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The Relationship of Motivational Climates, Mindsets, and Goal Orientations to Grit in Male Adolescent Soccer Players

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Abstract

Across a variety of domains, such as in academics and in the military, grit is a significant predictor of performance, even after controlling for dimensions of innate ability. However, little is known about how grit develops or the psychosocial factors that may contribute to its presence (i.e., motivational climates, mindsets, and goal orientations). Although sport is a natural context in which to examine grit, both as a predictor and an outcome, few studies have done so. Thus, within the framework of achievement motivation theory, we examined the relationships of the perceived motivational climate created by coaches (task-involving vs. ego-involving), athletes' mindset (growth vs. fixed) and goal orientation (task vs. ego), to their grit. Male high school varsity soccer players (N = 81) completed questionnaires measuring these constructs. Having a growth mindset and a task goal orientation, but not the perception of a task-involving climate, significantly predicted higher levels of grit (R^2 = .15)*;* ego-related constructs were not significantly related to grit. Components of achievement motivation theory, specifically mindset (fundamental belief regarding whether or not ability can change with hard work and effort) and goal orientation (approaching tasks to either improve ability or demonstrate ability), may be particularly salient in athletes developing a perspective that allows them to work effectively and diligently toward long-term goals. Limitations and future directions are discussed.

Keywords: grit, motivational climate, mindset, goal orientation, achievement motivation

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Duckworth and Gross (2014) have defined grit as "passion and effort sustained over years" (p. 320) and "the tenacious pursuit of a dominant superordinate goal despite setbacks" (p. 319). With this definition providing the conceptual framework, Duckworth, Peterson, Matthews, and Kelly (2007) began studying grit to determine if it could, above ability, predict success in achievement contexts. Through subsequent research with non-athlete samples, Duckworth and her colleagues (Duckworth et al., 2007; Robertson-Kraft & Duckworth, 2014) demonstrated that grit added incrementally in predicting success across a variety of performance outcomes (e.g., retention, educational achievement), and that it was associated with the adoption of adaptive achievement behaviours, such as task persistence, willingness to engage in difficult tasks, and effort. With the accumulating evidence of grit's positive effects in different non-sport performance domains, researchers have extended the study of grit to sport contexts to determine how it relates to how athletes perform (Larkin, O'Connor, & Williams, 2016; Martin, Byrd, Watts, & Dent, 2015; Moles, Auerbach, & Petrie, 2017), and have started to examine the psychosocial factors that may contribute to its presence (Akin & Arslan, 2014; Park, Yu, Baelen, Tsukayama, & Duckworth, 2018; West et al., 2016).

Grit

Although some researchers have suggested that grit is the same as related constructs (e.g., conscientiousness, self-control; Credé, 2018; Credé, Tynan, & Harms, 2017), Duckworth et al. (2007) has differentiated it through the dimensions of consistency of interests (including remaining loyal to commitments over time) and perseverance of effort (including having resilience in the face of adversity). Thus, individuals high in grit are able to sustain interest in,

and pursuit of, their goals over time (Duckworth et al., 2007). Specifically, these individuals display a commitment to long-term goals and interests, as well as a persistent work ethic. For instance, in their pursuit of task mastery and improved performance, spelling bee participants with high grit compared to low grit were more likely to prepare by doing the less intrinsically rewarding tasks that required more effort (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011).

Duckworth et al.'s (2007) subsequent measure of grit was based on this conceptualization (Grit Scale; Duckworth et al., 2007), which they then used to examine its relative utility in predicting performance. In their initial testing and validation of the construct and measure, which occurred within non-sport domains, Duckworth et al. (2007) found that, after controlling for intelligence, conscientiousness, and self-control, grit still explained individuals' performances across a variety of achievement outcomes, including educational attainment, number of career changes, success in a spelling competition, and strength of GPAs. This initial set of studies, as well as others conducted by Duckworth and colleagues (Duckworth & Gross, 2014; Duckworth et al., 2011), have provided empirical support for grit as a predictor of performances across a wide array of non-sport performance areas.

