantly correlated

with each other ($r(74) = .67, p < .001$). Similar Cronbach's alphas and degree of association were found at Term 2 (agency: $\alpha = .87$, pathways: $\alpha = .79$; $r(74) = .78, p < .001$).

Longitudinal mediation analysis. A dataset with two time points affords the possibility of evaluating hypothesised longitudinal mediation relationships (Jose, 2013). Thus, a mediation analysis where hope served as a potential mediator of the overall construct of mindfulness on the overall construct of grit was conducted. However, this mediation analysis was found to be non-significant (indirect effect = .032, 95% CI = [-.014, .105], $p = .157$). We then further explored potential mediation relationships that may exist between the facets within each construct. We focused on non-judging and acting with awareness as predictors as they were the only two mindfulness facets that predicted change in grittiness over time. In addition, hope-agency and hope-pathways served as potential mediators of these two mindfulness facets on the two facets of grit. Due to the limited sample size, four separate path models were constructed rather than one large model involving six variables. In all models, the *a* path in the mediation analysis was estimated between one of the Time 1 mindfulness facets of interest (non-judging or acting with awareness) and one of the (residualized) hope components at T2. The *b* paths were estimated between one of the Time 1 hope components and one of the (residualized) Time 2 grit components (see Figures 4 and 5). All variables at T2 were residualised in order to capture change over time. The indirect effects were estimated in Amos (Arbuckle, 2006), using 2,000 bootstrapped iterations, and significance was determined with a bias corrected 95% confidence interval. Results showed that hope-agency mediated the influence of non-judging on both perseverance of effort (indirect effect = .052, 95% CI = [.009, .126], $p = .019$), and consistency of interest (indirect effect = .044, 95% CI = [.001, .121], $p = .052$). Hope-agency also significantly mediated the influence of acting with awareness on perseverance (indirect effect = .049, 95% CI = [.009, .126], $p = .018$), but not consistency of interest (indirect effect = .020, 95% CI = [-.023, .089], $p = .332$). Hope-pathways did not yield any significant mediations, and those models are not reported here.

These findings suggest that one aspect of hope, i.e., hope-agency, functioned as a mediator between two facets of mindfulness (acting with awareness and non-judging) and the two facets of grit (perseverance of effort and consistency of interest). More specifically, increasing levels of non-judging led to higher levels of hope-agency, which in turn resulted in higher levels of perseverance of effort and consistency of interest. However, increasing levels of acting with awareness which predicted higher levels of hope-agency only resulted in higher levels of perseverance of effort, but not consistency of interest. Therefore, these

findings generally support our third hypothesis that hope would significantly mediate the positive relationship between mindfulness and grit, and also provide further insight into the mechanism underlying the relationship between mindfulness and grit at a deeper facet level.

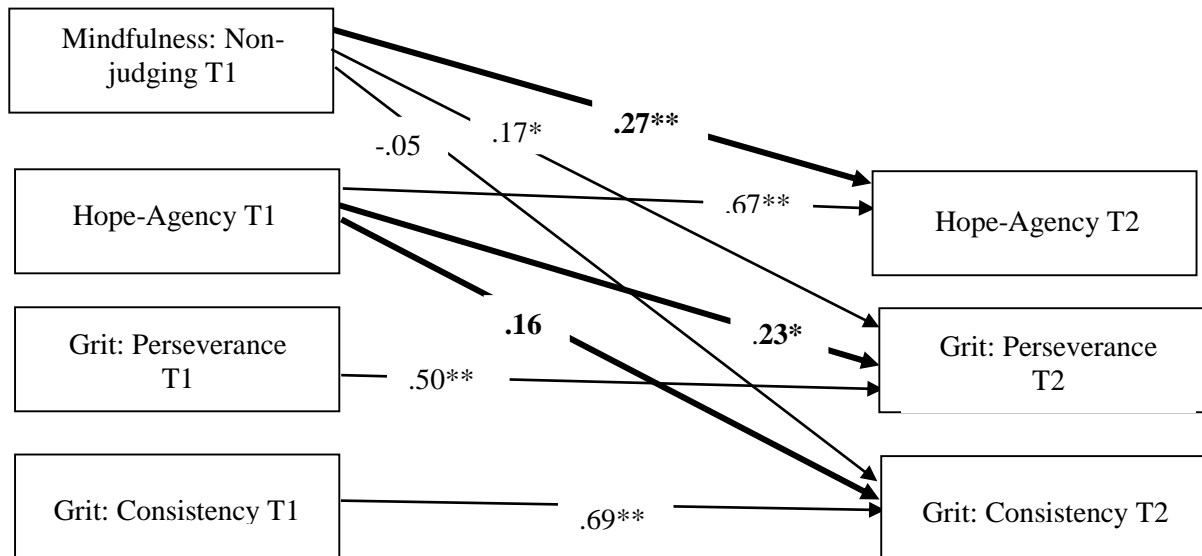


Figure 4. Hope-agency mediated the influence of non-judging on perseverance of effort and consistency of interest. *Note.* Standardized path coefficients are super-imposed on each path, with * $p < .05$ and ** $p < .01$. A and B paths are bolded.

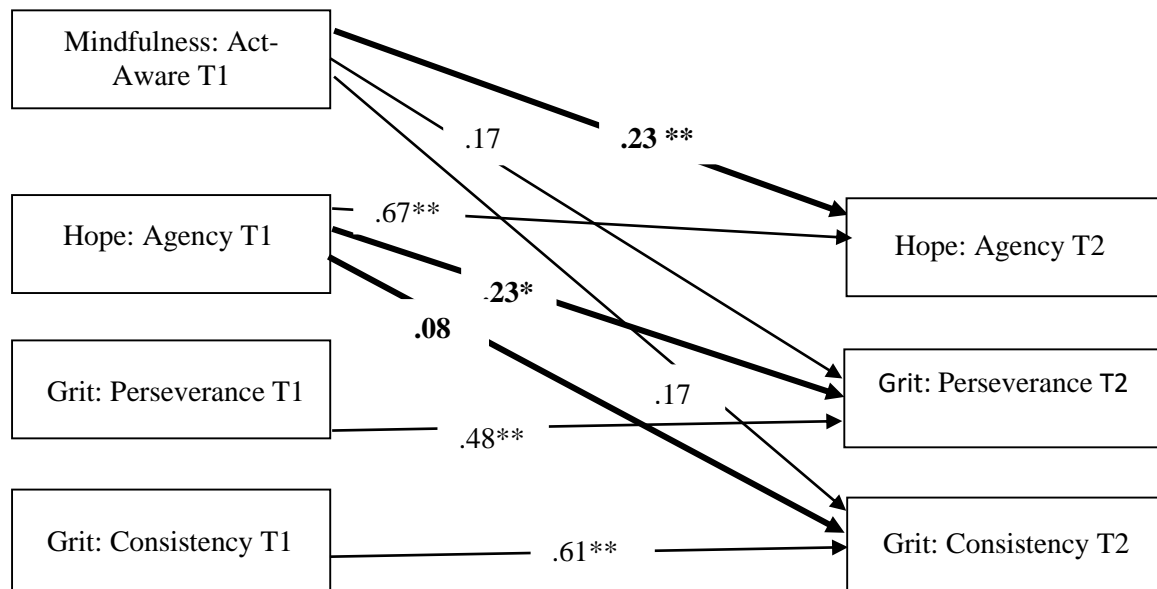


Figure 5. Hope-agency mediated the influence of acting with awareness on perseverance of effort and consistency of interest. *Note.* Standardized path coefficients are super-imposed on each path, with * $p < .05$ and ** $p < .01$. A and B paths are bolded.

Discussion

The goal of the present work was to determine whether dispositional mindfulness might function as a precursor of the development of grit. Using both concurrent and longitudinal data, and examining both mindfulness and grit at the facet level, we obtained evidence that two facets of mindfulness (namely nonjudging and acting with awareness) were reliable in predicting an increase in grit over time. Further, a mediational analysis suggested that hope based on goal-directed agency mediated the influence of the mindfulness facets of nonjudging and acting with awareness on the facets of grit. These results will now be considered within the context of existing literature.

The cross-sectional analyses revealed a number of interesting associations between the five facets of mindfulness and the two components of grit that generally supported our hypotheses, with one exception – observing, which was found to negatively associate with consistency of interest. In the literature, the observing facet has been found to yield some paradoxical patterns with other psychological constructs. For instance, it has been found to be positively associated with hyperarousal (Desrosiers, Klemanski, & Nolen-Hoeksema, 2013; Raphiphatthana, Jose, & Kielpikowski, 2015). Baer et al. (2008) suggested that without meditation training, individuals may observe in a non-mindful way, which may elicit negative consequences such as anxiety. Therefore, it is possible that university students, who are likely to be non-meditators, may observe in a non-mindful way which may negatively influence their ability to sustain interest in their long term goals.

However, cross-sectional findings are often ambiguous as they conflate bidirectional relationships into a single estimate of the association (Little, 2013), and thus no conclusions could be made regarding the direction of these relationships. Therefore, we followed up these analyses with a longitudinal study to examine the relationships over time, so that particular directional relationships could be identified. In the first instance, we examined the longitudinal relationship between the overall constructs of mindfulness and grit. The analysis revealed an unidirectional relationship where mindfulness significantly predicted change in grit over time but not vice versa, which suggests that mindfulness is an antecedent of grit but not the reverse. We then conducted a cross-lagged analysis to further explore the unique relationships between the five facets of mindfulness and the two components of grit. This more stringent analysis revealed that most of the associations found in the cross-sectional study were not verified when examined across time with residualization. Only two relationships from mindfulness to grit remained significant over this 4.5 month period of

time: acting with awareness was found to predict higher levels of consistency of interest, while non-judging predicted higher levels of perseverance of effort.

Acting with awareness may promote consistency of interest by encouraging individuals to act in ways that are aligned with their goals. Paying attention to one's present behaviour may make the goal that is driving that particular behaviour more salient. If an immediate goal is discrepant with the long-term goal, this conflict will prompt the individual to employ appropriate self-regulatory processes required to inhibit the alternative goal in order to protect the pursuit of long term goals (Baumeister et al., 1994). Therefore, by increasing goal-consistent behaviour, acting with awareness may elicit positive affect that typically arises when progress is made towards a goals (Custers & Aarts, 2005; Linnenbrink & Pintrich, 2010). Consequently, this positive affect may further fuel individuals' motivation and keep them interested in pursuing their long-term goals.

The cross-lag path analysis also revealed that non-judging predicted higher levels of perseverance over time, which is consistent with Evans, Baer, and Segerstrom's (2009) findings that highlighted non-judging's significant role in task persistence. Within the mindfulness literature, the non-judging facet has been found to be strongly linked to both high levels of self-compassion (Hollis-Walker & Colosimo, 2011), and low levels of negative thoughts, particularly rumination (e.g., de Bruin et al., 2012). Therefore, non-judging may foster perseverance by two processes. First, it may act to protect individuals from negative cognition (e.g., self-criticism) that can precipitate withdrawal and giving up (Diener & Dweck, 1978; Dweck & Leggett, 1988). Second, it may also boost positive self-related thoughts which have been shown to be associated with mastery goal-orientation (Dweck & Leggett, 1988; Elliott & Dweck, 1988). Therefore, fostering a non-judgmental stance towards thoughts and feelings may help to set an important foundation for cultivating intrinsic motivation and the growth mindset both of which promote perseverance (Yeager & Dweck, 2012; Vansteenkiste, Lens & Deci, 2010).

In addition, we also examined the opposite direction of relationships, wherein grit components were considered as predictors of the five mindfulness facets. One significant relationship was found, namely perseverance of effort predicted higher levels of non-reacting 4.5 months later. This result suggests that by being persistent in working towards long-term goals, individuals are less likely, over time, to become bogged down in negative thoughts and feelings. Our working memory is a limited source. Thus, when we are working on a task, we draw upon our cognitive resources which leaves less room in our cognitive system to process other information (Baddeley & Hitch, 1974; Forster & Lavie, 2009). Therefore, it is plausible

that when we are fully focused on difficult tasks which use up a lot of cognitive resources, we are left with few resources to further engage in distracting and ruminative thoughts. Consequently, such self-handicapping thoughts may be less common due to the limited available resources, and thus less effort is required in order to let such thoughts come and go without becoming entangled in them.

The last part of the present research aimed to investigate the possibility that hope might function as a mediator between the facets of mindfulness and the facets of grit. Results revealed that the agency facet of hope (but not the pathways facet) was a significant mediator of the influence of the non-judging facet of mindfulness on both of the grit components. Hope agency is defined as “the perceived capacity to use one’s pathways so as to reach desired goals” (Snyder, Rand, & Sigmon, 2002, p. 258). This “can do” attitude is very much conceptually interlinked with perceived competency, which is exhibited by individuals with high levels of self-compassion (Neff, Hsieh, & Dejitterat, 2005). Given non-judging’s strong links to self-compassion (Hollis-Walker & Colosimo, 2011), having a non-judgmental stance may help individuals to maintain their confidence in their ability to achieve their goals by encouraging positive self-related thoughts. Consequently, this approach in turn may enable individuals to sustain their interest and to keep persevering in working towards their long-term goals.

Furthermore, hope-agency was also found to mediate the positive relationship between acting with awareness and perseverance of effort. As previously discussed, paying attention to one’s present activity may help to frequently bring long-term goals to mind, and thus encourage goal-oriented behaviour (Chatzisarantis & Hagger, 2007). By progressing towards long-term goals, individuals will hopefully feel more competent due to positive feedback derived from accomplishing minor goals (Bandura, 1986; Denissen, Zarrett, & Eccles, 2007). Consequently, this sense of competency may then further fuel individuals’ motivation to keep working and persevering towards their long-term goals.

Limitations and Future Directions

The longitudinal sample was small in size, and the samples were drawn from the sampling frame of psychology students, who may not be representative of all university students. For example, our gender ratio was significantly skewed: more females than males. Also, the present study did not examine participants’ current or previous meditation experience. This important information should be obtained from future participants as meditation has been shown to moderate dispositional mindfulness’s influence on other

psychological outcomes (e.g., Baer et al., 2008; de Bruin et al., 2012). Also, since the present study utilized a sample of university students, who may manifest greater grittiness and mindfulness than community samples, it is important for future research to examine the relationship between dispositional mindfulness and grit within the general community. Moreover, although the FFMQ is a widely used method to assess dispositional mindfulness, there are some validity concerns regarding the use of self-reports, in general, and its accuracy in assessing dispositional mindfulness. Future research may benefit from using objective measures, i.e., physiological measures, alongside mindfulness questionnaires to provide further validation. It would also be fruitful to explore other potential mediators that may function to pass on the influence of mindfulness facets on grit components. Future research could consider resilience or adaptive coping strategies as mechanisms in which the acting with awareness and non-judging facets impact on levels of consistency of interest and perseverance of effort.

Implications and Conclusions

The purpose of the present study was to determine whether dispositional mindfulness promotes and fosters grit. The main finding obtained here was that the two mindfulness facets of non-judging and acting with awareness predicted increases in two different aspects of grit over time. These findings imply that by attending to one's present activities, one is more likely to sustain interest in their long term goals. Additionally, by being non-judgmental of one's thoughts and feelings, one is more likely to keep persevering and working towards one's long-term goals. These findings suggest that dispositional mindfulness helps individuals to develop characteristics that supports them in achieving their long-term goals. This set of results has further important implications for mindfulness interventions as such interventions have been shown to enhance dispositional mindfulness, and thus they may also boost grit as a by-product. Particularly, mindfulness interventions that prioritize specific aspects of mindfulness, i.e., non-judging and acting with awareness which have been shown to be the most relevant to grit, may be quite effective for grit cultivation. However, more research is required, specifically randomized control trial studies, to verify such potential benefits of mindfulness interventions.

Linkage from Study 1 to Study 2

Study 1 has provided several foundational insights into the relationship between mindfulness and grit. It demonstrated that mindfulness, particularly the acting with awareness and the non-judgment facets, predicted a positive change in levels of overall grit and its components over time. It also revealed that one specific component of hope, namely agency, i.e., “perceived capacity to use one’s pathways so as to reach desired goals” (Snyder et al., 2002), mediated the influence of both non-judging and acting awareness on both of the two grit components. These findings suggest that by being more mindful, especially by paying more attention to present activities and being more non-judgmental towards thoughts and feelings, individuals are more likely to hold a positive belief about their capability of achieving their goals (agency hope), which further enables them to sustain interest in their long term goals and pursue them with persistence and stamina. These findings are the first in the field to demonstrate a temporal link between mindfulness and grit, and one probable mechanism through which mindfulness fosters higher levels of grit over time.

However, as these findings were established in a Western culture, it is unknown whether the two constructs would also be empirically associated in a non-Western culture. Cross-cultural examination of the relationship between mindfulness and grit is of theoretical and practical importance as both constructs have been developed and mainly studied in the West. Therefore the next study was designed to address this gap in the literature by examining and comparing how mindfulness and grit are related to each other across Thai and NZ university students. Additionally, prior to cross-cultural comparisons, it was necessary to examine measurement invariance of the mindfulness and grit scales in order to ensure that they would capture similar constructs across these two cultures.

STUDY 2: The Association between Mindfulness and Grit: An East vs. West Cross-Cultural Comparison

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The manuscript has been revised based on an initial set of favourable reviews, and has been re-submitted to the journal *Mindfulness*, 2018.

Abstract

Mindfulness, namely present-oriented attention that is non-judgmental in nature, and grit, namely perseverance and passion for long term goals, are psychological constructs that have recently received considerable attention within the West. Given the theoretical importance and heretofore lack of research into how these two constructs relate to each other, the present study aimed to examine how mindfulness and grit relate to each other within Western and non-Western cultures. New Zealand (N = 343) and Thai (N = 233) university students completed a battery of questionnaires that assessed the variables of interest. Although both samples showed a positive association between grit and mindfulness at the construct level, results at the facet level showed several notable differences. Specifically, acting with awareness and non-judging were found to predict grit for NZ students more strongly than for Thai students. These findings suggest that mindfulness evidenced more robust relationships with grit in an individualistic culture than in a collectivist society.

The Association between Mindfulness and Grit: An East vs. West Cross-Cultural Comparison

Mindfulness, a concept adapted from the Buddhist tradition, has been increasingly studied within the West. It is typically described as an act of “paying attention in a particular way: On purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 1994, p. 4). In the literature, mindfulness can be conceptualized as a state or a trait; the present study, however, focused on mindfulness as a trait. To date, self-report is the chief method used to measure trait mindfulness. The most comprehensive questionnaire currently used within the literature is the Five Facet Mindfulness Questionnaire (FFMQ), developed by Baer, Smith, Hopkins, Krietemeyer, and Toney (2006). It conceptualizes mindfulness as a multi-faceted construct and thus assesses five different aspects of mindfulness, namely: a) observing – observation of mental or physical experiences; b) describing - the use of language to label one’s internal experiences; c) acting with awareness – attention of one’s present activities; d) non-judging of inner experience - the ability to hold a nonevaluative stance towards one’s thoughts and feelings; and e) non-reactivity to inner experience - the ability to let thoughts and feelings come and go without becoming entangled in them.