Within sport domains, and in relation to athletic performance, researchers have only recently begun to study the potential effects of grit (Larkin et al., 2016; Martin et al., 2015; Tedesqui & Young, 2017). Across these studies that were conducted using samples of male and female youth and adult athletes, grit has been associated positively with time spent in competition, training, and play (Larkin et al., 2016; Martin et al., 2015), deliberate practice (Tedesqui & Young, 2017; 2018), success in tasks of decision making and situational probability (Larkin et al., 2016), and athletes' sport commitment (Tedesqui & Young, 2017), and inversely

with thoughts of quitting or switching sports (Tedesqui & Young, 2018). Based on their results, Larkin et al. (2016) concluded that male youth soccer players with high levels of grit may exert high levels of effort over long periods of time without losing focus of their goals; athletes who lack grit, on the other hand, might experience performance decrements over time due to putting forth less effort or being less focused over time. These findings highlight how grit may play a role in athletes remaining interested in their sport, and persist in the activities essential for the development of expertise and high performance, such as deliberate practice and challenging tasks.

Given that grit has been empirically connected to improvements in performances, and performance-related behaviours, in non-sport (e.g., Duckworth et al., 2011; Duckworth et al., 2007; Robertson-Kraft & Duckworth, 2014) and sport (Larkin et al., 2016; Martin et al., 2015) domains, researchers have become interested in understanding how grit may develop, or be fostered in individuals (Akin & Arslan, 2014; Hill, Borrow, & Bronk, 2016). Specifically, Duckworth et al. (2007) suggested that grit might result from the specific messages individuals received from their environments regarding success, effort, and ability. They argued that such messages, as well as individuals' internalized beliefs about ability, effort, and success, which are central components of Achievement Motivation Theory (AMT; Ames, 1995; Dweck & Leggett, 1988), would influence their likelihood of pursuing long-term goals with passion and perseverance. Given this connection, researchers (Akin & Arslan, 2014; Gilchrist, Fong, Herbison, & Sabiston, 2018) have begun to use AMT as the framework through which they conceptualize and study grit's development.

Achievement Motivation Theory

AMT is conceptualized as having three primary constructs – perceived motivational climate (task-involving or ego-involving), mindset (growth or fixed), and goal orientation (task-oriented and ego-oriented) – that have been used to explain how individuals perceive and approach achievement contexts based on their beliefs about success, effort, and ability. Although initially developed to explain, and thus tested with, academic tasks and performances (e.g., using effective learning strategies in the classroom [Ames & Archer, 1988], persistence on a problem-solving task [Elliott & Dweck, 1988]), over the last 25 years, AMT constructs have been examined extensively in sport domains and in relation to a range of athlete performance-related behaviours and outcomes, such as practice and competition strategies, objective performance, and intrinsic motivation (Fry & Moore, 2019; Harwood, Keegan, Smith, & Raine, 2015).

Perceived motivational climate. According to AMT, motivational climates (referred to as task-involving or ego-involving) are created through socializing agents' (e.g., coaches) perspectives and communications about effort, task difficulty, participation, making mistakes, and performance success (Ames, 1995). Ultimately, motivational climates are thought to influence how individuals think about, and behave in, achievement contexts (Seifriz, Duda, & Chi, 1992; Smith, Smoll, & Cumming, 2009). Specifically, a task-involving climate is characterized by a focus on personal improvement and an equal distribution of coach support across athletes, whereas in ego-involving climates the focus is on social comparison (Newton, Duda, & Yin, 2000). Thus, within task-involving sport environments, athletes receive positive feedback from socializing agents when they work hard, demonstrate improvement, and learn in cooperation with their peers (Smoll, Smith, & Cumming, 2007). Across male and female athletes and differing levels of sport, the more athletes perceive the sport environment as task-involving, the higher their reported levels of persistence (e.g., Le Bars, Gernigon, & Ninot, 2009), self-

esteem (e.g., Atkins, Johnson, Force, & Petrie, 2013), perceived sport competence (e.g., Atkins et al., 2013), sport enjoyment (e.g., Atkins et al., 2013; Seifriz et al., 1992) and intrinsic motivation (e.g., Seifriz et al., 1992). In their systematic review of 104 published studies, Harwood et al. (2015) found that perceptions of task climates also were positively associated with performance and positive affect.

Within ego-involving sport environments, on the other hand, athletes receive messages from socializing agents that poor performances and mistakes are bad and punishable, athletes with the most ability receive positive attention (e.g., from a coach), and winning (or performing better than others) is more important than personal improvement (Seifriz et al., 1992). Empirically, athletes' perceptions of ego-involving climates have been positively associated with extrinsic motivation (Harwood et al., 2015), amotivation (lack of motivation; Harwood et al., 2015), sport dropout (Le Bars, et al., 2009), perfectionism (Harwood et al., 2015), and use of maladaptive strategies, such as self-handicapping and avoidance (Harwood et al., 2015; Kuczka & Treasure, 2005).

Mindset. Through repeated exposure to socializing agents' (e.g., coaches) messages about task difficulty, effort, and standards of success, individuals develop schema regarding whether or not ability can change (Cury, Da Fonseca, Rufo, & Sarrazin 2002; Dweck, 2006). These schema are referred to as mindsets, which Dweck has labelled as either "fixed" or "growth." From a fixed mindset perspective, ability is conceptualized as stable and difficult to develop or change regardless of individuals' efforts. From the perspective of a growth mindset, however, ability is viewed as malleable, something that can be developed and improved over time through hard work and effort (Mueller & Dweck, 1998). Individuals who endorse a growth over fixed mindset report increased motivation to persist in the face of physical challenges,

higher self-efficacy, and lower reported negative affect in response to task difficulty (Kasimatis, Miller, & Marcussen, 1996).

Research has shown that both mindsets, and perceived motivational climates, relate directly to athletes' goal orientations (e.g., Burnette, Ernest, O'Boyle, VanEpps, Pollack, & Finkel, 2013; Harwood, et al., 2015; Seifriz et al., 1992; Waldron & Krane, 2005), having significant effects on how they feel, think about, and behave in relation to their sport training and performances. For example, in a meta-analysis of 113 independent samples from a variety of achievement domains, including sport contexts, Burnette et al. (2013) found that a growth mindset significantly predicted task-oriented goal setting and goal strategies. Similarly, across three measurement development and validation studies, Biddle, Wang, Kavussanu, and Spray (2003) found that mindsets predicted athletes' adopted goal orientations, and mindset and goal orientation each acted as important predictors of motivation and sport enjoyment. Thus, both motivational climates and mindsets are hypothesized to orient individuals to adopt a specific achievement goal orientation (Biddle et al., 2003; Cury et al., 2002), highlighting the important role they play in understanding determinants of motivation in athletes.

Achievement goal orientation. The two goal orientations – task-oriented or ego-oriented – represent how individuals define success in achievement situations and are orthogonal to each other (i.e., the extent to which individuals hold one goal orientation is not related to the strength of the other; Nicholls, 1989). Nicholls (1989) theorized that individuals who adopt a task goal orientation feel successful when they improve their ability or master new tasks, and are motivated to work hard and put forth effort over time. With an ego goal orientation, he indicated that individuals feel successful when they maintain positive, and avoid negative, judgments of ability by demonstrating superior performances relative to others or normative standards.