Mindfulness questionnaires such as the FFMQ have been developed and mainly tested in the West. Given that the roots of mindfulness are embedded within the Buddhist tradition, it is imperative to examine whether the Western conceptualization and measurements of mindfulness are similar to those in a culture which is heavily influenced by Buddhism. Since Theravada Buddhism is the de facto state religion of Thailand Christopher, Christopher, and Charoensuck (2009) conducted a study which compared how mindfulness, as measured by the Kentucky Inventory of Mindfulness (KIMS) and the Mindfulness Attention Awareness Scale (MAAS), is experienced by Thai university students in comparison to American students. The authors found that American and Thai students endorsed similar levels of mindfulness as measured by the MAAS. However, although they did not compare KIMS overall scores, they found that American students endorsed higher levels of specific facets of the KIMS measure, i.e., observing and accepting without judgment, than did Thai university students.

The apparent difference in the non-judging facet of mindfulness may reflect the cultural differences between Western and Eastern cultures. Eastern cultures are described as collectivistic, where harmony of the society is prioritized over individuals’ goals and values, while Western cultures are typically described as individualistic, where importance is placed on individuals’ goals and values. According to Kitayama, Markus, Matsumoto, and

Norasakkunkit (1997), self-criticism is adaptive and an integral part of communal social relationships within collectivistic cultures as it fuels individual's effort to improve oneself in order to function harmoniously with others. This argument may provide an explanation as to why individuals from a collectivistic culture, such as Thailand, were found to be less accepting and more judging of themselves than those from individualistic cultures where harmony is less valued than individual differences.

It is important to know that Christopher et al. (2009) utilised The MAAS and KIMS which evidence some important differences from the FFMQ. In contrast to the FFMQ, the MAAS conceptualizes mindfulness as a single construct which solely focuses on present-oriented attention. The KIMS is very similar to the FFMQ in that it conceptualizes mindfulness as a multi-faceted construct and includes four factors that are almost identical to corresponding facets of the FFMQ, i.e., observing, describing, acting with awareness, and accepting without judgment. However, the FFMQ incorporates an additional factor that describes non-reactivity towards inner experiences which has been shown to be an important mindfulness facet in relation to other psychological outcomes (Baer et al., 2006; De Bruin, Topper, Muskens, Bogels, & Kamphuis, 2012). Thus with five different facets, the FFMQ is able to provide a more comprehensive view of mindfulness.

Another important psychological construct that has caught the attention of many scholars in recent years is *grit*, which is defined as passion and perseverance for long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007). It is proposed to encapsulate two important facets, one highlighting *consistency of interest* in long term goals and the other emphasizing *persistence of effort* in pursuing those long term goals.

In the Western literature, grit has been discussed as being related to the growth mindset (Duckworth, 2016; Hochanadel & Finamore, 2015; Laursen, 2015; Perkins-Gough, 2013). The growth mindset is one of the two types of mindset identified by Carol Dweck (1999), which describes individuals who hold the belief that intelligence is malleable and can be cultivated through effort and hard work. Research has shown that in comparison to individuals with a fixed mindset, those that believe that intelligence is a fixed attribute, individuals with a growth mindset are not easily discouraged by setbacks and tend to continue to work through obstacles. As one can see, the description of the growth mindset conceptually overlaps with grit, which describes tenacity and perseverance in working towards long term goals.

Within the cross-cultural literature on academic outcomes, Asian Americans have consistently been found to accrue better academic outcomes than their European-American

counterparts (e.g., Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987; Kao & Thompson, 2003). Their superior academic performance has been attributed to the cultural influence of Confucianism, which prioritizes perseverance and hard-work over innate abilities (Zhang & Carrasquillo, 1995). Supporting this claim, Heine et al. (2001) reported that Japanese students who failed on a task persisted more on a follow-up task than those who succeeded, while the opposite pattern occurred for the North American students. Similarly, Jose and Bellamy (2012) showed that perseverance demonstrated by Asian children is driven by parents' encouragement of the growth mindset. These findings suggest that Eastern cultures, particularly those influenced by Confucianism, encourage individuals to develop a growth mindset, more so than Western cultures. Since, grit and the growth mindset have been suggested to be conceptually interlinked, it is plausible that individuals from Eastern cultures may exhibit higher levels of grit in comparison to those from Western cultures. However, similar to mindfulness, grit is a concept developed in the West that has yet to be fully explored in non-Western cultures. Therefore, more research is needed to fully understand grit within non-Western cultures.

Measurement invariance is an important issue when considering cross-cultural comparisons of psychological constructs. A measure is judged to possess measurement invariance if two or more groups of participants respond to the questionnaire similarly (Cheung & Rensvold, 2002; Milfont & Fischer, 2010). Determining measurement invariance is a critical first step before the measure can be used to compare means and associations across groups. Without this first step, it cannot be discerned whether the differences found between groups reflect true differences or differences due to response sets or biases. The three most commonly tested measurement invariance levels are *configural invariance*, *metric invariance*, and *scalar invariance*. Establishment of *configural invariance* suggests that the groups of comparison responded to the items in a way that reflect the same factor structure. This step is a basic requirement for the other measurement invariance levels. *Metric invariance* indicates that the items' loadings onto its designated factor are similar across groups, while *scalar invariance* indicates that the intercepts of items (i.e., means) are the same across groups (for a more in depth discussion on invariance testing please refer to Krägeloh, Bergomi, Siegert, & Medvedev, 2017; Milfont & Fisher, 2010). However, despite the general importance of measurement invariance testing, most of the studies that have examined mindfulness and grit cross-culturally have not performed this crucial step before using the measures to compare means and associations across cultural groups.

Both mindfulness and grit are characteristics that have received attention in the literature. However, we have not found any published studies that describe how these two constructs are related to each other. On the other hand, suggestions about this potential association can be discerned in several studies. In the literature, mindful individuals have been shown to positively frame stressful situations, which help them to better cope with the situation (Garland, Gaylord, & Fredrickson, 2011; Garland, Gaylord, & Park, 2009). Therefore, they are more resilient and are less affected by stressful situations (Aikens et al., 2014; Weinstein, Brown, & Ryan, 2009). In an analogous fashion, gritty individuals persevere in working towards their long-term goals despite failure and adversity (Duckworth et al., 2007), thus, their ability to remain resilient and cope with stress may be reflective of mindful characteristics. Based on these observations, it is plausible that grit and mindfulness may be positively associated, i.e., gritty individuals are likely to also report higher levels of mindfulness.

Based on the discussion provided above, the present study aimed to examine mindfulness and grit, and the relationship between the two constructs, across culture. Particularly, the present study proposed four hypotheses and one research question. First, as early findings on mindfulness in non-Western contexts, specifically Thailand (Christopher et al., 2009), have suggested that the overall level of mindfulness may be similar to that of a Western sample, it was hypothesized that Thai and NZ university students would endorse similar levels of the overall construct of mindfulness (Hypothesis 1). Second, given Christopher et al.'s (2009) findings and arguments put forth by Kitayama et al. (1997), it was hypothesized that NZ students would endorse higher levels of the mindfulness facet of non-judging than Thai students as they should engage in less self-criticism (Hypothesis 2). Third, since the growth mindset, which is conceptually related to grit, is highly endorsed within Eastern cultures, it was predicted that Thai university students would endorse higher levels of grit than NZ university students (Hypothesis 3). Lastly, since mindfulness has been found to function in a way that is similar to the West, i.e., positively relate to cognitive control and negatively relate to depression and maladaptive emotional regulatory strategy (Sugiura et al., 2012), it was hypothesized that overall mindfulness and grit would be positively related to each other within both NZ and Thai cultural groups (Hypothesis 4). Given the importance of measurement invariance in cross-cultural investigation, the present study first sought to establish measurement invariance of the FFMQ and the Grit Scale before going on to compare mindfulness and grit across cultural groups.

In regards to the relationships between the facets of mindfulness and the facets of grit, no specific predictions were made as no previous research has investigated associations at this level. Therefore, this part of the present study was exploratory, and thus was treated as a research question: how do the five facets of mindfulness relate to the two components of grit?

Method

Participants

The Western cultural group was represented by 343 New Zealand university students, who were taking psychology courses, recruited from Victoria University of Wellington (260 females, 81 males, 2 information missing) aged between 18 and 60 years ($M = 21.38$, $SD = 5.90$). The students participated in the study as part of their research methods course, and no extra course credit was given. The Eastern cultural group consisted of 233 Thai university students recruited from various universities from Thailand (169 females, 60 males, 4 information missing) aged between 18 and 33 years ($M = 20.41$, $SD = 1.57$). The majority of Thai students (98.3%) attended Thammasat University. Thai students were recruited by two means. One hundred and seventy-seven students participated in the study as part of their psychological course at Thammasat University, where they were given extra course credit for their participation. The other 56 Thai students were recruited via flyers. They were informed that by completing the survey, their name would be entered in a prize draw for a movie voucher. There were no significant differences in the mean of mindfulness and grit between the two Thai student groups, therefore, they were merged into one group that represented Thai university students.

Procedure

Both NZ and Thai university students completed a battery of questionnaires consisting of the variables of interest, i.e., mindfulness and grit, alongside other variables not relevant for the present study. The NZ students completed an online version of the survey while Thai students completed the survey via two means, either by completing a paper and pencil version or by completing the survey online. The questionnaires administered to the Thai students were translated into the Thai language using the back-translation technique (Hambleton, 2001; Van de Vijver & Hambleton, 1996). A Thai Theravada Monk who has acquired a master's degree from the U.S. translated the English version to the Thai language. In return, another Thai layperson, who also studies Buddhism and has experience in translating English books into the Thai language, translated the Thai version back to English. The first author, who is fluent in both Thai and English and has wide and deep knowledge of

Buddhism, acted as the moderator and communicated with both of the translators to settle any differences noted in the translation process.

Measures

Five Facet Mindfulness Questionnaire – Revised (FFMQ-R). The present study used a revised version of the 32-item version of the Five Facet Mindfulness Questionnaire (FFMQ-SF: Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011) to assess mindfulness. The FFMQ-R employs five subscales (facets) that are identical to the original version, however, each of the facets contains exactly five items: three positively worded, e.g., “I notice the smells and aromas of things”, and two negatively worded items, e.g., “I tell myself I shouldn’t be feeling the way I’m feeling”. This revised scale corrected the previous version’s use of unequal numbers of items per facet as well as unequal ratios of positively worded to negatively worded items for each facet (for further description please refer to Raphiphatthana, Jose, & Kielpikowski, 2015). Participants responded to each item using a 5-point Likert scale that ranged from 1 (*never or very rarely true*) to 5 (*very often or always true*). Facet scores were calculated by averaging the scores across the individual items for each facet after reverse-coding the two negatively worded items. Higher facet scores indicate higher endorsement of that particular facet. The FFMQ-R (Raphiphatthana, et al., 2015) yielded similar psychometric properties and reliabilities to that of the original 32-item version of the FFMQ, which are deemed to be acceptable (Bohlmeijer et al., 2011).

The Grit Scale. The 12-item Grit scale (Duckworth et al., 2007) was used in the present study to measure levels of grit. The scale includes two subscales, one assesses *consistency of interest* which contains 6 reverse-coded items, and another assesses *perseverance of effort* which contains 6 positively-worded items. Participants responded to items such as “My interests change from year to year” (reverse-coded), and “I am diligent” by using a 5-point Likert scale ranging from 1 (*not at all like me*) to 5 (*just like me*). The items in the consistency of interest subscale were reverse-coded prior to the calculation of the overall scale and subscale score. The overall subscale score was calculated by averaging the scores across the individual items within the subscale. Likewise, the overall grit score was calculated by averaging the scores of all items within the scale. Higher scores indicate higher levels of endorsement of grit and its two components. Previous research with North American samples has demonstrated good internal reliability for each of the subscales (consistency of interest, $\alpha = .84$; perseverance of effort, $\alpha = .78$) (Duckworth et al., 2007).

Data Analyses

First, measurement invariance of the FFMQ-R and the Grit Scale was tested across the Thai and NZ samples using Multigroup Confirmatory Factor Analysis (MGCA). In the case that measurement invariance was established, the next step was to determine the differences in the mean levels of the overall construct of mindfulness and grit as well as their sub-facets between the Thai and NZ samples. Then the relationships between the five facets of mindfulness and the two components of grit were examined via path analysis conducted in AMOS (Arbuckle, 2006), with a path model assessing relationships for each cultural group separately. Lastly, the two path models, one representing the two cultural groups, were then compared for equivalence using an omnibus test.

Skewness, Kurtosis and Treatment of Missing Values

Overall, the total amount of missingness for both NZ and Thai samples was very low. Specifically, only 1.84% of data in total was missing from the NZ sample, while the Thai sample exhibited 0.19% of missing data. In addition, we confirmed that the missing data occurred at random by running the Little chi-square test which yielded non-significant findings for both samples (NZ: $\chi^2 = 1235.288$, $df = 1225$, $p = .413$; Thai: $\chi^2 = 163.774$, $df = 169$, $p = .599$). The few missing values were imputed using Expectation-Maximization imputation (Dempster, Laird, & Rubin, 1977). The data for both samples were found to be normally distributed, with all variables demonstrating skewness and kurtosis within standard limits, thus no transformations were necessary.

Results

Testing the Factor Structure of the Two Measures

We initially conducted confirmatory factor analysis (CFA) using AMOS (Arbuckle, 2006) to confirm the five-factor structure of the FFMQ-R within both NZ and Thai samples. On the basis of several reasons, parcels of items rather than individual items were used in the conducted CFAs. First, since item parcelling is a technique commonly used within the literature to determine the factor structure of the FFMQ (e.g., Baer et al., 2006; de Bruin, Topper, Muskens, Bogels, & Hamphuis, 2012), it seems fitting that the present study also uses such technique. Moreover, as discussed by Little, Cunningham, Shahar, and Widamon, (2002), parcelling of items has several advantages over CFAs performed on all individual items. First, parcels of items manifest greater reliability than individual items, thus they serve as more stable indicators, which reduces the risk of spurious correlations. Second, in comparison to individual items, parcels have been shown to yield stronger loadings on the

latent construct. And third, due to including more scale points than single item Likert scores (which are technically ordinal data), parcel scores more closely approximate continuous measurement of the latent construct. However, on the other side, concerns about multidimensionality of parcel scores has been raised regarding the items parcelling technique (Bandalos, 2002). In order to address this issue, we examined internal consistency reliabilities (i.e., Cronbach's alphas) of the facets contained in the FFMQ-R and the Grit Scale. Results showed that all items within a facet correlated highly with each other (indicated by high α s) for both measures, which suggests unidimensionality of the facets. Moreover, previous studies have demonstrated unidimensionality of the FFMQ (Baer et al., 2006) and the Grit Scale (Duckworth et al. 2007), which provides further assurance for the present study to use the parcelling technique for both measures.

However, we first conducted CFA with item level data, i.e. non-parcelled items, to examine a non-hierarchical five-factor model (1st order model) where the five facets of mindfulness were allowed to intercorrelate. Since this type of CFA does not account for redundant error, it was unsurprising that the model yielded unacceptable fit indices. Given this finding and the advantages of using items parcelling as mentioned above, we subsequently conducted CFA with parcelled items to examine the factor structure of the non-hierarchical model. Items one and three were parcelled into the first indicator, while items two and five were parcelled to form the second indicator. Item 3 was treated as a stand-alone item and was the third indicator. This parcelling technique was applied to each of the facets. The analysis yielded good model fit indices for both the NZ sample: $\chi^2/\text{df} = 2.509$; CFI = .934; TLI = .914; RMSEA = .066; sRMR = .053 and the Thai sample: $\chi^2/\text{df} = 1.456$; CFI = .942; TLI = .923; RMSEA = .044; sRMR = .057. Second, in order to test whether the five facets are constituents of an overall latent factor of mindfulness, we conducted a hierarchical model (2nd order model), where the five latent facets loaded onto the overarching mindfulness factor. We found no significant loss of fit in this 2nd order model for both the NZ sample: $\chi^2/\text{df} = 2.701$; CFI = .921; TLI = .902; RMSEA = .071; sRMR = .066, and the Thai sample: $\chi^2/\text{df} = 1.463$; CFI = .937; TLI = .923; RMSEA = .045; sRMR = .061. These findings indicate that both NZ and Thai university students' data support the five-factor model as described by Baer et al. (2006).

We employed the same analytic strategy to the grit scale. First, we conducted a 1st order CFA using item parcels as indicators for the two components of grit. In this model, the two components of grit, consistency of interest and perseverance of effort, were allowed to

intercorrelate. Resulting good model fit indices were obtained for both the NZ sample: $\chi^2/df = 1.229$; CFI = .998; TLI = .996; RMSEA = .026; sRMR = .028 and the Thai sample: $\chi^2/df = 1.470$; CFI = .991; TLI = .983; RMSEA = .045; sRMR = .044, which supported the two-factor structure of the Grit scale as described by Duckworth et al. (2007) in both cultural groups. In regards to 2nd order CFA, due to the two sub-factor structure of the grit scale, additional constraints were required for the model to converge at the 2nd order level. In particular, constraints were imposed on the variances of the two factors of grit to be equal. The model yielded the same set of model fit indices as that of the 1st order model, for both Thai and NZ university students.

Did Participants Respond Similarly to the Two Measures Between the Two Cultures?

Multigroup Confirmatory Factor Analysis (MGCFA) was conducted using AMOS (Arbuckle, 2006) to examine whether measurement invariance for both the FFMQ-R and the Grit Scale across the Thai and NZ samples could be confirmed. MGCFA runs three models sequentially for each scale in order to test for three levels of invariance, namely configural, metric, and scalar. Metric invariance is required for meaningful investigation of relationships between the variable of interest with other variables, while scalar invariance must be met to allow for meaningful mean comparisons of the variable of interest across groups (Cheung & Rensvold, 2002). The non-hierarchical models were first tested for invariance, followed by invariance testing of the hierarchical or 2nd order model, for the FFMQ-R and the Grit Scale. The model fit indices for the three levels of invariance testing for both non-hierarchical and 2nd order models, of both the FFMQ-R and the Grit Scale, are reported in Table 1.

The 1st order five-factor structure of the FFMQ-R, where the five facets were allowed to intercorrelate, with no constraints imposed on parameter estimates, was simultaneously fitted across the Thai and NZ samples. The unconstrained model yielded good model fit indices: $\chi^2 = 317.390$; $df = 160$; CFI = .936; GFI = .927; RMSEA = .041. Likewise, the 1st order model of the Grit Scale also yielded good model fit indices when simultaneously fitted across the two cultural groups: $\chi^2 = 21.591$; $df = 16$; CFI = .995; GFI = .987; RMSEA = .025. These results indicate that both measurement tools demonstrate *configural invariance*, which suggests that the five-factor structure of the FFMQ-R and the two-factor structure of the Grit Scale were similar across the two cultural groups.