Athletes' goal orientations have been examined in relation to a variety of psychological and achievement outcomes. In regards to a task goal orientation, research has demonstrated positive relationships with a variety of outcomes, including interest and enjoyment (Duda, Fox, Biddle, & Armstrong, 1992), adaptive achievement strategies (i.e., persisting, exerting effort, and working hard in practice to enhance skill; Lochbaum & Roberts, 1993), and viewing competition as a challenge and indices of well-being (i.e., positive affect and self-esteem; Adie, Duda, & Ntoumanis, 2008). Ego goal orientations, however, have been positively associated with avoidance (Duda et al., 1992), focusing on the threat of failing and indices of low well-being (i.e., decreased self-esteem, decreased positive affect, and increased negative affect; Adie et al., 2008), and maladaptive achievement strategies (i.e., practice avoidance, avoiding exerting effort or persistence; Lochbaum & Roberts, 1993).

AMT, Grit, and Related Outcomes

The motivational climates created by coaches seem to heavily influence the origin and development of athletes' mindsets and goal orientations (Seifriz et al., 1992; Waldron & Krane, 2005). Over time, as athletes are exposed to the feedback or messages delivered by the socializing agents in the sport environment (e.g., coaches), they integrate this new information into their existing schema regarding success; they are developing their mindset. Their mindset, along with the continuing messages from their sport motivational climate, then directs their pursuit of achievement goals and engagement in achievement behaviors, such as task persistence, willingness to engage in difficult tasks, effort, and objective performance success (Harwood, et al., 2015). In other words, the motivational climate in which athletes are immersed (particularly those that are task-involving), the mindset they have developed (particularly growth), and the

goal orientation they have adopted (particularly task-oriented) collectively may serve to explain the level of grit they possess (Duckworth et al., 2007).

To date there has been limited research examining grit as an outcome using AMT constructs. However, researchers have studied AMT constructs in relation to constructs that are either similar to grit, such as mental toughness (which has been positively correlated to grit; Martin et al., 2015), or may serve as a proxy for it, such as intention to continue in sport, enjoyment, and persistence (Beck, Petrie, Harmison, & Moore, 2017; Gardner, Vella, & Magee, 2017; Jõesaar, Hein, & Hagger, 2011). For example, Beck et al. (2017) found that adolescent athletes' perceptions of task-involving motivational climates (specifically those created by parents and coaches) were related indirectly to their levels of mental toughness through the extent to which they endorsed a task goal orientation. Ego-involving motivational climates created by parents and coaches were related to the athletes' having an ego goal orientation, but none of these ego-related constructs were associated with their reported levels of mental toughness. Athletes' task goal orientation is also positively associated with their enjoyment and intention to continue in sport (Gardner, et al. 2017). Further, athletes' perceptions of a task-involving motivational climate has been positively associated with reporting more enjoyment in their sport (Atkins et al., 2013) and indirectly with sport persistence through perceived autonomy (Jõesaar et al., 2011). Thus, motivational climates that are perceived as task-, but not ego-, involving, and goal orientations that are task-, but not ego-, oriented may be useful in understanding athletes' reported levels of grit.

Mindsets, which are hypothesized to be domain specific (Dweck, 2006; Yeager & Dweck, 2012), also may relate to athletes' grit, though to date researchers have not directly tested this association. For example, individuals can hold a growth mindset towards intelligence

and a fixed mindset towards sport ability. Mindsets can change over time due to both experiential and environmental factors, which can affect resilience. For instance, when students were praised for being smart (rather than for working hard), they were more likely to endorse a more fixed mindset and demonstrate less resilience following setbacks (Mueller & Dweck, 1998). Further, Dweck and colleagues' research (Dweck, 2006; Dweck & Leggett, 1988) has demonstrated that individuals who hold a growth mindset tend to pursue increased competence through hard work and effort. Growth mindsets also have been related to adaptive responses, including challenge-seeking behaviour (Hong, Chiu, Dweck, Lin, & Wan, 1999); effective emotional coping in response to failure (Potgieter & Steyn, 2010); persistence on difficult tasks (Hong et al., 1999; Kasimatis et al., 1996); enjoyment and intention to continue in youth sport (Gardner et al., 2017); and resilience and sustaining motivation, thereby serving as a protective factor against potential negative effects of adversity and failure (Wang, Haertel, & Walberg, 1997).

Although researchers have suggested that future research on the construct grit examine the roles motivational climates and task-oriented responses might play (e.g., Gilchrist et al., 2018), to date only one study has done so. Akin and Arslan (2014) examined achievement goal orientations as antecedents to grit in a sample of 509 male and female undergraduate non-athletes. They found that task goal orientation positively and significantly predicted the students' levels of grit. Although this study's findings are consistent with what would be predicted by AMT, it is limited in that it only examined the students' goal orientations (just one construct within AMT) and was conducted using only non-athletes. Thus, the extent to which AMT constructs might be related to grit among athletes currently is unknown.

Purpose

Given that grit has been empirically supported as either a predictor or correlate of performance outcomes (e.g., Duckworth et al., 2007; Larkin et al., 2016), or performance related behaviours (e.g., engaging in deliberate practice [Duckworth et al., 2011]) in non-athlete and athlete samples, researchers have become interested in determining the psychosocial factors that may underlie its presence. Specifically, AMT constructs–motivational climates, mindsets, and goal orientations–may be particularly useful in conceptualizing and understanding grit (Akin & Arslan, 2014; Hochanadel & Finamore, 2015; West et al., 2016).

Thus, using AMT as the framework for our study, we examined the relationships between perceived motivational climates, mindsets, goal orientations, and athletes' grit. We tested two different mediational models that reflected how these AMT constructs were expected to relate to each other and, ultimately, to the athletes' grit (see Figures 1 and 2). We hypothesized that (a) athletes' perceptions of a task-involving motivational climate would be related directly to higher levels of grit as well as positively and indirectly related to grit levels through the extent to which the athletes endorsed a growth mindset and a task goal orientation; (b) their growth mindset would be related directly to their grit, as well as indirectly through increases in their task goal orientation; and (c) their task goal orientation would be related directly to their grit scores. Although we expected that all ego-related constructs (i.e., ego-involving motivational climate, fixed mindset, and ego goal orientation) would be related positively to each other, we hypothesized that the direct and indirect relationships to grit would not be significant. Because researchers have found differences in male and female athletes' perceptions of motivational climates (Koh & Wang, 2015; Moreno-Murcia, Gimeno, & Gonzalez-Cutre Coll, 2008), mindsets (Li, Harrison, & Solmon, 2004; Li, Lee, & Solmon, 2006), and goal orientations

(Hanrahan & Cerin, 2009; Moreno-Murcia et al., 2008), we examined a single gender sample of athletes for the current study.

Method

Participants

Eighty-one male soccer players drawn, from four high schools and two select soccer clubs in a large suburban area located in the south central United States, participated. The players were primarily Latinx (*n* = 31, 43.7%) or White, Non-Latinx (*n* = 31, 43.7%). Mean age was 15.81 years (*SD* = .82) and mean years playing organized soccer was 9.38 (*SD* = 3.57). Athletes ranged from freshmen to seniors in their high schools.

Instruments

Demographics. Participants reported their age, race/ethnicity, and total number of years participating in organized soccer.

Perceived motivational climate. The 33-item Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2; Newton et al., 2000) measures athletes' perceptions of the two motivational climates created by their coach: task-involving (17 items; assesses the dimensions of cooperative learning, effort/improvement, and important role) and ego-involving (16 items; assesses the dimensions of intra-team member rivalry, unequal recognition, and punishment for mistakes). The athletes assessed their current soccer team's motivational environment as created by their coach, and responded to each item from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The total score for each climate is the mean of those items; higher scores indicate a stronger perception of that climate. Cronbach's alphas were .87 (task-involving) and .89 (ego-involving) in a sample of female adolescent volleyball players (Newton et al., 2000). In the current study, task-involving (.91, 95% CI [.88, .94]) and ego-involving (.90, 95% CI [.87, .93]) climates were

reliably measured. Newton et al. (2000) provided extensive information about the scale's validity.