Next, *metric invariance* was examined for both measures, wherein the parcelled items' loading onto their particular factor was constrained to be equal across Thai and NZ samples. As shown in Table 1, the ΔCFI and ΔGFI from the unconstrained (Model 1) to the

more constrained model (Model 2) yielded values less than .01, for both the FFMQ-R and the Grit Scale. This result indicates that the parcelled items' loadings were similar across the two cultural groups, demonstrating *metric invariance* for both measures.

And last, *scalar invariance* was tested, where constraints were imposed upon items' intercepts to be equal across the two cultural groups, in addition to the previously imposed constraints on items' loadings. As shown in Table 1, the non-hierarchical model of the FFMQ-R and the Grit Scale demonstrated *scalar invariance*, as the model fit indices of the scalar model (Model 3) in comparison to that of the metric model (Model 2), specifically the CFI and GFI, did not change beyond the adopted criteria, i.e., more than .01 (Cheung & Rensvold, 2002). This set of results suggests that factors within the FFMQ-R and the Grit Scale manifested the same intervals and zero points across the two cultural groups, which further implies that they were operationalized in the same way across Thai and NZ samples. These results suggest that meaningful mean group comparisons of the sub-factors of mindfulness and grit could be made between Thai and NZ samples.

The 2nd order models of the FFMQ-R and the Grit Scale were also tested for equivalence across the two cultural groups. As can be seen in Table 1, when the 2nd order model of the FFMQ-R, where the five facets loaded onto the overall construct of mindfulness, was simultaneously fitted across the Thai and NZ sample with no constraints (Model A), the model yielded good model fit indices, demonstrating *configural invariance*. This result suggests that the hierarchical five-factor structure of the FFMQ-R was similar across the two cultural groups. Next, *metric invariance* was tested by constraining the 1st order loadings (the items' loadings onto their particular facet, Model B), and the 2nd order loadings (the five facets' loadings on the overall mindfulness construct, Model C), to be equal across group. The fit of the overall model, specifically CFI and GFI, did not change more than 0.01, from Model A to Model B or from Model B to Model C, suggesting that the items' loadings and the facets' loadings were similar across the two cultural groups (Cheung & Rensvold, 2002). And last, scalar invariance was tested by constraining facets' intercepts (Model D) and items' intercepts (Model E) to be equal across the two cultural groups, on top of the previously imposed constraints on the pathway loadings. Again, no significant loss of fit was seen from Model C to model D or from Model D to Model E, indicating that the items and facets within the FFMQ-R manifested the same intervals and zero points across the two cultural groups, all of which implies that these factors were operationalized in the same way across Thai and NZ university samples.

The same analytic strategy was applied to the Grit Scale. However, as noted above, the base model failed to converge and two additional constraints were required for the unconstrained model (Model A) to run simultaneously across the two cultural groups, i.e., the variances of the two grit components were set to be equal and the variance of the overall grit construct was set to 1. Consequently, we were only able to test for *metric invariance* but not *scalar invariance*, at the 2nd order level. *Metric invariance* was tested by imposing constraints on the 1st order pathways (Model B) and 2nd order pathways (Model C) of Model A. As can be seen in Table 1, these sequential placing of constraints did not significantly change the CFI or GFI, which indicated *metric invariance*. This set of results suggests that the two subfactors related to the overall construct of grit in a similar way across Thai and NZ university samples, and thus the latent grit construct could be used to relate to other constructs across both cultures. However, since *scalar invariance* could not be tested, the mean of the latent grit construct could not be compared across the two groups.

Table 3

Invariance test for the FFMQ-R and the Grit Scale across NZ and Thai cultural groups

Models		χ^2	df	χ^2/df	RMSEA	CFI	GFI	Comparison	ΔCFI	ΔGFI
FFMQ-R 1 st order	1. Unconstrained (configural invariance)	317.390	160	1.984	.041	.936	.927			
	2. Measurement weights (metric invariance)	332.019	170	1.953	.041	.934	.925	2 vs. 1	-.002	-.002
	3. Structural covariance (scalar invariance)	364.264	185	1.969	.041	.927	.918	3 vs. 2	-.007	-.007
FFMQ-R 2 nd order	A. Unconstrained (configural invariance)	354.622	170	2.086	.043	.925	.919			
	B. Measurement weights (1 st order metric invariance)	370.792	180	2.06	.043	.923	.916	2 vs. 1	-.002	-.003
	C. Structural weights (2 nd order metric invariance)	381.892	184	2.076	.043	.920	.914	3 vs. 2	-.003	-.002
	D. Structural covariance (2 nd order scalar invariance)	388.618	185	2.101	.044	.917	.913	4 vs. 3	-.003	-.001
	E. Structural residuals (1 st & 2 nd order scalar invariance)	399.632	190	2.103	.044	.915	.910	5 vs. 4	-.002	-.003
Grit Scale 1 st order	1. Unconstrained (configural invariance)	21.591	16	1.349	.025	.995	.987			
	2. Measurement weights (metric invariance)	25.109	20	1.255	.021	.996	.985	2 vs. 1	.000	-.002
	3. Structural covariance (scalar invariance)	29.138	23	1.267	.022	.995	.984	3 vs. 2	-.001	-.001
Grit Scale 2 nd order	1. Unconstrained (configural invariance)	21.596	17	1.270	.022	.996	.987			
	2. Measurement weights (1 st order metric invariance)	25.424	21	1.211	.019	.996	.985	2 vs. 1	.000	-.002
	3. Structural weights (2 nd order metric invariance)	29.138	23	1.267	.022	.995	.984	3 vs. 2	-.001	-.001

Were Differences in Means and Associations Found Between the Two Cultures?

Internal reliability was evaluated with Cronbach's alphas. Results showed that for the NZ sample, most of the variables yielded a Cronbach's alpha above .70, which indicates acceptable internal reliability, with one facet (acting with awareness) exhibiting a Cronbach's alpha approaching this value ($\alpha = .67$). The internal reliabilities for the Thai sample were not as high, in comparison, as most of the Cronbach's alphas for this group fell in the range of .60 and .70, which are nevertheless usually deemed to be acceptable.

Since the FFMQ-R was found to exhibit scalar invariance, both at the 1st and 2nd order level, we were able to compare the means of the overall construct and the facets of mindfulness across the two cultural groups using SEM mean testing (Byrne, 2010). As predicted, the 2nd order model showed that both Thai and NZ students endorsed similar levels of the overall mindfulness as revealed by the non-significant mean comparison ($B = .04$, $SE = .02$, $p = .052$). When investigated at the 1st order level, the two cultural groups exhibited several significant mean group differences at the facet level. As predicted in Hypothesis 2, in comparison to Thai students, NZ students reported higher levels of non-judging ($B = .31$, $SE = .07$, $p < .001$), and describing ($B = .17$, $SE = .09$, $p = .045$). However, they were found to endorse lower levels of acting with awareness relative to Thai students ($B = -.25$, $SE = .05$, $p < .001$). Mean differences were not found for the other two mindfulness facets (Non-react: $B = .07$, $SE = .07$, $p = .36$, Observing: $B = -.07$, $SE = .07$, $p = .24$). In regards to grit, since we were not able to establish scalar invariance at the 2nd order level, a mean comparison at the overall construct level could not be made. On the other hand, since the 1st order model demonstrated scalar invariance, we were able to conduct mean comparisons at the facet level across the two cultural groups. Unexpectedly, NZ students endorsed higher levels of perseverance of effort relative to Thai students ($B = .28$, $SE = .05$, $p < .001$). No mean difference was found for consistency of interest between the two groups ($B = -.08$, $SE = .06$, $p = .159$).

Last, as predicted (Hypothesis 4), the overall construct of mindfulness was found to positively and significantly correlate with the overall construct of grit separately for both the NZ ($r(334) = .46$, $p < .001$) and the Thai samples ($r(233) = .31$, $p < .001$). However, the correlation between the two constructs was significantly stronger for the NZ sample than for the Thai sample ($p < .001$). Moreover, several notable differences in the zero-order correlations between the five facets of mindfulness and the two components of grit were observed between the Thai and NZ samples. For the Thai sample, the mindfulness facets of describing, non-reacting, and non-judging did not yield significant relationships with

consistency of interest. Additionally, non-judging and observing also did not significantly correlate with perseverance of effort. In contrast, for the NZ sample, almost all of the five facets of mindfulness, except observing, significantly and positively correlated with the two components of grit. These apparent differences in zero-order correlations were explored more systematically in the following path model examining the strengths of association among facets by the two cultural group.

Table 4

Bivariate Correlations and Descriptive Statistics for the FFMQ-R and the Grit Scale for the Two Cultures Separately

Cultural groups		1	2	3	4	5	6	α	Mean (SD)
Thai	1. FFMQ (Des)							.74	3.00 (0.78)
	2. FFMQ (Non-r)	.18**						.65	2.92 (0.72)
	3. FFMQ (Non-j)	.28**	.32**					.62	3.15 (0.65)
	4. FFMQ (Obs)	.13	-.00	.03				.60	3.76 (0.66)
	5. FFMQ (Act-a)	.34**	.35**	.36**	.19**			.65	3.57 (0.64)
	6. Grit (Consistency)	.12	.08	.08	.15*	.20**		.79	2.83 (0.68)
	7. Grit (Perseverance)	.28**	.25**	.06	.09	.23**	.33**	.77	3.14 (0.61)
NZ	1. FFMQ (Des)							.83	3.08 (0.85)
	2. FFMQ (Non-r)	.28**						.83	2.99 (0.88)
	3. FFMQ (Non-j)	.35**	.55**					.74	3.32(0.76)
	4. FFMQ (Obs)	.15**	.15**	.17**				.71	3.68 (0.7)
	5. FFMQ (Act-a)	.38**	.35**	.37**	.30**			.67	3.28 (0.62)
	6. Grit (Consistency)	.21**	.26**	.25**	-.08	.37**		.75	2.75 (0.77)
	7. Grit (Perseverance)	.32**	.35**	.40**	.11	.43**	.41**	.83	3.54 (0.65)

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

How Were Mindfulness Facets Related to Grit Facets?

The unique relationships between the five facets of mindfulness and the two facets of grit were examined through path model analysis conducted in AMOS (Arbuckle, 2006). A single model was constructed, as depicted by Figure 1, wherein the five facets of mindfulness predicted the two components of grit in a fully saturated model, for the two groups of the Thai and NZ samples. Results from the path analysis for both samples are reported in Table 3. As can be seen, we found several similarities between the two samples, i.e., non-reacting and describing were found to significantly and positively predict higher levels of perseverance of effort for both cultural groups. However, at the same time several differences were noted. More specifically, four significant differences were obtained when equality constraints, using a chi-square difference test with 1 *df*, were performed on all 10 paths in order to determine the equivalence or difference between the two cultural groups. This test showed that acting with awareness predicted consistency of interest more strongly in the NZ sample than the Thai sample. In addition, while the mindfulness facets of acting with awareness and non-judging predicted perseverance of effort in the NZ sample, they did not do so in the Thai sample. And last, while observing negatively predicted consistency of interest in the NZ sample, it did not yield any significant relation to grit for the Thai sample. These results suggest that, at least in terms of grit as a correlate, New Zealanders benefit more from acting with awareness and non-judging than Thai students.

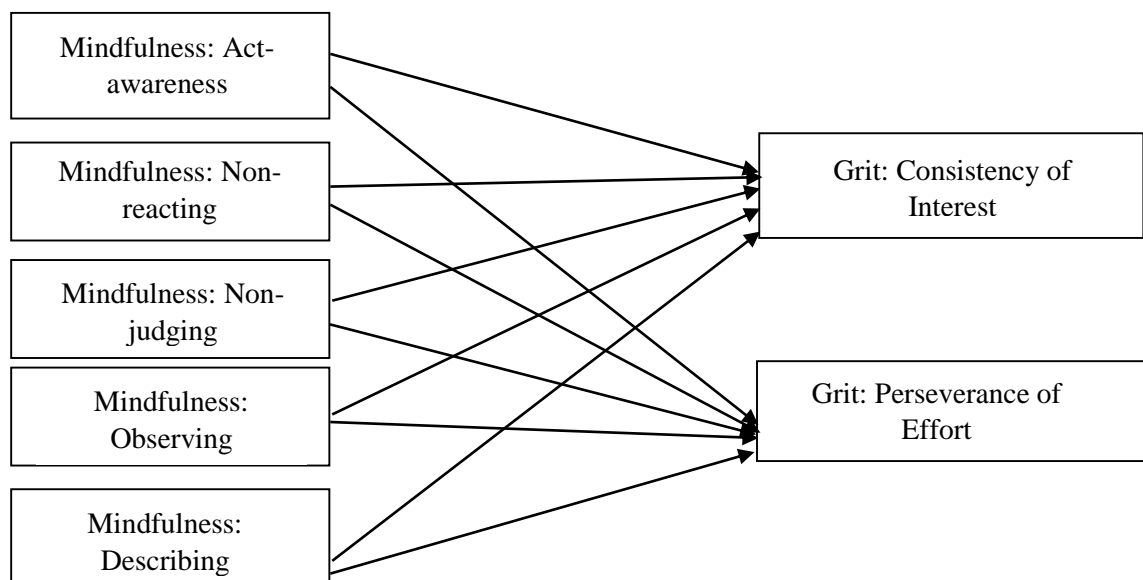


Figure 6. Path model illustrating the relationships between the five facets of mindfulness and the two components of grit that are compared across NZ and Thai cultural groups

Table 5

Comparison of the Relationships between the Five Facets of Mindfulness and the Two Components of Grit between the Thai and NZ samples

	NZ sample		Thai sample		Equality Constraint test
	β	<i>p</i> value	β	<i>p</i> value	<i>p</i> value
Acting-awareness ---> Consistency of Interest	.34	.001	.15	.044	.013
Acting-awareness ---> Perseverance of Effort	.28	.001	.11	.118	.033
Non-reacting ---> Consistency of Interest	.12	.043	.02	.834	.279
Non-reacting ---> Perseverance of Effort	.12	.030	.21	.002	.238
Observing ---> Consistency of Interest	-.22	.001	.12	.077	.000
Observing ---> Perseverance of Effort	-.05	.329	.04	.502	.258
Non-judging ---> Consistency of Interest	.07	.235	.00	.998	.454
Non-judging ---> Perseverance of Effort	.20	.001	-.11	.099	.000
Describing ---> Consistency of Interest	.06	.298	.06	.420	.975
Describing ---> Perseverance of Effort	.11	.027	.23	.000	.149

Discussion

In the present study we sought to examine how dispositional mindfulness and grit are experienced and relate to each other across different cultures. Once measurement invariance was established for both scales, the FFMQ and the Grit Scale, across Thai and NZ samples, we then proceeded with further analyses. First, we found that Thai and NZ students endorsed similar levels of overall mindfulness, and as predicted, NZ students exhibited higher levels of describing and non-judging than the Thai students when the comparison was made at the facet level. Surprisingly, we found contrary to prediction, NZ students endorsed slightly higher levels of the perseverance of effort component of grit than Thai students. Moreover, as hypothesised, overall mindfulness was found to positively relate to overall grit in both cultural groups; however, the association was found to be stronger for the NZ sample. When examined at the facet level, several differences in the association between mindfulness and grit were noted. Specifically, acting with awareness was found to be more highly associated with consistency of interest for the NZ sample relative to the Thai sample. In addition, acting with awareness and non-judging both positively predicted perseverance of effort for the NZ sample, but not for the Thai sample. And last, while observing did not relate to any component of grit for the Thai sample, it negatively predicted consistency of interest within the NZ sample. These results will now be discussed in more depth.

Did the Two Scales Function Similarly in the Two Cultural Contexts?

Measurement invariance was examined using Multigroup Confirmatory Factor Analysis (MGCFA). Results showed that both 1st and 2nd order factor structure of the FFMQ-

R met all three essential types of measurement invariance, i.e., configural, metric, and scalar, across the Thai and NZ samples. Although scalar invariance could not be established for the Grit Scale at the 2nd order model; we were able to demonstrate configural and metric invariance for the 2nd order model, and all of the essential measurement invariances for the 1st order model. Since, no other studies within the field have conducted measurement invariance testing on both of the FFMQ and Grit Scale, this study is the first to examine and show equivalence of the structure of both of the scales across Western and non-Western cultures. This result indicates that the Western conceptualization of mindfulness as a five-faceted construct and grit as a two-faceted construct also translate into a non-Western culture, specifically the Thai culture.

However, it is important to note that the Cronbach's alphas for the FFMQ, particularly the non-judging and observing facets, within the Thai sample were weaker than the comparable ones in the NZ sample. These results suggest that although the overall structure of the FFMQ and the Grit scale may be generally interpreted similarly by Thai and NZ individuals, as indicated by measurement invariance testing, some differences in interpretation at the cultural level may occur within the facet level.

Did We Find Mean Group Differences in Grit and Mindfulness Between the Two Cultures?

Following measurement invariance testing, we compared the means of mindfulness across the two cultural groups. As predicted, we found that Thai and NZ students reported similar levels of overall mindfulness. This finding is similar to that of Christopher et al. (2009), who found mindfulness levels, as measured by the MAAS, to be similar between Thai and American students. However, when investigated at the sub-facet level, we found several differences, such that Thai students reported higher levels of acting with awareness but lower levels of non-judging and describing relative to NZ students.

Before these results are discussed further, we would like to note that 81.5% of the current Thai sample identified as Buddhist, which is close to the percentage reported by the National Statistical Office of Thailand (2000). Furthermore, 57% of the Thai students reported to meditate regularly. Though we did not obtain the corresponding information from the NZ sample, it is likely that the percentage of meditators among this sample would be lower because the NZ culture is described as bi-cultural, composed of European and indigenous Maori, neither of which strongly embrace the Buddhist tradition. Given this additional information, it is not surprising that in comparison to NZ students, Thai students endorsed higher levels of acting with awareness which is one of the core aspects of

mindfulness. However, this finding seems to be somewhat inconsistent with the other findings, i.e., NZ students reported endorsing higher levels of describing and non-judging.

Upon consideration of the literature, we discerned several reasons that may underlie these interesting findings. As previously noted, the main school of Buddhism in Thailand is Theravada. Consequently, the meditation techniques that are widely taught in Thailand are influenced by the *Pāli Canon* – the standard collections of scriptures in the Theravadan Buddhist tradition (an anthology of texts from the *Pāli Canon*, in english, can be found here – Shaw, 2006) . In such scriptures, mindfulness, i.e., *sati*, means ‘keeping or holding in mind’, which does not explicitly include the ability to describe experiences. *Sati* emphasizes the awareness of bodily sensations or quality of the mind rather than encouraging the use of language to describe thoughts or feelings (Chakma, 2015; Gethin, 2015). Therefore, our finding that Thai students’ level of describing was lower than for NZ students may be attributable, at least in part, to the type of meditation that is practiced in Thailand.