Mindset. Dweck, Chiu, and Hong (1995) developed a three-item scale in which each item was worded to assess a fixed mindset perspective. Because we wanted to examine the extent to which the athletes endorsed both a fixed and a growth mindset, we modified one item from the original scale (i.e., "You have a certain amount of intelligence and you really can't do much to change it") to create two sport-specific questions: "You have a certain amount of soccer ability and you can't really do much to change it" (Fixed) and "No matter how much soccer ability you have, you can always change it quite a bit" (Growth). Athletes responded to each item from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). Dweck et al. (1995) reported that Cronbach's alphas for the original three items ranged from .94 to .98 (Dweck et al., 1995) and that their original items were not related significantly to measures of cognitive ability, confidence in intellectual ability, and self-esteem.

Achievement goal orientation. The 12-item Achievement Goal Scale for Youth Sports (AGSYS; Cumming, Smith, Smoll, Standage, & Grossbard, 2008) measures task (6 items; e.g., "The most important thing is to improve my skills.") and ego (6 items; e.g., "My goal is to be better than others in my sport") goal orientations. Athletes responded from 1 (*Not True At All*) to 5 (*Very True*). Total score for each goal orientation is the mean of the respective items; higher scores indicate greater perceptions of that goal orientation. Among male and female youth athletes, Cumming et al. (2008) found Cronbach's alphas of .78 (task) and .88 (ego), and provided extensive information about the scale's validity and factor structure. In the current study, task (.64, 95% CI [.51, .75]) and ego (.87, 95% CI [.82, .91]) were reliably measured.

Grit. The 8-item Short Grit Scale (Grit-S; Duckworth & Quinn, 2009) assesses the pursuit of a long-term goal through sustained focus, interest, and effort and represents a valid and reliable abbreviated version of the original 12-item scale. On each item, such as "I have achieved a goal that took years of work," athletes responded from 1 (*Very much like me*) to 5 (*Not like me at all)*. For the current study, item 3 ("I have been obsessed with a certain idea or project for a short time but later lost interest") was eliminated because of its negative effect on the scale's internal consistency. The total score was the mean of the remaining seven items; higher scores indicate greater grit. Cronbach's alpha from the current study was .62, 95% CI [.47, .73]. Larkin et al. (2016) reported a similar alpha of .63 in a sample of male youth soccer players. Duckworth and Quinn (2009) provided information about the scale's validity, such as predictive validity and consensual validity.

Procedure and Data Analysis

We collected our data in conjunction with a larger study that was experimentally examining the influence of motivational feedback on the players' objective performance in a soccer passing task (NOT PROVIDED FOR BLIND REVIEW). After obtaining university Institutional Review Board approval, we emailed the head coaches of the high school and select club soccer teams to receive permission to invite their players to participate in the study. Once we received approval from the head coaches, we attended one of their regularly scheduled practices to distribute informed consent forms for the players to take home to their parents to read and sign. After approximately one week, we met with each team during one of their regularly scheduled practices to have them complete the study. During each second in-person team meeting, all the players whose parents had provided signed consent (and the players had provided assent) anonymously completed the previously described measures. The questionnaire

packets took approximately 10 minutes to complete; only the researchers (and no coaches) were present during the data collection. Within each high school or soccer club, the participating players were entered in a random drawing to win gift cards valued at $5 to $10, which were distributed at the completion of the larger study.

Within the larger study, and for this project in particular, we recruited more participants than needed to reach our desired level of power (.80). Specifically, with our sample of 81, an effect size estimate of $R^2 = .15$, and four variables per analysis, our *a priori* power was determined to be .82 (G*Power). Regarding our data, we first checked for missingness and found only 0.48% of the data to be missing across all of the questionnaire items and these items were missing completely at random based upon Little's MCAR test, $\chi^2(629) = 623.94$, $p = .549$. Given the very small percent of missing values across the 81 participants, we used mean substitution to replace the data (Schlomer, Bauman, & Card, 2010). Next, we examined the variables' distributional properties (e.g., skewness, kurtosis, outliers) and found no significant violations of normality. Within the SPSS Version 23.0 program, we used the PROCESS Macro (Hayes, 2016) to separately test the ego and task mediation models and used the recommended 10,000 bootstraps to estimate the indirect effects and establish confidence intervals. Alpha was set at .05 for all analyses.

Results

Reliabilities, means, standard deviations, and correlations are reported in Table 1.

Task-Involving Climate and Grit

As hypothesized, the task mediation model (Figure 1) was significant overall, explaining 15% of the variance in the athletes' grit scores, $F(3, 77) = 4.68$, $p = .005$. First, the task-involving climate was unrelated to the athletes' growth mindset ($\beta = -.02$, $p = .91$) and task goal

orientation (β = .06, p = .49). Second, athletes' growth mindset was also unrelated to their task goal orientation (β = .02, p = .60). Third, the athletes' task goal orientation (β = .33, p = .007) and growth mindset (β = .11, p = .03), but not the task-involving climate (β = .06, p = .50), were directly related to athletes' reported level of grit. There were no significant indirect effects, across any of the constructs, in this model.

Ego-Involving Climate and Grit

As hypothesized, the ego mediation model (Figure 2) was not significant, explaining just 3% of the variance in the athletes' grit scores, $F(3, 77) = 0.93$, p = .43. None of the direct pathways in the model were significant. First, ego-involving climate was unrelated to the athletes' fixed mindset (β = .05, p = .81) and ego goal orientation (β = .22, p = .16). Second, the athletes' fixed mindset was not associated with their ego goal orientation (β = -.05, p = .61). Third, the athletes' ego goal orientation (β = .02, p = .79), their fixed mindset (β = -.08, p = .12), and their perceptions of an ego-involving climate (β = -.03, p = .67) were not related to their grit scores. There also were no significant indirect effects in the model across all the constructs.

Discussion

Regarding the task mediational model, we found partial support for our hypotheses. Athletes who believed that ability was malleable (i.e., endorsed a growth mindset) and thought success was defined by personal improvement and mastery through hard work and effort (i.e., endorsed a task goal orientation) reported higher levels of grit as expected. Contrary to our hypothesis, the athletes' perceptions of a task-involving motivational climate were not a significant predictor of grit, either directly or indirectly. With respect to the ego-involving mediational model, we also found partial support for our hypotheses. Inconsistent with our expectations and past research (e.g., Biddle et al., 2003; Cury et al., 2002; Seifriz et al., 1992),

none of the ego-related AMT constructs were significantly associated with one another. As we predicted, however, none of the AMT constructs were related significantly to the athletes' grit scores.

Within sport contexts, past research has demonstrated relationships between the AMT constructs and variables with characteristics similar to grit, such as mental toughness, but not grit itself (Beck et al., 2017; Biddle et al., 2003; Kasimatis et al., 1996). However, among non-athletes, AMT constructs have been tested directly in relation to grit. For example, Akin and Arslan (2014) found in a sample of university non-athletes that a task-approach goal orientation was the strongest predictor of their grit scores, explaining 22% of its variance; task-avoidance, ego-approach, and ego-avoidance goal orientations were all significantly related to grit, though the relationships were inverse and weaker than with task-approach scores. They concluded that task-approach goals foster achievement, task persistence, and an understanding of the importance of persevering, all characteristics that underlie grit. Similar to Akin and Arslan (2014), we found that task goal orientation was a significant predictor of grit scores. Extending Akin and Arslan's work, we found that the athlete's growth mindset also contributed significantly, though not as strongly as task goal orientation, to the athletes' levels of grit. Concerning our ego-oriented variables, like Akin and Arslan (2014), we found that these constructs, including a fixed mindset, did not positively predict the athletes' reported levels of grit.