Moreover, the present finding regarding the non-judging facet is similar to that of the previous studies which found Thai students (Christopher et al., 2009) and Japanese students (Sugiura et al., 2012) to report lower levels of non-judging than American students. Within the cross-cultural literature, Kitayama and colleague (1997) proposed that self-criticism is adaptive within collectivistic cultures as it motivates individuals to modify one’s behaviour in order to maintain harmonious relations with others. From this perspective, in Thai and Japanese cultures, where harmony within society is of the utmost importance, self-criticism may be highly endorsed and motivate Thai and Japanese individuals to be more judging and critical of themselves. In contrast, in cultures where individual freedom is celebrated, such as in the NZ and American cultures, individuals may feel less pressure to conform. Therefore, they may be less judging of their thoughts and feelings since individuality is more often accepted.

In regard to grit, since scalar invariance could not be tested for the 2nd order model, we were unable to compare the mean of the overall grit construct across the two cultural groups. However, as we were able to demonstrate scalar invariance at the 1st order model, we were able to conduct mean group comparisons at the subfacet level. Contrary to Hypothesis 3, NZ students endorsed higher levels of perseverance of effort than Thai students. This result is surprising insofar as previous findings within the cross-cultural literature have consistently shown that Asians and Asian Americans expend greater academic effort and display higher levels of task persistence relative to their American counterparts (e.g., Heine et al., 2001; Hsin & Xie, 2013; Jose & Bellamy, 2012).

One possible explanation for this discrepancy is response bias. Although self-report is a valid and reliable method, it is nevertheless influenced by social norms. Given that modesty and self-criticism are important aspects of many Asian cultures, particularly those influenced by Confucianism, such social norms may influence Asians' self-evaluation. Indeed, Eaton and Dembo (1997) found that Asian American students reported lower levels of self-efficacy relative to their Western counterparts, despite their superior performance. Likewise, Heine, Takata, and Lehman (2000) found that Japanese were less likely than their American counterparts to self-enhance in their performance rating (see a meta-analysis by Heine & Hamamura, 2007). Therefore, it is possible that Thai students may have been harsher on themselves and evaluated themselves as less hardworking than they actually are.

Were Grit and Mindfulness Positively Related in Both Cultures?

The chief hypothesis of the present study was that grit and mindfulness would be positively related in both cultures. Regardless of the differences found in the mean levels of the constructs in question, as predicted, the two constructs were found to be positively associated with each other in both cultural groups. This finding suggests that in both cultures, gritty individuals tend to also be more mindful and vice versa. However, equality constraint testing showed that the two constructs exhibited a stronger positive relationship within the NZ sample than the Thai sample. Moreover, when the relationship was examined at the facet level, several differences were noted between the two cultural groups. In particular, within the NZ sample, acting with awareness positively predicted both components of grit, while this mindfulness facet only weakly predicted consistency of interest for the Thai sample. This result suggests that, to a certain extent, paying attention in the present moment may be helpful in maintaining students' interest in long-term goals for both cultures. However, NZ students appeared to benefit more from such a present-oriented attentional mind-set than Thai students in terms of grit. Given that Asian parents are more involved and have higher expectations for their children compared to Western parents (Glick, & White, 2004; Yamamoto & Holloway, 2010), it may be that Thai students' tenacity with regard to long-term goals may be driven more by other factors such as parental expectations and encouragement than by paying attention to events and mood states in the moment.

In addition, non-judging was found to predict the perseverance of effort aspect of grit for NZ students, but it did not do so for the Thai students. Within the cross-cultural literature, there has been much discussion regarding the formation of the self-concept, particularly the role of self-enhancing versus self-critical motivation in Asians' and Americans' achievement motivations. Positive self-perceptions are very important for Western individuals. In

particular, self-efficacy and self-esteem in the West have been shown to be highly relevant to students' academic performance (Caprara et al., 2008; Lane, Lane, & Kyprianou, 2004). Having a non-judgemental stance may help NZ students to be less harsh on themselves when they make mistakes or experience setbacks. This positive self-perception, at least among Western participants, may therefore serve to fuel individuals' motivation and enable them to remain resilient in the face of adversity.

In contrast, Heine et al. (2001) argues that rather than focusing on the positive aspects of selves, individuals from East Asia tend to pay attention to the negative and improvable aspects of selves and the identification of such aspects motivates improvement on weaknesses. This argument is supported by their findings illustrating that Japanese who failed on a task persisted more on the follow-up task than those who succeeded, while Americans evidenced the opposite trend. Moreover, a large number of studies have shown that Westerners tend to self-enhance while East Asians do not (for a meta-analysis see Heine & Hamamura, 2007). Consequently, Thai students' motivation to persevere may benefit from being self-critical and identifying aspects of the self that need improvement rather than striving to retain a positive perception of self in the face of failure. Therefore, non-judging may help Western individuals to remain resilient in the face of setbacks by helping them to maintain positive self-perception, while this process may not be culturally germane to the Thai students.

Interestingly, observing was found to negatively predict consistency of interest in the NZ sample, but it did not relate to grit in the Thai sample. The mindfulness facet of observing, in the Western literature, has been consistent in its association with other maladaptive psychological constructs. Among non-meditators, observing has been found to positively predict hyperarousal anxiety (Desrosiers, Klemanski, & Nolen-Hoeksema, 2013; Raphiphatthana et al., 2015), as it may overlap with the construct of anxious vigilance. Baer et al. (2008) have suggested that without meditation training, individuals may observe in a non-mindful way, which may elicit negative consequences such as anxiety. It is possible that NZ university students, who are likely to be non-meditators, may observe in a non-mindful way, and this stance may have negatively influenced their ability to sustain interest in their long term goals. In contrast, for the Thai student sample where 57% of the sample meditate regularly, observing may not elicit such negative consequences.

Taken together, the present findings indicate that although mindfulness was related to grit in both Thai and NZ samples, the two traits were more closely linked for NZ students than they were for Thais. Moreover, the differences found at the facet level on the

relationship between mindfulness and grit highlights that different aspects of mindfulness may have different associated outcomes for individuals from different cultures. These differences, therefore, underscore the importance of considering cultural influence on the facet-level functions of mindfulness. These findings have further practical implications for mindfulness-based stress reduction therapy, as the current findings suggest that we should be aware of the subtle differences in the manifestation of mindfulness and its associated benefits across individuals from different cultural backgrounds.

Limitations and Future Directions

It is important to note that although the FFMQ met the criteria for measurement invariance (Cheung & Rensvold, 2002) in the present study, the internal consistency for certain subscales, i.e., acting with awareness, non-judging, and observing, were lower for the Thai sample than for the NZ sample. These results suggest that the internal consistency of some mindfulness facets were not as strong within the Thai sample as among the NZ sample. This finding is consistent with other studies that have examined psychometric properties of the FFMQ in Asian samples (Deng, Liu, Rodriguez, & Xia, 2011; Sugiura et al., 2012). Regardless, together with previous findings, the present study suggests that the overall conceptualization of mindfulness as a five-factor solution was similarly endorsed by both Asian and Western individuals.

An important limitation of the study is that the Thai-language questionnaires that were used were not previously validated within this culture, which raises the concern of whether the measures' construct validity was adequate within the Thai culture. However, as both the FFMQ-R and the Grit Scale demonstrated measurement invariance across NZ and Thai cultural groups, this result suggests that both of the questionnaires were conceptualized by the Thais in a way that was similar to that of the New Zealanders. This finding implies that, at the very least, the Thai questionnaires were consistent with the validated English version at the psychometric level. Nonetheless, it is important for future studies to validate these Thai versions of the FFMQ-R and the Grit Scale in order to provide more confidence in the future use of such scales.

We acknowledge differences in how Thai and NZ students completed the questionnaire. Most Thai students completed the questionnaire on paper, while NZ students completed the questionnaire online. This difference in measure completion was necessitated by constraints in the collection of data in Thailand. This difference in the mode of questionnaire completion may have caused bias in how participants in the two cultures responded to the questionnaires. Moreover, incentivisation also differed across cultural

groups as the majority of the Thai students received extra course credit for their participation, and some received a movie voucher, while NZ students did not receive any kind of incentive to participate in the study. We believe that the effects on the data of these differences were minor as invariance testing identified basic similarity between the two groups.

Additionally, the present study only assessed meditation practice and experience within the Thai sample. Therefore, although it is assumed that the Thai sample would consist of more meditators than the NZ sample, this question could not be explicitly tested here. Future studies should obtain such information from both of their samples, because, as previously mentioned, meditators seem to engage in and benefit from mindfulness in ways that are different from non-meditators (Baer et al., 2008). Since the present study only obtained meditation practice information from the Thai students, we could not discern whether the differences found here between the Thai and NZ samples were due to differences in meditation practice or cultural background. Additionally, it would be fruitful for future studies to also obtain information regarding well-being, social desirability, and distress caused by self-criticism, as these data may provide further insight into the comparability of mindfulness and grit across the two cultural groups.

Moreover, although the present study was based on reasonably good-sized sample sizes for both cultures, university students may not be the best sampling frame for the general Thai and NZ populations due to the selective nature of the sample (i.e., uniform emerging adult age and well educated). Also, as there are many factors that potentially affect cross-cultural comparisons, we do not wish to overgeneralise or overstate the main conclusions of the study. Lastly, due to the concurrent nature of the present data, our interpretations about which variables affected other variables were limited. A previous study by Raphiphatthana, Jose, and Salmon (in press) examined the relationship between mindfulness and grit longitudinally within NZ university students, and found mindfulness to predict change in grit over time, but not vice versa. This result suggests that, at least for NZ students, mindfulness may serve as an antecedent of grit. It would be fruitful for future research to determine whether a similar finding would be replicated in other cultures, e.g., in Thailand.

Linkage from Study 2 to Study 3

Study 2 shed light on the relationship between mindfulness and grit in a cross-cultural context. First, psychometric characteristics of the mindfulness and grit questionnaires were examined across the groups of Thai and NZ university students. The results demonstrated adequate measurement invariance for both mindfulness and grit across the two cultural groups, suggesting that Thai and NZ students responded to the questionnaires similarly. Once measurement invariance was established, mean comparisons were examined which revealed several differences in the mean levels of certain aspects of 1) mindfulness, i.e., acting with awareness, describing, and non-judging, and 2) grit, i.e., perseverance of effort.

Notably, mindfulness and grit were found to be positively associated with each other across both Thai and NZ university students at the overall construct level, with the association being significantly stronger for NZ university students. Moreover, the chi-square difference test also showed some differences in the strength of association between mindfulness and grit at the facet level. In particular, it revealed that certain mindfulness facets, i.e. acting with awareness and non-judging, exhibited more and stronger associations with components of grit for NZ students than for Thai students. No stronger associations were noted among facets for Thai than for NZ students. This set of results suggests that mindfulness may be more relevant to grit for individuals from an individualistic culture than in a collectivist society.

Although these cross-cultural findings are very illuminating, they are limited by the particular demographic group being studied, namely university students, which has been criticised for having low generalizability. Therefore the third, and last, study of the thesis, involved similar analyses but across adult community samples from the U.S. and Thailand. Additionally, the next study aimed to examine whether meditation experience might moderate the relationship between mindfulness and grit. Thus this study investigated the association between mindfulness and grit between meditating and non-meditating groups in the U.S. and Thailand.

STUDY 3: The Relationship between Dispositional Mindfulness and Grit Moderated by Meditation Experience and Culture

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Abstract

The present research was designed to examine the relationship between dispositional mindfulness and grit in community samples and to explore the potential moderating role of meditation experience, across Western and non-Western cultures, i.e. the U.S. and Thai, over two studies. Study 1 specifically investigated the relationship between mindfulness and grit and the moderating role of meditation experience within a Western culture (i.e., the U.S.). Study 2 tackled the same question, but across Western (the U.S.) and non-Western (Thai) cultural groups. Results from both studies demonstrated that mindfulness and grit were positively related to each other in all samples included in the research. Surprisingly, meditation experience was found to be an insignificant moderator in the relationship between mindfulness and grit in all samples. These findings suggest that mindful individuals tend to also be gritty in nature regardless of cultural backgrounds or meditative experience.

The Relationship between Dispositional Mindfulness and Grit Moderated by Meditation Experience and Culture

Traditionally, cognitive skills, e.g., IQ, have been valued as the most important contributor to success. However, a change in this trend in the recent decade has occurred where non-cognitive skills, sometimes referred to as *character*, are receiving greater attention in regard to their important role in success. Within this field of research, the characteristic trait *grit*, defined as passion and perseverance for long-term goals (Duckworth, Peterson, Mathews, & Kelly, 2007), has become one of the most studied constructs in this discussion. It has been conceptualised to encompass two essential components: a) sustained interest in long-term goals, and b) perseverance in working towards long-term goals. Together, these two aspects form an overall psychological trait of grit, which has been found to predict success in various contexts, e.g., academic and other personal pursuits such as career and marriage, above and beyond IQ and the well-researched personality trait of conscientiousness (e.g., Duckworth et al., 2007; Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014). However, since grit is a relatively new construct and much of the research has focused on the results of employing grit in one's life, more knowledge is needed regarding how it is cultivated.

The present research aimed to provide some insight into potential antecedents of grit by examining the relationship between mindfulness and grit. Mindfulness, defined as an awareness of one's present mental, emotional, and bodily-sensory experiences that is accepting and non-evaluative (Kabat-Zinn, 1994), is a widely researched dynamic within psychological literature. Due to its numerous benefits, many mindfulness interventions have been trialed within both clinical and non-clinical settings. The potential relationship between mindfulness and grit, therefore, has theoretical and practical implications because it may provide more insight into the mechanisms of how mindfulness intervention work, and additionally it may illuminate ways in which mindfulness interventions could be used to promote grit.

Mindfulness is commonly studied as a trait and is typically measured by the means of self-report questionnaires. The most comprehensive questionnaire to date is the Five Facet of Mindfulness Questionnaire (FFMQ, Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), which conceptualizes mindfulness as a multi-faceted construct. It breaks mindfulness down to five essential components: observing--noticing one's mental and physical experiences; describing--using language to label one's thoughts and feelings; acting-with-awareness--paying attention to one's present-moment activity; non-judging--the ability to not criticize and

evaluate one's thoughts and feelings; and non-reacting—being able to let one's thoughts and feelings come and go without getting caught up in them.

In discussion of the mechanisms underlying mindfulness's benefits, Shapiro, Carlson, Astin, and Freedman (2006) introduced the concept of *reperceiving*. They hypothesized that “through the process of mindfulness, one is able to disidentify from the contents of consciousness (i.e., one's thoughts) and view his or her moment-by-moment experience with greater clarity and objectivity” (p. 377). This ability to perceive emotions, thoughts or sensations as they occur without identifying with them is argued to set a foundation upon which other mechanisms, e.g., self-regulation and cognitive flexibility, can be built. Indeed, dispositional mindfulness has been found to be positively linked to cognitive flexibility and the tendency to use adaptive coping strategies, such as positive reappraisal, when dealing with stressful situations (Moore & Malinowski, 2009; Weinstein, Brown, & Ryan, 2009). Therefore, these skills enable mindful individuals to better cope with stress and exhibit more resilience (Keye & Pidgeon, 2013; Smith et al., 2011).

Given these benefits of mindfulness, how may mindfulness be related to grit? Gritty individuals are thought to continuously persevere in working towards their long-term goals despite setbacks. They do not get discouraged by adversities and bounce back after failures. Being mindful may help individuals to disidentify from negative cognition and affect brought about by setbacks and failures, and help people to remain optimistic in pursuing their goals. Mindfulness may enable individuals to reframe stressful situations in a more positive light in order to remain resilient through difficult situations.

Moreover within motivation theory (Kruglanski et al., 2002), goals can be hierarchically organized into lower-order goals serving higher-order goals. From this perspective, attainment of successive lower-order goals is crucial in achieving long term goals or superordinate goals. Self-regulation is required when the valued short-term goal, i.e., one that aligns with the long term goal, is compared with another that is more hedonically pleasant in the moment but makes no contribution to the long-term goal (Baumeister, Heatherton, & Tice, 1994; Hofmann & Kotabe, 2012). Since mindfulness interventions have been found to increase self-regulation (Canby, Cameron, Calhoun, & Buchanan, 2015; Frieze, Messner, & Schaffner, 2012), and as a trait, dispositional mindfulness has also been found to be positively associated with self-regulation (Evans, Baer, & Segerstrom, 2009). Mindfulness may, therefore, help individuals to regulate their moment-to-moment behavior and enable them to choose actions that are beneficial to their long-term goals over ones that are hedonically pleasant but exhibit no long-term benefits.

To date, only two studies have investigated the relationship between mindfulness and grit. Raphiphatthana, Jose, and Salmon (in press) examined the relationship between mindfulness and grit within New Zealand (NZ) university students, and found the two constructs to be positively associated, both cross-sectionally and longitudinally. Since both mindfulness and grit have been chiefly studied in the West, a follow-up study was conducted to examine and compare the relationship between the two constructs across Western and non-Western cultures. In this study, Raphiphatthana, Jose, and Phatthanakit (2017) found that mindfulness's relationship with grit was stronger in the NZ culture than in the Thai culture. Though the previous studies have provided some interesting insights into the relationship between mindfulness and grit, the authors only utilized university student samples, the practice of which is criticized to result in unrepresentative groups in psychological literature. Thus the present study was designed to expand on the previous findings by examining the relationship between mindfulness and grit within community samples.

Within Buddhist tradition, meditation is a method that is used to cultivate mindfulness, and this approach has been adopted by many Western mindfulness interventions. Numerous studies have shown that mindfulness meditation does indeed lead to higher levels of dispositional mindfulness, suggesting that it is an effective method in fostering mindfulness (e.g., Carmody & Baer, 2008; Nyklicek & Kuijpers, 2008). As expected, mindfulness meditation interventions have been found to reduce negative psychological symptoms as well as increasing positive psychological states (Grossman, Niemann, Schmidt, & Walach, 2004; Hofmann, Sawyer, Witt, & Oh, 2010). Therefore, it is non-surprising that individuals who meditate regularly exhibit higher levels of mindfulness and display positive psychological states, while simultaneously reporting lower levels of negative psychological symptoms compared to those individuals who do not meditate (e.g., Baer et al., 2008; Brown & Ryan, 2003; de Bruin, Topper, Muskens, Bogels, & Kamphuis, 2012).

Given that meditation increases dispositional mindfulness as well as other positive psychological states, another goal of the present study was to examine the influence of mindfulness meditation on the relationship between mindfulness and grit. More specifically the study was designed to determine whether mindfulness meditation experience would moderate the relationship between mindfulness and grit, i.e., would highly experienced meditators exhibit a stronger relationship between mindfulness and grit than those with limited experience? And relatedly, we sought to determine whether its moderating effect would be similar across Western and non-Western cultures. It is important to note that

individuals engage in a variety of meditation techniques; however, the present study focused only on meditation that aims to foster mindfulness, e.g., insight meditation or mindfulness meditation.

In essence, the present study was conducted in order to examine the relationship between mindfulness and grit in community samples, and to determine whether mindfulness meditation would moderate the relationship between mindfulness and grit similarly across Western and non-Western cultures. In order to address these objectives, two studies were conducted. Specifically, Study 1 was performed to examine the relationship between mindfulness and grit and the influence of meditation experience within a Western culture, by comparing American meditators and non-meditators. Study 2 was enacted in order to tackle the same question but across samples of American and Thai meditators. Given the review of the literature above, we proposed the following hypotheses for each study.

Study 1 Hypotheses (Comparing American Meditators vs. Non-Meditators)

Hypothesis 1: Given that previous studies have found mindfulness and grit to be positively related (Raphiphatthana et al., in press), it was predicted that mindfulness and grit would be positively related for both American meditators and non-meditators.

Hypothesis 2: As discussed in the introduction, mindfulness has been shown to increase positive psychological states, for example, the ability to self-regulate and cope with stress. Therefore, the high level of mindfulness exhibited by meditators may provide them with a stronger foundation for grit, and thus it was hypothesized that the relationship between mindfulness and grit would be stronger for meditators in comparison to non-meditators.

Hypothesis 3: Based on the same argument as Hypothesis 2, it is also predicted that within the group of American meditators, those individuals who have *more* meditation experience would also endorse stronger relationship between mindfulness and grit.

Study 2 Hypotheses (Comparing American Meditators vs. Thai Meditators)

Hypothesis 4: Given that Raphiphatthana et al. (2017) found mindfulness and grit to be positively related in university students from both New Zealand and Thailand, and other studies have found mindfulness to function in a similar way in non-Western cultures (Deng, Liu, Rodriquez & Xia, 2011; Sugiura, Sato, & Ito, 2012), it was predicted that mindfulness and grit would be positively associated in both American and Thai meditating samples.

Hypothesis 5: Not much research has been conducted to examine the effects of mindfulness meditation practice in the Thai culture; however, since Western mindfulness practices originate from Buddhism, which is the de facto religion of Thailand, it was

considered likely that mindfulness meditation would yield similar outcomes in the Thai culture as in the American culture. Consequently, we predicted that the influence of meditation experience on the relationship between mindfulness and grit in the Thai meditating sample would be similar to that of the American sample. That is, we expected that Thai individuals who reported greater meditation experience would also demonstrate a stronger relationship between mindfulness and grit.

Study 1: U.S. Meditators compared with U.S. Non-meditators

Participants and Procedure

The sample of American non-meditators was recruited through Amazon's Mechanical Turk (www.Mturk.com), a website that enables researchers to collect online data from a large participant pool. This method of data collection is becoming increasingly popular, and research suggests that the Mechanical Turk participant pool is more demographically diverse than typical samples of university students and resembles more closely the average American community sample (Buhrmester, Kwang, & Gosling, 2011; Paolacci, Chandler, & Ipeirotis, 2010). The American meditators were recruited from various meditation and Buddhist groups as well as retreat centers and monasteries across the U.S. They were contacted via a range of methods, i.e., flyers, posts on Facebook groups focused on mindfulness and meditation, email invitations, and face-to-face invitations. Participants completed the survey online by using the URL link provided in the flyers, email, or Facebook posts. Initially, there were no prizes for participation, and from this initial recruitment we were able to recruit 65 meditators. Given the feedback that we received from some of the meditation centers, we decided to offer a prize draw in which 20 individuals would be randomly selected to receive a voucher worth \$20 each upon completion of the survey. An additional 115 meditators completed the survey in the 2nd wave of recruitment.

As there are various meditation methods, the survey asked participants to report how frequently they practice the following meditative methods: mindfulness meditation, concentrative meditation, contemplative meditation, and loving kindness meditation. Since we are interested in mindfulness meditation specifically, we only included the individuals who reported practicing mindfulness meditation. Those individuals who reported practicing another meditative practice but not mindfulness meditation were excluded from the study. The final meditating U.S. sample was comprised of 154 meditators (63 males, 91 females), aged between 21 and 80 years ($M = 53.86$, $SD = 14.61$). The majority of the U.S. meditators held a postgraduate degree (66.9%) as their highest degree, while 28.6% held an undergraduate degree as their highest degree, and only 4.5% of the sample reported

completing secondary level of schooling as their highest degree. The non-meditator sample was comprised of 162 individuals (70 males, 91 females, 1 other), aged between 18 and 71 years ($M = 35.73$, $SD = 11.37$) recruited from Mechanical Turk who reported to not engage in any form of meditation practice. The non-meditators reported fewer educational years in comparison to their meditator counterparts, with the majority holding an undergraduate degree (61.7%) as their highest degree, while only 17.9% held a post-graduate degree, and 20.4% reported completing secondary level of schooling as their highest degree. The non-meditator group was also younger than the meditator group.

Measures

Five Facet Mindfulness Questionnaire – Revised (FFMQ-R). To measure mindfulness, we used a revised version of the 32-item version of the original Five Facet Mindfulness Questionnaire (FFMQ-SF: Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011). The FFMQ-R is identical to the original version in that it also measures the same five different facets of mindfulness, i.e., acting with awareness, observing, non-judging, non-reacting, and describing. However, the original scale included unequal numbers of items as well as unequal ratios of positively and negatively worded items per facet. The revised version improved the original scale by ensuring that each of the facets contained exactly five items, with three positively worded items, e.g., “I notice the smells and aromas of things”, and two negatively worded items, e.g., “I tell myself I shouldn’t be feeling the way I’m feeling” (for further description please refer to Raphiphatthana, Jose, & Kielpikowski, 2015). Participants were asked to respond to each of the questions using a 5-point Likert scale which ranged from 1 (*never or very rarely true*) to 5 (*very often or always true*). Facet scores were calculated by averaging across the five items after reverse coding of the negatively worded items. Similarly, the overall mindfulness score was calculated by averaging across all 25 items. Higher facet scores indicate higher endorsement of a particular facet, while higher overall scores indicate higher endorsement of the overall mindfulness construct. The FFMQ-R (Raphiphatthana et al., 2015) has been shown to exhibit good psychometric properties and reliabilities, similar to the original scale (Bohlmeijer et al., 2011).

The Grit Scale. We used the 12-item Grit Scale (Duckworth et al., 2007) to measure levels of grit in our samples. The scale consists of two components, perseverance of effort and consistency of interest, which are composed of 6 items each. The perseverance of effort subscale contains six positively worded items, such as “I am diligent”, while the consistency of interest subscale contains six negatively worded items, such as “My interests change from year to year”. Participants were asked to respond to each item using a 5-point Likert scale

ranging from 1 (*not at all like me*) to 5 (*just like me*). The overall subscale scores were calculated by averaging across the six items in each of the two subscales. The items in the consistency of interest subscale were first reverse-coded before facet score calculation took place. Similarly, the overall grit score was calculated by averaging across all 12 items. Higher grit scores indicate higher levels of grit. The Grit Scale has been demonstrated to have good psychometric properties and good internal reliability for each of the subscales (consistency of interest, $\alpha = .84$; perseverance of effort, $\alpha = .78$) (Duckworth et al., 2007).

Results

Factor structure of the FFMQ-R. The first step was to determine whether the FFMQ-R exhibited a reliable five-factor structure across both meditating and non-meditating samples. A non-hierarchical or 1st order Confirmatory Factor Analysis (CFA) using item parcels (groups of items) as indicators, a commonly used method within the literature on the FFMQ (e.g., Baer et al., 2006; de Bruin et al., 2012), was first conducted using AMOS (Arbuckle, 2006). Results showed good model fit indices for both meditators: $\chi^2/df = 1.350$; CFI = .975; TLI = .967; IFI = .975; RMSEA = .048; sRMR = .055, and non-meditators: $\chi^2/df = 1.894$; CFI = .935; TLI = .915; IFI = .937; RMSEA = .075; sRMR = .057. The next step was to construct a hierarchical or 2nd order CFA of the FFMQ-R in which the five facets loaded onto the overall construct of mindfulness. The model fit indices for both groups, though deemed as acceptable, were somewhat compromised at this level, particularly for the non-meditators (meditators: $\chi^2/df = 1.821$; CFI = .937; TLI = .923; IFI = .939; RMSEA = .073; sRMR = .098, non-meditators: $\chi^2/df = 2.298$; CFI = .900; TLI = .877; IFI = .902; RMSEA = .090; sRMR = .084).

Factor structure of the Grit Scale. We employed the same analytic strategy for the Grit Scale. First, a 1st order Confirmatory Factor Analysis (CFA) using parcels as indicators was conducted for the two groups separately. In this model, the two components of grit, perseverance of effort and consistency of interest, were allowed to intercorrelate. Acceptable model fit indices were obtained for both groups, meditators: $\chi^2/df = 2.193$; CFI = .960; TLI = .926; IFI = .962; RMSEA = .088; sRMR = .055, non-meditators: $\chi^2/df = 2.418$; CFI = .974; TLI = .951; IFI = .974; RMSEA = .094; sRMR = .061. In order to confirm that the two components contributed to the overall construct of grit, we performed a 2nd order CFA in which the two sub-scales loaded onto the second order latent construct of grit. However, in order for the 2nd order model to converge, additional model constraints were required due to the lack of degrees of freedom for hierarchical two-factor structure models. Therefore, in

addition to constraining the variance of the overall construct of grit to 1, we also constrained the variances of the two components of grit to be equal. The model fit indices of this more parsimonious model did not change from the 1st order model, for both groups, which suggest that both samples exhibited a two-factor structure of grit as proposed by Duckworth et al. (2007).

Invariance testing. Measurement invariance was examined by utilising the Multigroup Confirmatory Factor Analysis (MGCFA) function in AMOS (Arbuckle, 2006) to determine whether the FFMQ-R and the Grit Scale functioned in the same way across the meditating and non-meditating samples. Three types of measurement invariance were tested: configural, metric, and scalar invariance. According to the literature, metric invariance must be met before the variable can be used to examine associations with other variables, while scalar invariance must be established before any meaningful means comparisons can be made (Cheung & Rensvold, 2002). The model fit indices for all three levels of invariance testing for both 1st and 2nd order models of the FFMQ-R and the Grit Scale are reported in Table 1.

Measurement invariance testing for the 1st order models. Configural invariance was first examined by simultaneously fitting the five-factor structure of the FFMQ, where the five facets were allowed to intercorrelate, with no constraints being imposed on the parameter estimates. The model fit indices for the unconstrained model were deemed acceptable: $\chi^2 = 259.563$; $df = 160$; $\chi^2/df = 1.622$; CFI = .955; GFI = .894; RMSEA = .045. This set of results suggests that the five-factor structure of the FFMQ-R was equally applicable to both samples. Similarly, the same analysis was conducted for the Grit scale. The unconstrained model also yielded good model fit indices: $\chi^2 = 36.891$; $df = 16$; $\chi^2/df = 2.306$; CFI = .969; GFI = .962; RMSEA = .064. This set of results suggests that both meditating and non-meditating samples exhibited a similar two-factor structure of grit as conceptualized by Duckworth et al. (2007).

Next, metric invariance, which refers to the equivalence of factor loadings across groups, was examined for both the FFMQ-R and the Grit Scale. In this model, the loadings of each mindfulness facets' indicators were constrained to be equal across the meditating and the non-meditating groups. Likewise, the same constraints were imposed onto the indicators of the two components of the Grit scale. According to Cheung and Rensvold (2002), if the model fit indices of the constrained model, specifically the CFI and the GFI, do not change more than 0.01 when compared to the unconstrained model, the measure is said to exhibit metric invariance. As demonstrated in Table 1, the Δ CFI and Δ GFI values from the unconstrained to the constrained models were smaller than .01 for both scales. These results

suggest that the factor loadings of both the FFMQ-R and the Grit Scale were similar across the two samples, indicating metric invariance for both measures.

And last, scalar invariance was examined for the two measures. In order to examine scalar invariance, in addition to the previous model, further constraints were imposed on item intercepts so that they were equal across groups. Similar to metric invariance, scalar invariance is established when the model fit indices, particularly the CFI and the GFI, of the more constrained model do not change more than .01 when compared to the previously less constrained model, i.e., the metric invariance model (Cheung & Rensvold, 2002). As shown in Table 1, the Δ CFI and Δ GFI values from the metric to the scalar model were smaller than 0.01 for the FFMQ-R, indicating that the FFMQ-R manifested similar intervals and zero points across the two groups. This set of results means that the factors within the FFMQ-R were conceptualized in a similar way across the meditating and non-meditating samples, which enables meaningful mean comparisons of mindfulness's facets across the two groups. However, the Δ CFI and Δ GFI values from the metric to the scalar model for the Grit Scale exceeded the recommended criterion, which suggests that the intervals and zero points of the grit items were not similar between the two groups. As scalar invariance is a prerequisite for meaningful mean comparisons, mean comparisons were not conducted for the Grit Scale.

Measurement invariance testing for the 2nd order model. The 2nd order model was also tested for measurement invariance in order to determine whether the five facets of mindfulness loaded onto an overarching mindfulness construct and whether the two components of grit loaded onto the overall construct of grit in a similar fashion across the meditating and the non-meditating samples. The same steps of the analyses for the 1st order model were also applied to the 2nd order model. MGCFA revealed that both measures exhibited configural invariance (Model 1, FFMQ: $\chi^2 = 350.099$; $df = 170$; $\chi^2/df = 2.06$; CFI = .919; GFI = .864; RMSEA = .058, and the Grit Scale: $\chi^2 = 45.248$; $df = 17$; $\chi^2/df = 2.66$; CFI = .958; GFI = .953; RMSEA = .073), which suggests that the 2nd order models of the FFMQ-R and the Grit Scale conformed reasonably well in both the meditating and non-meditating samples.

Metric invariance was next examined. First, the 1st order loadings (items' loadings onto their specific facets) were constrained to be equal across groups (Model 2). For the FFMQ-R, the model fit indices, particularly the CFI and the GFI, did not change more than .01 when compared to those of the unconstrained model (Model 1). Likewise, when the 2nd order loadings (the five facets' loadings onto the overall mindfulness construct) were

constrained to be equal in addition to the constraints previously imposed on the 1st order loadings (Model 3), the ΔCFI and ΔGFI were less than .01 when compared to Model 2. This result suggests that the five facets loaded onto the overall construct of mindfulness in the same fashion across the two groups. Similar analyses were conducted for the Grit Scale; however, the grit scale did not meet metric scalar at this 2nd order model level as the ΔCFI and ΔGFI exceeded .01 when Model 2 was compared to Model 1.

The last step was to examine scalar invariance. In this step, additional constraints were imposed on the facets' intercepts so that they are equal across groups. As can be seen in Table 2, for the FFMQ-R, when the model fit indices of this more constrained model (Model 4) were compared to those of the previously constrained model (Model 3 in which the items' and facets' loadings were constrained to be equal across groups), the ΔCFI and ΔGFI values were found to be less than .01. This result indicates similar intervals and zero points for the FFMQ-R across the two groups, which further enables us to conduct meaningful mean comparisons of the five facets as well as the overall construct of mindfulness across the meditating and the non-meditating samples. As for the Grit Scale, since the baseline model required the variances of the grit components to be set to be equal within the two groups in order for the model's estimates to converge, this requirement prevented us from imposing constraints on the intercepts to be equal across groups. Therefore, scalar invariance could not be determined for the Grit Scale, and, thus, mean comparisons of the overall grit construct could not be conducted.

Descriptive statistics and correlations. Cronbach's alphas were used to test for internal reliability of the FFMQ-R and the Grit scale for both samples. As can be seen in Table 2, almost all variables yielded Cronbach's alphas that exceeded .70, apart from the observing facet which yielded a Cronbach's alpha of .69 for both meditators and non-meditators, and consistency of interest which yielded a Cronbach's alpha of .69 for the meditators. In sum, all indicators were deemed sufficiently internally reliable.

Next, the latent mean differences of the five facets of mindfulness were compared across the meditators and the non-meditators, using Multi Group Analysis conducted in Amos, where education and age were added as covariates. As expected, results demonstrated that in comparison to non-meditators, meditators exhibited higher levels of non-judging ($B = .53$, $SE = .099$, $p < .001$), observing ($B = .66$, $SE = .103$, $p < .001$), describing ($B = .47$, $SE = .110$, $p < .001$), and non-reacting ($B = .44$, $SE = .099$, $p < .001$). No significant difference was found for acting with awareness. The mean of the overall mindfulness level was compared across the two groups through the same method but on the overall latent means,

with education and age treated as covariates. Results showed that meditators exhibited higher levels of mindfulness relative to non-meditators ($B = .41$, $SE = .093$, $p < .001$). Since the Grit Scale did not meet the criterion for scalar invariance, we could not compare the means of the grit's components between the two groups.

The zero-order correlations between the five facets of mindfulness and the two components of grit within the two groups revealed the same pattern of associations, such that almost all of the mindfulness facets were positively associated with the two components of grit, with the exception of observing which yielded a non-significant correlation with consistency of interest for both groups. In terms of the overall levels of mindfulness and grit, zero-order results showed that the two constructs were positively correlated in both samples (meditators; $r = .50$, $p < .01$, non-meditators; $r = .64$, $p < .01$).