Although empirical research regarding the psychosocial antecedents of grit is just beginning, our results, along with those from Akin and Arslan's (2014) study of non-athletes, suggest that AMT may be a useful framework for examining its development. Specifically, our findings suggest that AMT constructs such as goal orientation (specifically task-oriented) and mindset (specifically growth) may be useful in explaining athletes' grit. Prior research has

demonstrated that over time, athletes who are immersed in task-involving climates will begin to internalize messages associated with the environment (e.g., focus on personal growth, effort, and maximum participation; Seifriz et al., 1992). This internalization results in schemas that reflect a growth mindset toward athletic ability and a task goal orientation that directs behaviours in performance contexts. With these belief systems in place, athletes may approach training and practices with an intrinsic motivation and commitment to mastery, perceive competitions as opportunities to challenge themselves, grow personally, and be mentally tougher (Adie et al., 2008; Beck et al., 2017; Lochbaum & Roberts, 1993). Thus, as they work hard and exert effort, and define their success through their personal development and progress, they may see that sustained effort and perseverance often pays off in terms of reaching long-term goals. That is, they increase their levels of grit.

Limitations, however, existed in our study that warrant discussion. First, two measures, the task goal orientation of the AGSYS (.64) and the grit scale (.62) demonstrated relatively low internal consistency reliabilities in our sample, though for both scales the 95% CIs for the alphas were above .70. Further, other research that has been conducted with similar samples of younger athletes also has reported lower internal consistencies, though higher alphas are found within older samples. For example, Duckworth et al. (2007) reported an alpha of .83 in a sample of male and female undergraduates, but Larkin et al. (2016) found in their study of male youth soccer players an alpha of .63. Although seemingly problematic, the reality is that the relationships with grit may have been supressed in the current study because low internal consistency reliabilities downwardly bias results (Iacobucci & Duhacheck, 2003). That is, our findings actually may have underrepresented the strength of the association between the AMT variables and the athletes' grit. More research, with larger samples, is needed to determine the

stability of our findings and to further examine if the internal consistency of measures, such as grit, are affected by age (and thus perhaps cognitive development).

Second, the sample included only male high school soccer players, which limits generalizability. Previous achievement motivation research has demonstrated gender differences on many of the same constructs used in our study (Duda, Olson, & Templin, 1991; Dweck & Reppucci, 1973), thus future research should examine female athletes to determine how motivational climates, mindsets, and goal orientations may relate to their levels of grit. Although appropriate given the nascent state of grit research in sport, our cross-sectional methodology limits statements about directionality or causality. If future cross-sectional studies continue to support the relationships between grit, task goal orientation, growth mindset, and possibly task-involving climates from other socializing agents, researchers could use longitudinal methodologies to determine if grit results from the presence of task-related constructs.

Our findings indicate that task-oriented AMT constructs are associated with athletes' grit levels. Specifically, the more the athletes viewed hard work and effort as essential for success (i.e., endorsed a task goal orientation) and believed their abilities were malleable (i.e., endorsed a growth mindset), the more likely they were to report having higher levels of grit; findings that are consistent with other AMT research that has examined grit (Akin & Arslan, 2014; Park et al., 2018; West et al., 2016). Even so, we acknowledge that additional research is needed, and encourage researchers to replicate and extend our study by testing female athletes and athletes who are older and at different competitive levels. As the relationships between the AMT constructs and grit are affirmed through additional correlational studies, researchers then can employ longitudinal approaches to determine if certain climates may, over time, foster the development of task goal orientations, as well as growth mindsets, and ultimately athletes' grit.

Being “gritty” may serve athletes well as they pursue longer-term goals in and out of sport, particularly by helping them maintain consistent effort and engagement to improve their performance and position in their sport. Ultimately, understanding grit through AMT may provide coaches and parents with a framework for helping to develop athletes’ passion, persistence, and pursuit of long-term goals in sport.

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