Table 6

Invariance Testing for the FFMQ-R and the Grit Scale across U.S. Meditators and Non-meditators

Questionnaire	Models	χ^2	df	χ^2/df	RMSEA	CFI	GFI	Comparison	ΔCFI	ΔGFI
FFMQ-R 1 st order	A. Unconstrained (configural invariance)	259.563	160	1.622	.045	.955	.894			
	B. Measurement weights (metric invariance)	281.962	170	1.659	.046	.950	.887	B vs. A	-.005	-.007
	C. Structural covariance (scalar invariance)	300.661	185	1.625	.045	.948	.882	C vs. B	-.002	-.005
FFMQ-R 2 nd order	1. Unconstrained (configural invariance)	350.099	170	2.059	.058	.919	.864			
	2. Measurement weights (1 st order metric invariance)	368.474	180	2.047	.058	.915	.857	2 vs. 1	-.004	-.007
	3. Structural weights (2 nd order metric invariance)	376.722	185	2.036	.057	.914	.854	3 vs. 2	-.001	-.003
	4. Structural residuals (2 nd order scalar invariance)	380.806	190	2.004	.057	.914	.854	4 vs. 3	.000	.000
Grit Scale 1 st order	A. Unconstrained (configural invariance)	36.891	16	2.306	.064	.969	.962			
	B. Measurement weights (metric invariance)	43.877	20	2.194	.062	.965	.955	B vs. A	-.004	-.007
	C. Structural covariance (scalar invariance)	60.369	23	2.625	.072	.945	.939	C vs. B	-.020	-.016
Grit Scale 2 nd order	1. Unconstrained (configural invariance)	45.248	17	2.662	.073	.958	.953			
	2. Measurement weights (1 st order metric invariance)	57.303	21	2.729	.074	.946	.942	2 vs. 1	-.012	-.011
	3. Structural weights (2 nd order metric invariance)	60.369	23	2.625	.072	.945	.939	3 vs. 2	-.001	-.003

Table 7

Bivariate Correlations and Descriptive Statistics for the FFMQ-R and the Grit Scale for the Meditating and Non-meditating Samples Separately

Sample		1	2	3	4	5	6	α	Mean (SD)
Meditators	1. FFMQ (Des)							.86	3.96 (.79)
	2. FFMQ (Non-J)	.32**						.80	3.95 (.72)
	3. FFMQ (Obs)	.24**	.28**					.69	4.13 (.61)
	4. FFMQ (Act-a)	.46**	.34**	.43**				.81	3.87 (.64)
	5. FFMQ (Non-R)	.23**	.67**	.23**	.36**			.86	3.65 (.80)
	6. Grit (Consistency)	.36**	.25**	.12	.20**	.27**		.69	3.15 (.74)
	7. Grit (Perseverance)	.26**	.36**	.33**	.46**	.40**	.38**	.78	3.95 (.55)
Non-Meditators	1. FFMQ (Des)							.87	3.56 (.88)
	2. FFMQ (Non-J)	.51**						.81	3.44 (.85)
	3. FFMQ (Obs)	.34**	.20**					.69	3.63 (.72)
	4. FFMQ (Act-a)	.58**	.55**	.37**				.75	3.77 (.72)
	5. FFMQ (Non-R)	.40**	.67**	.08	.37**			.84	3.24 (.92)
	6. Grit (Consistency)	.46**	.48**	.07	.49**	.30**		.85	3.19 (.83)
	7. Grit (Perseverance)	.41**	.47**	.34**	.47**	.43**	.41**	.81	3.74 (.70)

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

The relationship between mindfulness and grit. The relationship between mindfulness and grit at the overall construct level was first examined separately for the two groups (education and age were controlled). As hypothesized, mindfulness was found to be positively associated with grit for both meditators and non-meditators (meditators: $\beta = .44, p < .001$; non-meditators: $\beta = .65, p < .001$). However, comparison of the strength of the association between mindfulness and grit at the overall level could not be evaluated as the Grit Scale did not meet metric invariance at the 2nd order level. However, as both measures demonstrated metric invariance at the 1st order level, we were able to examine and compare the unique relationships between the five facets of mindfulness and the two components of grit across the two samples. This analysis was performed using path analysis conducted in AMOS (Arbuckle, 2006). A model was constructed where the five facets of mindfulness predicted the two components of grit in a fully saturated model, where levels of education and age were also included as control variables, for the two groups separately. We then conducted a chi-square test with 1 *df* on all 10 paths in the saturated model in order to determine the equivalence or difference of estimated coefficients between the two groups. The analysis revealed, as reported in Table 3, one significant difference between the two groups – acting with awareness yielded a significant positive relationship with consistency of interest for non-meditators but not for meditators, which was unpredicted. However, in general, the findings suggest that meditators and non-meditators exhibited similar relationships between mindfulness and grit.

Table 8

Comparison of the Relationships between the Five Facets of Mindfulness and the Two Components of Grit between Meditators and Non-meditators

	Meditators		Non-meditators		Equality Constraint test
	β	p value	β	p value	p value
Acting-awareness ---> Consistency of Interest	-.06	.509	.30	.000	.004
Acting-awareness ---> Perseverance of Effort	.30	.000	.20	.015	.592
Non-reacting ---> Consistency of Interest	.13	.214	-.06	.467	.163
Non-reacting ---> Perseverance of Effort	.23	.019	.22	.000	.867
Observing ---> Consistency of Interest	.01	.906	-.17	.014	.103
Observing ---> Perseverance of Effort	.14	.067	.23	.000	.319
Non-judging ---> Consistency of Interest	.07	.487	.28	.003	.147
Non-judging---> Perseverance of Effort	.07	.460	.16	.061	.493
Describing ---> Consistency of Interest	.23	.009	.25	.002	.825
Describing ---> Perseverance of Effort	-.01	.950	.02	.801	.827

Did amount of meditation experience moderate the relationship between mindfulness and grit? Since mindfulness meditation has been shown to enhance mindfulness, it is of interest to examine whether amount of meditation experience might strengthen the relationship between mindfulness and grit in our samples of meditators. First, all of the variables assessing meditation experience, i.e., amount of years of regular practice, frequency of meditation practice per week, length of each meditation practice, total amount of days spent on meditation retreats, frequency of retreat attendance in the past year, and the extent to which meditation practice is being carried out in the day-to-day life, were standardized and an average of all variables were computed for each individual. Since all of the variables highly correlated with each other ($\alpha = .76$), an interaction term was computed where the overall meditation experience variable was multiplied by the overall mindfulness variable. A regression analysis was then conducted to examine whether meditation experience moderated the relationship between overall mindfulness and overall grit. The analysis stipulated grit as the dependent variable, and it involved three steps: 1) age and education were included as control variables, 2) mindfulness and meditation experience were next added as main effect predictors, and 3) the interaction term (meditation experience X mindfulness) was added as a predictor in the last step. The analysis revealed that meditation experience did not significantly moderate the relationship between mindfulness and grit ($B = -.161$, $SE = .107$ $p = .137$).

Summary of Study 1 Findings

As expected, we found that meditators endorsed higher levels of non-judging, observing, describing, non-reacting, and higher levels of the overall mindfulness, in comparison to the non-meditators. However, since the Grit Scale did not meet scalar invariance at either 1st or 2nd order level, mean comparisons at the sub-facet or at the overall construct could not be conducted. In support of Hypothesis 1, we found mindfulness and grit to be positively related to each other in both groups. However, since measurement invariance could not be established for the Grit Scale at the 2nd order level, we were unable to test whether the relationship between mindfulness and grit was stronger for meditators in comparison to non-meditators (Hypothesis 2). Though closer examination of the relationships between the five facets of mindfulness and the two grit components at the sub-facet level showed similar pattern of association between meditators and non-meditators, with one exception – acting with awareness was found to be positively associated with consistency of interest for non-meditators but not for meditators, which is inconsistent with Hypothesis 2. Lastly, Hypothesis 3 was also not supported as we found that meditation experience did not significantly moderate the relationship between mindfulness and grit.

Study 2: U.S. Meditators VS. Thai Meditators

Since both mindfulness and grit have been developed and mainly studied in the West, it is of importance to determine whether the two constructs are conceptualized and function in a similar way in a non-Western culture. In order to address this important issue, the second part of the present study utilized Thai meditators as a non-Western comparison sample to that of the previously used group of U.S. meditators. The main aim of this second study was to determine whether mindfulness and grit were associated with each other in a similar fashion across different cultures, and whether meditation experience might function as a moderator of this relationship similarly between the two cultures.

Participants and Procedure

Similar to the U.S. meditating sample, the Thai meditating sample was comprised of meditators who were recruited from various meditation and Buddhist groups as well as retreat centers and monasteries across Thailand. They were contacted via similar methods used to recruit the American sample (e.g., flyers, posts on Facebook groups focused on mindfulness and meditation etc.); however, they were not offered any compensation for their participation. Moreover, in contrast to the American meditators who completed the survey online, approximately half of the Thai meditators completed the survey online, while the others

completed it on paper as this method was more familiar to these individuals. The survey administered to the Thai sample contained the same content as the one used with the American sample but it was translated into the Thai language using the back-translation technique (Hambleton, 2001; Van de Vijver & Hambleton, 1996).

Thai meditators were selected for the final sample based upon the same procedures applied to the U.S. meditating sample, such that only individuals who reported practicing mindfulness meditation were included in the final sample. The final Thai meditating sample was comprised of 276 meditators (66 males, 208 females, 2 other), aged between 16 and 82 years ($M = 43.13$, $SD = 12.14$). They reported fewer educational years in comparison to their U.S. counterparts, with the majority of Thai meditators holding an undergraduate degree (60.6%) as their highest degree, while only 28% held a post-graduate degree, and 11.4% reported completing the secondary level of schooling as their highest degree.

The demographic characteristics of meditation experience for both groups are presented in Table 4. The six meditation variables were standardized and averaged to form an overall meditation experience variable, which was compared between the two cultural groups. In regards to meditation experience, the U.S. meditators reported more experience relative to the Thai meditators $t(455) = 3.43$, $p < .001$, 95% CI [.10, .36].

Table 9

Characteristics of Meditation Practice for the U.S. and Thai meditators

	U.S. Meditators	Thai Meditators
Duration of regular practice		
Less than 1 year	4.5%	27.8%
1 - 3 years	17.5%	26.0%
4 - 5 years	11.7%	17.9%
6 - 10 years	18.8%	13.2%
More than 10 years	47.4%	15.0%
Sample size	154	276
Frequency of meditation sessions per week		
1 - 2 times per week	14.3%	42.1%
3 - 4 times per week	21.4%	19.8%
5 - 6 times per week	20.5%	16.1%
7 or more per week	33.8%	22.0%
Sample size	154	276
Length of typical meditation session		
Less than 15 minutes	8.4%	29.8%
15 - 30 minutes	51.9%	36.8%
31 - 45 minutes	23.4%	15.4%
46 - 60 minutes	12.3%	9.2%

more than 60 minutes	3.9%	8.8%
Sample size	154	276
Total number of days on meditation retreats		
None	9.7%	15.5%
1 - 4 days	11.0%	17.7%
5 - 10 days	7.8%	11.1%
11 - 30 days	18.8%	21.8%
31 - 90 days	21.4%	9.6%
More than 90 days	31.2%	24.4%
Sample size	154	276
Frequency of attendance to meditation retreats per year		
Not at all	25.3%	26.9%
1 time per year	27.9%	24.7%
2 - 3 times per year	23.1%	21.4%
4 - 6 times per year	11.0%	9.6%
More than 7 times per year	2.6%	17.3%
Sample size	154	276
The extent to which meditation practice is applied to daily life		
Not at all	0%	3.3%
Very little	3.2%	9.8%
Somewhat	11.7%	24.0%
Moderately	29.2%	24.0%
Very much	55.8%	38.9%
Sample size	154	275

Results

Factor structure and cultural invariance. The first step was to determine whether the Thai meditating sample also demonstrated the five-factor structure of the FFMQ-R as previously established in the American meditating sample in Study 1. The same analytic strategy that was used with the American sample was also applied here, i.e., use of a CFA using item parcels, to examine the 1st order model of the FFMQ-R within the Thai sample. In contrast to the American sample, the model for the Thai sample yielded poorer model fit indices: $\chi^2/df = 2.751$; CFI = .844; TLI = .795; IFI; .848; RMSEA = .080; sRMR = .070. In order to address this lack of comparability issue, we conducted a standard CFA without item parcels as indicators to explore factor loadings. That is, all five items were used as indicators for each facet, so that we were able to determine which items had the lowest loadings on their particular facet. The model showed that for most facets the two lowest loading items for the Thai sample were the negatively worded items. This pattern illustrates that negatively worded items were problematic for the Thai sample to read and answer, and is consistent with the

previously noted issue of misunderstood negatively worded items in the cross-cultural context (Sliter & Zickar, 2014; Wong, Rindfleisch, & Burroughs, 2003). Therefore, we decided to remove the two lowest loading items from each sub-scale, leaving each facet with three positively worded items, except for the observing facet which contained two positively worded items and one negatively worded item. The new 1st order CFA with three non-parceled indicators yielded good model fit indices for the Thai sample: $\chi^2/df = 1.876$; CFI = .908; TLI = .880; IFI = .911; RMSEA = .056; sRMR = .051. The same model was applied to the American sample, which also yielded acceptable model fit indices: $\chi^2/df = 1.223$; CFI = .980; TLI = .973; IFI = .980; RMSEA = .038; sRMR = .051. From this point onward we only utilized these revised facets to test comparisons between the Thai and U.S. samples. The next step was to construct a hierarchical or 2nd order CFA of the FFMQ-R in which the five facets loaded onto the overall construct of mindfulness. This more parsimonious model yielded good model fit indices for the American meditators: $\chi^2/df = 1.538$; CFI = .948; TLI = .935; IFI = .949; RMSEA = .059; sRMR = .089, and acceptable fit indices for the Thai meditators: $\chi^2/df = 1.916$; CFI = .898; TLI = .874; IFI = .901; RMSEA = .058; sRMR = .054. This set of results suggested that the five-factor structure of the FFMQ-R was manifested similarly in both the American and the Thai meditating sample.

The same analysis was utilized with the Grit Scale. Similar to the American sample, the Thai sample also demonstrated good model fit indices for the 1st order model: $\chi^2/df = 1.677$; CFI = .987; TLI = .975; IFI = .987; RMSEA = .050; sRMR = .033, and the model fit indices were not compromised when tested at the 2nd order level. Again, for the two-factor structure of grit, the variances of the two components of grit had to be constrained to be equal in order for the model to converge. However, these results suggest that both the American and the Thai meditators exhibited a two-factor structure of grit as described by Duckworth et al. (2007).

Invariance testing. Before any comparison between the two cultural groups could be made, it was imperative to discern whether the FFMQ-R and the Grit Scale operated in a similar way across the two cultural groups. Therefore, Multigroup Confirmatory Factor Analysis (MGCFA) was used to conduct measurement invariance testing of the FFMQ-R and the Grit scale across the two cultural groups. Similar to the invariance testing in Study 1, three levels of measurement invariance were tested: configural, metric, and scalar, for both 1st and 2nd order models.

Results for the FFMQ-R showed that both 1st order and 2nd order models demonstrated configural invariance (1st order model: $\chi^2 = 247.983$; $df = 160$; $\chi^2/df = 1.55$; CFI = .946; GFI = .932; RMSEA = 0.036; 2nd order model; $\chi^2 = 293.577$; $df = 170$; $\chi^2/df = 1.73$; CFI = 0.925; GFI = .919; RMSEA = 0.041). Both of the models also demonstrated both metric invariance and scalar invariance as certain model fit indices (i.e., CFI and the GFI), did not change more than 0.01 when compared to the previously less constrained model. This set of results suggests that the five-factor structure of the FFMQ-R was conceptualized in a similar way across the two cultures, which enables meaningful mean comparisons of mindfulness's facets as well as the overall level of mindfulness across the two groups.

As for the Grit Scale, the unconstrained model, both at the 1st order and 2nd order level, yielded good model fit indices (1st order model: $\chi^2 = 30.967$; $df = 16$; $\chi^2/df = 1.94$; CFI = 0.977; GFI = .976; RMSEA = 0.047, 2nd order model: $\chi^2 = 34.345$; $df = 17$; $\chi^2/df = 2.02$; CFI = 0.973; GFI = .974; RMSEA = 0.049), which suggests that both Thai and American meditating samples exhibited a similar two-factor structure of grit as conceptualized by Duckworth et al. (2007). The 1st order model demonstrated metric invariance, as the Δ CFI and Δ GFI values from the configural model to the metric model fell within the acceptable range. However, the model failed to meet scalar invariance as the Δ CFI and Δ GFI values from the metric model to the scalar model exceeded the adopted criteria, which suggests that the intervals and zero points of the items were dissimilar between the two cultural groups. The 2nd order model did not meet metric invariance as the Δ CFI and Δ GFI values moving from the configural to the metric model (where items' loadings onto their specific facet were constrained to be equal across group) exceeded the acceptable range. Moreover, due to the constraints on the variance of the two grit components at this 2nd order level, we could not test for invariance at the scalar level. Since scalar invariance is a prerequisite for meaningful mean comparisons, mean comparisons were not conducted for the Grit Scale. The model fit indices of each step of invariance testing are presented in Table 5.

Descriptive statistics and correlations. As reported in Table 6, for the Thai sample, two of the mindfulness facets yielded a Cronbach's alpha falling slightly below .70 (describing, $\alpha = .69$; non-reacting, $\alpha = .65$), while the other three facets yielded much lower Cronbach's alphas ranging from .51 to .55. Since only three items constituted each facet, we also took into account corrected item-total correlations which is less reliant on the number of items than Cronbach's alphas. Results show that for three facets, obtained values fell above .30, (observing: .30 to .42, describing: .40 to .59, non-reacting: .43 to .46), which is the

suggested cutoff for corrected item-total correlation (Nurosis, 1994). However, the other two facets did not meet this criterion, more specifically the non-judging facets items ranged from .26 to .37, and acting with awareness items ranged from .29 to .39. In contrast, almost all of the mindfulness facets yielded good internal reliability for the American meditators as most facets yielded a Cronbach's alphas above .70, apart from the non-judging and observing facets which yielded a Cronbach's alpha approaching this value ($\alpha = .69$). In regards to the Grit Scale, the two components of grit yielded acceptable Cronbach's alphas for the Thai meditating sample (consistency of interest: $\alpha = .70$; perseverance of effort: $\alpha = .75$), indicating good internal reliability. Similarly, the American meditators sample yielded acceptable Cronbach's alpha for perseverance of effort ($\alpha = .78$), while yielding a marginal Cronbach's alpha of .69 for consistency of interest.

The latent means of the five facets of mindfulness were compared across Thai meditators and U.S. meditators using Multi Group Analysis conducted in Amos, where education, age and meditation experience were added as covariates. Results demonstrated that in comparison to Thai meditators, U.S. meditators endorsed higher levels of describing ($B = .74$, $SE = .094$, $p < .001$), observing ($B = .62$, $SE = .083$, $p < .001$), acting with awareness ($B = .35$, $SE = .071$, $p < .001$), and non-judging ($B = .24$, $SE = .076$, $p = .001$). No significant difference was found for non-react across the two groups. The mean of the overall mindfulness level was compared across the two groups through the same method but on the overall latent means, with education, age and meditation experience treated as covariates. The analysis revealed that in comparison to U.S. meditators, Thai meditators endorsed lower levels of mindfulness ($B = -.42$, $SE = .066$, $p < .001$). In terms of grit, we could not compare the means of the overall level of grit and its components between the two cultural groups as the Grit Scale did not meet scalar invariance.

The zero order correlations between the five facets of mindfulness and the two components of grit revealed some notable differences across the two cultural groups, as shown in Table 6. In particular, for the Thai sample, almost all of the mindfulness facets but one, non-judging, did not significantly correlate with the consistency of interest component of grit. In contrast, almost all but one mindfulness facet, observing, positively correlated with consistency of interest in the American sample. However, for both countries, all of the mindfulness facets were found to positively correlate to the grit component of perseverance of effort.

Table 10

Invariance Testing for the FFMQ-R and the Grit Scale across Thai and U.S. Meditators

Questionnaire	Models	χ^2	df	χ^2/df	RMSEA	CFI	GFI	Comparison	ΔCFI	ΔGFI
FFMQ-R 1 st order	A. Unconstrained (configural invariance)	247.983	160	1.550	.036	.946	.932			
	B. Measurement weights (metric invariance)	265.665	170	1.563	.036	.942	.927	B vs. A	-.004	-.005
	C. Structural covariance (scalar invariance)	291.012	185	1.573	.037	.935	.921	C vs. B	-.007	-.006
FFMQ-R 2 nd order	1. Unconstrained (configural invariance)	293.577	170	1.727	.041	.925	.919			
	2. Measurement weights (1 st order metric invariance)	310.386	180	1.724	.041	.920	.915	2 vs. 1	-.005	-.004
	3. Structural weights (2 nd order metric invariance)	322.389	185	1.743	.042	.916	.912	3 vs. 2	-.004	-.003
	4. Structural residuals (2 nd order scalar invariance)	335.127	190	1.764	.042	.911	.907	4 vs. 3	-.005	-.005
Grit Scale 1 st order	A. Unconstrained (configural invariance)	30.967	16	1.935	.047	.977	.976			
	B. Measurement weights (metric invariance)	40.718	20	2.036	.049	.968	.969	B vs. A	-.009	-.007
	C. Structural covariance (scalar invariance)	64.388	23	2.799	.065	.936	.953	C vs. B	-.032	-.016
Grit Scale 2 nd order	1. Unconstrained (configural invariance)	34.345	17	2.020	.049	.973	.974			
	2. Measurement weights (1 st order metric invariance)	52.935	21	2.521	.060	.951	.961	2 vs. 1	-.022	-.013
	3. Structural weights (2 nd order metric invariance)	64.388	23	2.799	.065	.936	.953	3 vs. 2	-.015	-.008

Table 11

Bivariate Correlations and Descriptive Statistics for the FFMQ-R and the Grit Scale for the Thai and U.S. Meditating Samples, Separately

Cultural groups		1	2	3	4	5	6	α	Mean (SD)
Thai Med	1. FFMQ (Des)							.69	3.28 (.87)
	2. FFMQ (Non-J)	.21**						.51	3.62 (.81)
	3. FFMQ (Obs)	.25**	.40**					.55	3.56 (.77)
	4. FFMQ (Act-a)	.32**	.35**	.34**				.51	3.60 (.82)
	5. FFMQ (Non-R)	.22**	.48**	.29**	.44**			.65	3.54 (.73)
	6. Grit (Consistency)	-.004	.12*	.11	.06	.07		.70	3.01 (.66)
	7. Grit (Perseverance)	.33**	.35**	.30**	.49**	.48**	.14*	.76	3.59 (.67)
U.S. Med	1. FFMQ (Des)							.88	3.98 (.86)
	2. FFMQ (Non-J)	.34**						.69	3.83 (.77)
	3. FFMQ (Obs)	.31**	.25**					.69	4.22 (.70)
	4. FFMQ (Act-a)	.45**	.30**	.35**				.76	3.91 (.69)
	5. FFMQ (Non-R)	.26**	.59**	.19*	.37**			.79	3.62 (.80)
	6. Grit (Consistency)	.34**	.19*	.13	.18*	.22**		.69	3.15 (.74)
	7. Grit (Perseverance)	.29**	.25**	.35**	.41**	.35**	.38**	.78	3.95 (.55)

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

The relationship between mindfulness and grit across the two cultural groups.

First we examined the relationship between mindfulness and grit at the overall construct level separately for the two cultural groups. In support of hypothesis 1, mindfulness was found to be positively associated with grit for both Thai and U.S. samples (Thai: $\beta = .45, p < .001$; U.S.: $\beta = .31, p < .001$, with education, age, and meditation experience controlled). However, since we were unable to establish metric invariance of the Grit Scale at the 2nd order level across the two cultural groups, we could not compare the strength of the relationship between mindfulness and grit at the overall construct level across the two cultural groups.

Nonetheless, as metric invariance was established at the 1st order level for both measures, we were able to examine and compare the unique relationships between the five facets of mindfulness and the two components of grit across the U.S. and the Thai samples. This analysis was performed using path analysis conducted in AMOS (Arbuckle, 2006). A model was constructed where the five facets of mindfulness predicted the two components of grit in a fully saturated model, where meditation experience, levels of education, and age were also included as control variables, for the two meditating groups separately. We then conducted a chi-square test with 1 *df* on all 10 paths in the saturated model in order to determine the equivalence or difference between the two cultural groups. The analysis revealed only one difference between the two groups, that is, the facet of describing was found to significantly predict consistency of interest for the American sample but not for the Thai sample.

However, in general, the results suggested that both cultural groups exhibited similar relationships between the five facets of mindfulness and grit. Results from the path model are reported in Table 7.

Table 12

Comparison of the Relationships between the Five Facets of Mindfulness and the Two Components of Grit between the Thai and U.S. Meditating samples

	Thai sample		U.S. sample		Equality Constraint test
	β	<i>p</i> value	β	<i>p</i> value	<i>p</i> value
Acting-awareness ---> Consistency of Interest	.03	.640	-.06	.473	.393
Acting-awareness ---> Perseverance of Effort	.27	.001	.18	.033	.173
Non-reacting ---> Consistency of Interest	.05	.498	.06	.550	.906
Non-reacting ---> Perseverance of Effort	.27	.001	.12	.182	.077
Observing ---> Consistency of Interest	.07	.273	.01	.932	.609
Observing ---> Perseverance of Effort	.07	.225	.23	.003	.093
Non-judging ---> Consistency of Interest	.08	.280	.04	.690	.771
Non-judging---> Perseverance of Effort	.06	.285	.04	.678	.712

Describing ---> Consistency of Interest	-.07	.260	.21	.018	.010
Describing ---> Perseverance of Effort	.15	.005	-.00	.965	.079

Did meditation experience moderate the relationship between mindfulness and grit in a similar fashion across cultures? In the previous study, it was found that meditation experience did not have a significant moderating effect on the relationship between mindfulness and grit for the American meditators. One of the goals of the second study was to determine whether this null finding would also apply to the Thai meditating sample. The same analysis that was used with the American sample was also used here with the Thai sample – i.e., a regression analysis with grit stipulated as the dependent variable, involving three steps: 1) age and education were included as control variables, 2) mindfulness and meditation experience were added as main effect predictors, and 3) the interaction term (meditation experience X mindfulness) was added as a predictor, in order to test for the moderating effect of meditation experience on the relationship between the mindfulness and the grit component within the Thai sample. Similar to the finding with the American sample, the analysis revealed that meditation experience did not significantly moderate the relationship between mindfulness and grit within the Thai sample ($B = .047$, $SE = .084$, $p = .574$). As we were unable to establish measurement invariance of the Grit Scale at the 2nd order level across the two cultural groups, we could not directly compare the moderating effect of meditation experience across the two groups. However, as both groups showed non-significant moderating effect of meditation experience on the relationship between mindfulness and grit, the findings suggest that meditation experience did not influence the strength of the relationship between mindfulness and grit in both cultures.

Summary of Study 2 Findings

In general, Hypothesis 4 was supported as both Thai and U.S. meditators exhibited a positive association between mindfulness and grit. Examination at the sub-facet level also showed similar relationships between the five facets of mindfulness and the two components of grit across the two cultural groups, with one exception – describing was found to significantly predict consistently of interest for the U.S. meditators but not for the Thais. Moreover, similar to Study 1, we did not find evidence to support Hypothesis 5 as meditation experience did not significantly moderate the relationship between mindfulness and grit for the Thai meditators. This result suggests that for both cultures, meditation experience does not play a role in strengthening the relationship between mindfulness and grit.

Discussion

The present study was designed to examine how mindfulness and grit relate to each other in a community sample (as opposed to university students) across different cultures, and the potential role that meditation experience may play in the relationship between the two constructs. Study 1 specifically compared how the two positive constructs relate to each other across American meditating and non-meditating community samples, while Study 2 focused on the comparison between American and Thai meditating samples. The most important result from both studies was that mindfulness and grit were positively related to each other in all community samples, regardless of culture and meditation experience. When examined at the subfacet level, the five facets of mindfulness and the two components of grit yielded a similar pattern of associations across the American meditating and non-meditating samples, as well as across the meditating samples from U.S. and Thailand. And last, meditation experience was found to be an insignificant moderator of the relationship between mindfulness and grit for both American and Thai samples.

The Value of Testing Measurement Invariance

Before these results are discussed any further, it is worth mentioning that the present study is unique in that it assessed measurement invariance of the FFMQ-R and the Grit Scale across samples within the same culture as well as across cultures. Previously, although Baer et al. (2008) conducted CFAs on the FFMQ separately for meditating and non-meditating samples and showed that the same five factor structure functioned well in both samples, they did not assess measurement invariance across the two samples. Consequently, they could not determine whether the two groups exhibited similar factor loadings and intercepts. Demonstrating equivalence of factor loadings and intercepts across groups is an important first step because it is critical to ensure that the measure is conceptualized in the same way before any comparisons can be made between groups. Because the present study demonstrated measurement invariance of the FFMQ-R, both at 1st order and at 2nd order levels, across meditators and non-meditators within the same culture, it provided further validation of the suitability of the FFMQ-R to be used across samples that vary in meditation experience.

At the same time, we initially found that the five factor structure did not fit well with the Thai meditators' data. However, when negatively worded items were mostly omitted from the CFA, the revised model yielded good model fit indices. Utilization of negatively-worded items is an on-going debate in the cross-cultural literature, as they have been shown to cause psychometric issues, and thus some researchers advocate against the use of such items in

cross-cultural research (e.g., Sliter & Zickar, 2014; Wong et al., 2003). Supporting this notion, the present study demonstrated that the revised model of the FFMQ-R, which contained almost entirely positively worded items, demonstrated measurement invariance across American and Thai meditators. This result suggests that at least for the FFMQ-R, removal of negatively worded items enhanced its measurement coherence across community samples drawn from different cultures.

Mindfulness Was Associated Positively with Grit

The main purpose of the present research efforts was to examine the relationship between mindfulness and grit in different samples. Supporting Hypothesis 1, Study 1 showed that mindfulness and grit were positively related in both American meditating and non-meditating samples. Likewise, a similar finding was demonstrated for the Thai meditating sample in Study 2. These findings are consistent with that of a previous study conducted by Raphiphatthana et al. (2017), who found mindfulness and grit to be moderately and positively related in both NZ and Thai university students. Together, these findings suggest that the relationship between mindfulness and grit may be reasonably universal across different samples and cultures.

Hypothesis 2 posited that relative to non-meditators, meditators would exhibit a stronger relationship between the two constructs. However, we were not able to test this hypothesis directly, as we were unable to establish measurement invariance of the Grit Scale at the 2nd order level. Thus the overall latent construct of grit could not be compared across cultures. However, the trend suggests that the non-meditators evidenced a stronger relationship between mindfulness and grit than did the meditators, which is quite surprising. Future research should attempt to replicate this finding, and further, determine the reason for this differential association.

Nevertheless, as both the FFMQ-R and the Grit Scale demonstrated metric invariance at the 1st order level, we were able to compare the relationships between mindfulness and grit at the subfacet level across the two groups. Results at the subfacet level were inconsistent with Hypothesis 2, as the omnibus test revealed that both groups exhibited associations there were mostly of similar strength between the five facets of mindfulness and the two components of grit. One exception was found, namely, acting with awareness was positively associated with consistency of interest for non-meditators but not for meditators. This positive association was also found for the NZ and Thai university students (Raphiphatthana et al., 2017). Together with previous studies, this finding suggests that perhaps acting with

awareness may be helpful in terms of sustaining interest for individuals who do not meditate regularly but not for those individuals that do.

In the same vein, and inconsistent with Hypothesis 3, we also found in Study 1 that meditation experience did not significantly moderate the relationship between mindfulness and grit. These latter findings are surprising, as previous studies have found that in comparison to non-meditators, meditators deal better with stress and are superior self-regulators (Grossman et al., 2004; Hofmann, et al., 2010). It was hypothesized that meditators would have a stronger foundation for grit, and thus manifest a stronger association between mindfulness and grit. It is plausible that the FFMQ scale is not sufficiently sensitive to fully capture the range of differences in mindfulness between meditators and non-meditators. In this vein, the FFMQ has been discussed to be incomplete or inconsistent with the Buddhist conceptualisation of mindfulness (Feng, Krägeloh, Billington, & Siegert, 2017). Given that our meditators were recruited from Buddhist centers and groups, the FFMQ may not have provided an accurate and nuanced assessment of mindfulness levels for individuals who exercise mindfulness meditation every day as part of their Buddhist practice. Consequently, the unexpected findings regarding meditators and the role of meditation experience may be due to an insensitivity of the FFMQ in capturing the complexities of high level Buddhist meditative practice.

The second objective of the present study was to examine the relationship between mindfulness and grit across cultures, with the focus on the comparison between American and Thai meditators. Results from Study 2 supported Hypothesis 4: mindfulness and grit were found to be positively related in both cultures. This finding is similar to that of a previous study conducted by Raphiphatthana et al. (2017) who found the two constructs to be positively related in university student samples from NZ and Thailand. These results taken in combination suggest that despite being from different cultures, mindful individuals also tend to be gritty. These results are consistent with previous studies that have examined the benefits of mindfulness in cultures other than the U.S. (e.g., Deng et al., 2011; Sugiura et al., 2012). These studies found mindfulness to be positively associated with favorable psychological outcomes in the same way that is found in the U.S.

Previous research has not examined the relationship between mindfulness and grit at the subfacet level, so the present study presented new information about this issue. The present results showed that Thai and U.S. meditators exhibited similar pattern of associations, with one exception: describing was found to positively relate to consistency of interest for the American meditators but not for the Thai meditators. This difference between the two groups

may be due to the differences in meditation methods that are practiced in the two countries. The Thai meditator sample was composed of individuals who practice several styles of mindfulness meditation rarely encountered in Western countries, including movement meditation, a technique whereby attention is anchored to bodily movements, such as hand movements (Puntarigvivat, 1992). In contrast, our American sample was mainly composed of individuals who practiced sitting meditation, a technique whereby attention is anchored to breathing or bodily sensations. Exactly how different types of mindfulness meditation influence different facets of mindfulness or other psychological outcomes has not been well researched. However, some evidence exists to suggest that there may be some outcome differences across meditation techniques. To be specific, Carmody and Baer (2008) found that different meditation techniques, i.e., body scan, movement meditation (yoga), and sitting meditation, were associated with changes in different mindfulness facets and other psychological outcomes. Thus, our obtained difference may have been due to the meditators in our U.S. sample practicing a method which cultivates the describing facet more so than the one practiced by the Thai meditators.

Lastly, in the present study we were interested in comparing the moderating influence of meditation experience on the relationship between mindfulness and grit across the Thai and U.S. meditating samples. Surprisingly, the results from the moderation analyses did not support Hypothesis 5, as they showed that meditation experience was not a significant moderator of this relationship for the Thai meditators. This finding was similar to that obtained for the American meditators, which suggests that for both cultural groups, meditation experience did not strengthen the relationship between mindfulness and grit. As previously discussed, the FFMQ may not sufficiently sensitively capture important distinctions between low vs. high levels of mindfulness within the Buddhist context.

Limitations and Applications

Though participation was voluntary for both American and Thai participants, part of the American sample was offered the chance to enter a prize draw to win a \$20 voucher, while the Thai sample was not provided with any compensation for their participation. This difference in recruitment method may have influenced the way that participants responded to the survey. Thai individuals, who were not provided with any external incentive, may have paid more attention to the survey due to their inherent interest in the study, while some of the American meditators who were incentivized by the prize draw may not have been as conscientious while answering the survey.

Another limitation to address is the low Cronbach's alphas of the FFMQ-R for the Thai sample. This trend suggests that the FFMQ-R may not function as well outside the Western-English speaking culture as within it. Studies that have examined the FFMQ within Asian cultures have found the internal reliability of the mindfulness facets to also be low (Deng et al., 2011; Sugiura et al., 2012). This difference in level of internal reliability is an important issue that future research needs to address and find ways to improve. Moreover, since we created a Thai-language version of the FFMQ questionnaire, future work should verify that it is equally valid in the Thai context as the English version in within the U.S. context. Nevertheless, the FFMQ-R demonstrated measurement invariance across the two cultural groups studied here, which suggests that it, at least, has similar psychometric properties across the two groups.

Lastly, the design of the present study was cross-sectional, which limits our ability to make conclusions about temporal relationships. Does mindfulness promote grit, does grit promote mindfulness, or do they bidirectionally affect each other over time? Although our present study could not elucidate this issue, a previous study conducted by Raphiphatthana et al. (2017) found mindfulness to positively predict grit over time within a NZ university sample, but not in the reverse direction. This result suggests that mindfulness is an antecedent of grit, at least within NZ university students. Although a longitudinal study is required to test whether this same relationship applies to community samples, the present findings still provide a solid platform for future research to examine the causal link between mindfulness and grit within the general populations of different cultures. This work would inform the potential of using mindfulness interventions for grit cultivation across cultures. However, the present study also highlights a potential limitation of mindfulness and its relation to grit, as it revealed that meditation experience did not have an additional influence on the relationship between the two constructs. It could be that mindfulness interventions may be useful for those individuals who acquire even a low level of mindfulness, and it may be that the addition of higher levels of mindfulness do not confer significant additional benefit. This information has implications for grit interventions and thus is a worthwhile goal for future research efforts.

Conclusions

The present study aimed to examine the relationship between mindfulness and grit and the influence of meditation experience on the relationship across Western and non-Western cultures. Despite the insignificant finding regarding meditation experience in moderating the relationship between mindfulness and grit, the present finding showed that the

two constructs were positively associated in all samples in the present study. This result suggests that mindful individuals tend to also be gritty regardless of cultural backgrounds or meditative experience.

General Discussion

The present thesis embodied two key aims, namely to investigate: 1) the relationship between mindfulness and grit, and 2) factors that may influence this basic relationship such as culture and meditation experience. Three studies were conducted to shed light on these objectives. Study 1 examined the relationship between mindfulness and grit, both cross-sectionally and longitudinally, within the NZ culture. Study 2 addressed the cross-cultural aspect by comparing the relationship between the two constructs across NZ and Thai cultural groups. Lastly, Study 3 provided insight into the influence that meditation experience may have on the relationship between mindfulness and grit within Western and non-Western cultures. These findings will now be discussed in more depth.

First, Study 1 demonstrated that mindfulness and grit are positively and moderately associated within NZ university students. Consistent with prediction, individuals who report high levels of grittiness are also more likely to report higher mindfulness. And second, we sought to determine whether the relationship between the two constructs would be bidirectional or unidirectional over time. Notably, mindfulness was found to predict change in grit over time but not vice versa. This finding suggests that mindfulness is an antecedent to grit, but the reverse order of influence was statistically nonsignificant. At the facet level, acting with awareness and non-judging were found to be the most important mindfulness facets that predicted change in grit's components over time, and these influences were mediated by determination in achieving goals, i.e., the *agency* aspect of hope. These findings imply that being attentive to present activities while holding a non-judgmental stance towards thoughts and feelings is predictive of the determination to achieve goals, which, in turn, is predictive of focus and perseverance in working towards long term goals. These findings are important because they examine one mechanism by which mindfulness bolsters grit over time.

In an effort to extend the basic finding beyond a single Western culture, Study 2 compared the relationship between mindfulness and grit across groups of NZ and Thai university students. At the overall construct, mindfulness and grit were positively associated with each other across Thai and NZ students; however, the association was stronger for NZ students. Additionally, the cross-cultural comparison also revealed some differences in the associations between the two constructs at the facet level. To briefly reiterate, acting with awareness and non-judging were found to be more powerful in predicting grit components for NZ students than for Thai students. This finding suggests that, in terms of the outcome of grit, certain aspects of mindfulness may be more salient for individuals who grew up in a

Western culture than for those who were raised in an Eastern culture. Given that Confucianism, parental involvement and achievement expectations play a big part in Asian cultures (Glick & White, 2004; Yamamoto & Holloway, 2010), it could be that Confucian belief systems and parental factors may influence Thai students' grittiness more so than mindfulness compared to Western samples.

However, as both Study 1 and 2 utilized samples of university students, which are selective in age and educational background, it is uncertain whether these findings can be generalized to the wider population. This issue was addressed in Study 3, which utilised community samples of adults. Results showed that the two constructs were positively related in both American and Thai community samples, which suggests that the relationship between the two constructs exists within the general population, as well as across cultures. This finding further suggests that mindfulness and grit may be inherently interrelated regardless of age, cultural, and educational backgrounds.

In addition, Study 3 also aimed to examine whether meditation experience would moderate the relationship between mindfulness and grit similarly across Western and non-Western cultures. As meditation practice has been shown to enhance levels of mindfulness (Carmody & Baer, 2008; Nyklicek & Kuijpers, 2008), it was expected that greater experience in such practice would also enhance the link between mindfulness and grit. Therefore, it was predicted that: 1) in comparison to non-meditators, meditators would exhibit a stronger association between mindfulness and grit, and 2) that among meditators, individuals with greater meditation experience would also exhibit a stronger association between the two constructs.

Surprisingly, results from Study 3 showed that within American culture, non-meditators and meditators demonstrated similar strengths of associations between the five facets of mindfulness and grit. Moreover, we also found that meditation experience did not significantly moderate the relationship between mindfulness and grit for both American and Thai meditators. That is, among the meditators from the U.S. and Thailand, individuals with greater meditation experience did not exhibit a stronger association between mindfulness and grit. Thus, the moderation hypotheses were not supported. As discussed in Study 3, a possible explanation for the insignificant findings may lie within the FFMQ as a measure. Commentators have voiced a concern over the conceptual validity of the existing mindfulness measures, e.g., the FFMQ, in measuring mindfulness within the Buddhist context. For instance, aspects of the FFMQ have been discussed to be incomplete or inconsistent with the Buddhist conceptualisation of mindfulness (Christopher, Woodrich, & Tiernan, 2014; Feng,

Krägeloh, Billington, & Siegert, 2017). Given that our meditators were recruited from groups affiliated with Buddhist thought and philosophy, it is plausible that the FFMQ scale is not sufficiently sensitive to capture the complexities of mindfulness levels in Buddhist meditative practice.

Conclusions Based on the Studies' Findings

In reviewing the main findings from the three studies, several trends have stood out. First, it is important to note that the samples included in the present thesis covered a range of individuals from various social economic, age, educational and cultural backgrounds. Therefore, the finding that mindfulness and grit, as an overall construct, were moderately and positively associated with each other in all samples across the three studies is an important one. This consistent finding across diverse samples strongly suggests that mindful individuals tend to also be gritty regardless of age, education and cultural backgrounds (at least across the three studied cultures).

This finding is, however, not surprising as there are several overlapping concepts between mindfulness and grit literature. In her book, Duckworth (2016) discussed several psychological aspects that are important to grit, i.e., interest-taking, self-regulation, and hope. These aspects have also been found to associate with dispositional mindfulness within mindfulness literature (Deci, Ryan, Schultz, & Niemiec, 2015; Sears & Kraus, 2009). Therefore, there is strong theoretical reasoning underpinning the positive association between the two constructs. Moreover, given that dispositional mindfulness has been found to associate with other psychological constructs in the same way across Western and Eastern cultures (e.g., Cheng et al; Sugiura et al., 2012), it is not surprising that the positive relationship between mindfulness and grit found within NZ and U.S. samples would also be replicated in the Thai samples.

Secondly, when the association between mindfulness and grit was examined at the facet level across cultures, there were some differences worth noting. In particular, the cross-cultural comparison showed that American and Thai community samples exhibited more similar patterns of associations among the facets (Study 3) relative to when the comparison was made between NZ and Thai university students (Study 2). This difference could be due to the samples' differences in demographic characteristics. The mean age of our university samples is much lower than that of the community samples. As mindfulness and grit are positively associated with age (Baer et al., 2008; Duckworth et al., 2007), it is possible that the association between the two constructs may be influenced by life stages and experiences. Moreover, American and Thai community samples were meditators explicitly recruited from

Buddhist groups. Therefore, given their common interest in meditation and/or Buddhism, the two groups may be more similar than Thai and NZ students.

Lastly, despite the differences found in the pattern of the associations between the five facets of mindfulness and the two components of grit across cultural groups, one similarity emerged across all cultural groups, i.e., acting with awareness was consistently found to be a significant predictor of grit components. This consistent result suggests that out of the five facets in the FFMQ, acting with awareness may be the most important aspect that links mindfulness to grit across cultures. This finding is consistent with the literature as acting with awareness has consistently been found to be a mindfulness aspect that strongly predicts other psychological outcomes (e.g., Bohlmeijer et al., 2011; Christopher et al., 2012). This emerging empirical fact has an important implication for future grit interventions as it suggests that the ability to be attentive to everyday activities may be an important factor in the cultivation of grittiness.

Implication for Practice

Given positive outcomes of grit, especially within educational and organizational contexts, and the lack of an established grit intervention, the present findings have an important implication as they highlight the potential use of mindfulness interventions in cultivating grit. Particularly, the finding from Study 1, which showed that mindfulness is an antecedent of grit over time, suggests that by cultivating mindfulness, one may also become grittier as a consequence. Moreover, since mindfulness interventions are already well described and well regarded within psychological literature, it would be more efficient to utilize and adapt an existing infrastructure than creating an entirely new intervention from the ground up.

As mentioned, grit is often discussed within the academic literature. It is considered to be an important characteristic that contributes to individuals' academic success (Duckworth et al. 2007). Thus the potential of grit being a positive by-product of mindfulness interventions is a great consequence for the educational context. Recently mindfulness interventions are playing a larger role within education, with a number of studies demonstrating the benefits of mindfulness interventions for students' psychological well-being (Canby, Cameron, Calhoun, & Buchanan, 2014; Mendelson et al., 2010). The link between mindfulness and grit provides an exciting avenue in which mindfulness interventions could be utilized beyond its recognized benefits for students' well-being, i.e., they could also be used to promote grit. Therefore, mindfulness interventions may not only help students to improve their wellbeing, but also help them to succeed academically.

The link between mindfulness and grit also has an important implication for the workplace. Within the organizational psychology context, mindfulness interventions have been shown to promote work productivity and engagement, resilience, and reduction in stress (Aikens et al., 2014; Wolever et al., 2012). Though grit is not as well researched within this area, it has been shown to predict reduced career change (Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014). Greater work commitment is an important factor within the workplace as quick turnover has significant negative consequences for organizations (Abbasi & Hollman, 2000). Therefore, the potential use of mindfulness interventions to enhance grit may provide a number of benefits, i.e., in addition to the well-documented benefits of mindfulness interventions for employees, the interventions may also benefit organizations at the macro-level by reducing turnover rate.

Lastly, mindfulness interventions such as Mindfulness-based Stress Reduction (MBSR) and Mindfulness-based Cognitive Therapy (MBCT), which are widely practiced and well researched within clinical settings, have been shown to be effective at ameliorating symptoms associated with depression and anxiety disorder (Hofmann, Sawyer, Witt, & Oh, 2010; Piet & Hougaard, 2011). In addition to the well-known benefits of mindfulness interventions for mental health, the present thesis provides another potential avenue in which mindfulness interventions could be useful in clinical contexts. Within such settings, patients are ultimately in charge of turning up to appointments and adhering to the regime or practice, i.e. mindfulness practice, taking medications, or physiotherapy exercises, given out by the clinicians. In this light, grit is an important attribute that assists progress and adherence to the treatment regime. Given the link between mindfulness and grit, it is plausible that mindfulness interventions may have additional value in encouraging individuals to stick to their appointed regime and persevere in their road to recovery.

Strengths and Limitations

In the last couple of decades, research into both mindfulness and grit has increased exponentially, and much value has been placed on these two psychological dispositions in terms of wellbeing and achievements. However, to date, the two constructs have not been explored in regard to their relation with each other. Therefore, the present thesis provides an important new insight into the relationship between mindfulness and grit. By addressing this gap in the literature, the present findings also provide a potential new avenue in which mindfulness interventions could be used beyond its traditional purpose of ameliorating mental health symptoms. This implication extends beyond clinical contexts to those such as

educational and organizational settings. Therefore, the present findings do not only hold important theoretical value but also an applied one.

Additionally, since both mindfulness and grit have been developed and chiefly studied in the West, the present thesis provides further knowledge of the two constructs in non-Western cultures. By conducting invariance testing of measures of mindfulness and grit, the thesis lays an exemplary methodological framework for future cross-cultural research of mindfulness and grit to build upon. The cross-cultural aspect of the present thesis is an important one as today's society is becoming more culturally diverse and at the same time more integrated. Therefore, it is of importance to understand how Western conceptualizations and measures fare in non-Western cultures in order to provide a more accurate picture of mindfulness and grit and their function in such cultures. This understanding would hopefully lead to a better adaptation and use of psychological interventions and measures, specifically mindfulness and grit, in populations from different cultural backgrounds.

Lastly, the utilizations of university students as a research sample in psychological studies has been consistently criticized due to its limited generalizability. Addressing this issue, the present thesis used community samples in addition to samples of university students. Therefore, the researched samples presented in this thesis varied in their demographics, i.e., age, cultural and educational backgrounds, socio-economic status, and experiences with meditation. Consequently, the present study provides a wider understanding of mindfulness and grit across a variety of individuals, and beyond that of a study based solely on typical Western university students.

Nonetheless, the studies presented here in this thesis also have limitations that are worth noting. In Study 1, the longitudinal relationship between mindfulness and grit was examined within New Zealand university students. However, due to the lack of longitudinal data in the other samples in the thesis, the directionality of the relationship between mindfulness and grit could not be replicated in those subsequent samples. Thus the finding that mindfulness is an antecedent of grit, but not vice versa, is limited to the NZ sample only. In addition, the sample size of this longitudinal study was relatively small ($N = 74$). Consequently, further research is needed, especially larger sample longitudinal studies and randomized control trials, in order to provide evidence regarding the directionality of the two constructs in Western and non-Western cultures.

Another important limitation worth noting is the use of translated questionnaires that were not previously validated. In Studies 2 and 3, mindfulness and grit questionnaires, back-translated from English to Thai, were administered to Thai samples without having their

validity examined prior to utilization. Generally it is good practice to thoroughly investigate both the etic and emic validity of a translated measure before use. However, given that both the FFMQ-R and the Grit Scale exhibited measurement invariance at least at the configural and metric levels across all cultural groups, this result suggests that psychometrically, both measures functioned in a similar way, across the Thai and Western-English speaking samples. This outcome implies that the measures of mindfulness and grit were responded to by Thai, New Zealanders, and Americans in a similar manner, which provides some confidence in the implications of the cross-cultural analyses of these measures. However, it would be fruitful for future research to more fully examine the validity of these questionnaires in order to be fully confident that these measures are, in fact, both conceptually and psychometrically invariant across cultures.

The present study used meditators that were selected from Buddhist-affiliated organizations as a comparison group to non-meditators. It is possible that there are some differences between meditators that practice mindfulness meditation as part of a spiritual practice versus those that practice mindfulness meditation in a secular manner. Although this issue has yet to be explored empirically, it is important to consider that mindfulness may qualitatively and/or quantitatively differ in these groups, which should be addressed by future research. Lastly, the present thesis only investigated three cultural groups, i.e., Thai (representing non-Western cultures), and NZ and the U.S. (representing Western cultures). Therefore, the findings and their implications are limited to these specific national and cultural groups. In order to have a more complete picture of the universality of the utility of mindfulness, grit and their measures, studies with a larger number of samples from more countries are required.

Future Directions

The present thesis provides a basic foundation for future studies to build upon and further investigate the relationship between mindfulness and grit. Given the moderate positive association between these two constructs, it would be very beneficial for future studies to examine whether interventions that aim to increase mindfulness, e.g., MBSR and MBCT, are also able to enhance levels of grit. As discussed, since there are no empirically established grit interventions, it would be extremely useful and efficient to be able to use an already well-established program, i.e. mindfulness interventions, for the purpose of fostering grit. Therefore, more research, particularly methodologically rigorous designs such as randomized control trials, is needed to shed light on this new potential outcome of mindfulness-based interventions.

In addition, more research is required to understand the relationship between mindfulness and grit, especially their longitudinal relationship. For instance, a future study could longitudinally investigate a group of individuals, who are naive to meditation practice at recruitment, from the start of their meditation practice over the course of 6-12 months. During that time, measures of mindfulness and grit could be administered frequently, i.e., bi-weekly or monthly. Such a study would illuminate the intricate, complex and nuanced interrelations among the mindfulness facets and the two components of grit over time. This approach would provide valuable insights into the relationships between the two constructs at the micro level and would likely reveal aspects of mindfulness that are particularly important for the development of grit. Further, it would allow for a more in depth investigation of whether their relationship is unidirectional or dynamic (i.e., bidirectional) over time.

Lastly, more knowledge is needed regarding the mechanisms underlying the positive temporal relationship between mindfulness and grit. As shown in Study 1, hope, particularly the determination to achieve goals, is an important mediator between the two constructs over time. However, as discussed in the introduction, there are other potential mechanisms worth exploring, such as self-regulation, self-compassion, and implicit motivation. Although mindfulness and its relation to the growth mindset has not been explored, it is plausible that the two are also related. Moreover, mindfulness is discussed to change the way individuals relate to their cognitive processes by coming to learn that the sense of self, thoughts, and feelings are malleable constructs and changeable due to context (Shapiro, Carlson, Astin, & Freedman, 2006). This described feature of mindfulness overlaps with the conceptualisation of the growth mindset, which denotes the belief that intelligence is not a fixed attribute (Dweck, 2006). Therefore, if one notices one's own malleable sense of self, then it is likely that this belief would be applied to different aspects of self, including intelligence. Since the growth mindset has been discussed as an important foundation for grit development (Hochanadel & Finamore, 2015), it may be another potential mediator worth investigating between mindfulness and grit.

Conclusions

Across the three studies, the present thesis identifies a new and intriguing empirical finding concerning the previously unexplored relationship between mindfulness and grit. Specifically it was revealed that the two constructs are positively and moderately associated, and that mindfulness may potentially be an antecedent of grit as it has been found to predict change in grit over time. Within the cross-cultural context, the thesis showed that mindfulness and grit were positively associated with each other across Thai, New Zealand,

and American samples, which suggests that the relationship between the two constructs may be common across different cultures. However, these are preliminary findings and more research is needed to provide a deeper understanding of the relationship between the two constructs. In particular, research into the mechanisms underlying the relationship, further clarification on the influence of meditation practice on the relationship, and employing other methods to examine causality between the two constructs, i.e., longitudinal studies and randomized control trials, are needed. Nonetheless, the findings presented here provide a strong foundation for future research to build upon, and highlight the potential of utilizing mindfulness-based interventions to cultivate grit, which has important implications for various contexts, i.e., education, organizations and clinical settings.

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Appendix A: FFMQ-R

Please read the statements below and indicate how true each of them is for you.

	Never or very rarely true			Sometimes true		Very often or always true
1. When I have distressing thoughts or images, I feel calm soon after.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I am usually aware of what I am doing when I am doing a task.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. When I have distressing thoughts or images, I just notice them and let them go.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Generally, I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I notice the smells and aromas of things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. It's hard for me to find the words to describe what I'm thinking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. When I have disturbing thoughts or images in my mind, I find it difficult to stop thinking about them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I don't judge or reject my feelings; they are what they are.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. Even when I'm feeling terribly upset, I can find a way to put it into words.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I think some of my emotions are bad or inappropriate and I shouldn't feel them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. I don't criticise myself for thinking certain thoughts or feeling certain feelings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. It is easy for me to get carried away by upsetting thoughts that I have.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. When I have distressing thoughts or images, I don't let myself be carried away by them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. I accept my feelings and thoughts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. I don't usually notice colours or shapes of objects in my field of vision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. I tell myself I shouldn't be feeling the way I'm feeling.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. It seems I am “running on automatic” without much awareness of what I’m doing.	O	O	O	O	O
19. I’m good at finding words to describe my feelings.	O	O	O	O	O
20. I can easily put my beliefs, opinions, and expectations into words.	O	O	O	O	O
21. I focus my attention on what I am doing.	O	O	O	O	O
22. I do jobs or tasks automatically without being aware of what I’m doing.	O	O	O	O	O
23. When I feel something in my body, it’s hard for me to find the right words to describe it.	O	O	O	O	O
24. I am able to avoid going on “automatic pilot” when I am doing something.	O	O	O	O	O
25. I don’t usually pay much attention to body sensations such as taste, touch, and temperature.	O	O	O	O	O

Non-reacting: positively worded items 1, 3, 14; reverse coded items 7, 13

Acting with awareness: positively worded items 2, 21, 24; reverse coded items 18, 22

Observing: positively worded items 4, 5, 12; reverse coded items 16, 25

Describing: positively worded items 9, 19, 20; reverse coded items 6, 23

Non-judging: positively worded items 8, 11, 15; reverse coded items 10, 17

Appendix B: Grit Scale

Here are a number of statements that may or may not apply to you. For the most accurate score, when responding, think of how you compare to most people -- not just the people you know well, but most people in the world. There are no right or wrong answers, so just answer honestly

	Not at all like me	Not like me	Neutral	Like me	Just like me
I have overcome setbacks to conquer an important challenge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New ideas and projects sometimes distract me from previous ones.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My interests change from year to year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Setbacks don't discourage me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have been obsessed with a certain idea or project for a short time but later lost interest.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am a hard worker.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often set a goal but later choose to pursue a different one.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have difficulty maintaining my focus on projects that take more than a few months to complete.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I finish whatever I begin.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have achieved a goal that took years of work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I become interested in new pursuits every few months.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am diligent.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>