UNIVERSITY OF CALIFORNIA, MERCED

Achievement Goal Theory and Self-Determination Theory: A Meta-Analysis

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy

in

Psychological Sciences

by

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The Dissertation of Thaís Camargos Zanatta Benoit is approved, and it is acceptable in quality and form for publication on microfilm and electronically.

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Abstract of the Dissertation

The present study introduced an integrated theoretical model linking constructs from achievement goal theory (AGT) and self-determination theory (SDT) with behavioral outcomes in physical activity, sport, and performance contexts. In the model, autonomous and controlled forms of motivation from SDT were proposed as mediators of associations between achievement goal orientations from AGT and behavioral outcomes. Model predictions were tested using meta-analytically synthesized data from available studies in the extant research literature. In addition, model effects were expected to vary according to salient methodological and contextual conditions tested in a series of moderator analyses of the meta-analytic model tests. A systematic literature search identified eligible studies reporting associations among AGT, SDT constructs, and behavioral outcomes ($k = 66$). The proposed model was fit to the meta-analytically pooled matrix of correlations among model constructs and behavioral outcomes using meta-analytic structural equation modeling. The model was fit separately to groups of studies at each level of key moderators: evidence of validity or reliability, or both, of study measures, sample type (athlete vs. non-athlete), and physical activity level (competitive vs. recreational). Sex distribution, age, sample type, and study quality were included as covariates in the model. Conceptually-consistent direct effects of achievement goal orientations on autonomous forms of motivation, and indirect effects of mastery goal orientations on behavioral outcomes mediated by autonomous forms of motivation, were observed. Moderator analyses indicated larger model effects in studies reporting scale validity or reliability evidence, larger effects of performance goal orientations on autonomous motivation, and of mastery goal orientations on controlled motivation, in athlete samples, and larger direct effects of performance goals on autonomous motivation in samples engaged in structured or competitive activities. The current analysis supports the integrated model in physical activity, sport, and performance contexts, providing evidence corroborating the shared conceptual bases of AGT and SDT and implicates autonomous forms of motivation as a candidate mediator of associations between mastery goal orientations and behavioral outcomes. Findings add to an evidence base supporting congruence across two key motivational theories and provide evidence of the process by which constructs from each relate to behavioral outcomes.
Keywords: motivation; achievement goal theory; self-determination theory; physical activity behavior.

Chapter 1: Introduction

Extensive conceptual and empirical work has highlighted the role of psychological constructs related to motivation as key determinants of individuals' uptake and performance of behaviors likely to bring about adaptive health and performance outcomes and service-desirable goals (e.g., DeCharms & Muir, 1978; Geen, 1995; Weiner, 1990). Accordingly, developing a comprehensive theoretical account of motivational constructs, and the processes by which these constructs relate to these behaviors, is of paramount importance for researchers and practitioners interested in identifying behavioral determinants and, potentially, developing means to intervene and change behavior to promote adaptive outcomes. Achievement goal theory (AGT; Nicholls, 1984, 1989) and self-determination theory (SDT; Deci & Ryan, 1985, 2000; Ryan & Deci, 2017a) represent two prominent theories that have been applied to identify the motivational constructs that relate to these behaviors and describe the possible mechanisms underlying motivation-behavior relations. Eschewing traditional motivational theories (e.g., theories in the behaviorist and social cognition traditions), and building on theories of achievement (e.g., McClelland, 1959), competence (e.g., White, 1959), and organismic needs (e.g., Maslow, 1943), a common theme of the two theories is their focus on the type or *quality* of motivation that underpins behavior, rather than its *quantity* per se. The two theories also converge on the role that environmental contingencies play in determining the type of motivation people experience when performing tasks and behaviors and, ultimately, the extent of their involvement in, and persistence with tasks and behaviors.

An extensive evidence base has lent support to key constructs from each theory as determinants of behaviors, particularly those in sport, exercise, physical activity, and other performance-related contexts (e.g., academic and work performance; Barkoukis et al., 2010; Hagger et al., 2006; Van Yperen et al., 2015; Dompnier et al., 2009), and the processes and mechanisms involved. In particular, conceptual reviews and meta-analyses have indicated that constructs relating to intrinsic or autonomous forms of motivation from self-determination theory, which represent motives that are self-endorsed and reflect reasons performing the behavior emanating from within the individual (e.g., for reasons of interest or enjoyment), and mastery goals from AGT, which represent tendencies to interpret behavioral performance and success on tasks as means to attain competence, emerge as positive correlates of behaviors in these domains. Other motivational constructs from the theories, such as controlled forms of motivation from self-determination theory, that encompass performing behaviors for externally-referenced reasons (e.g., for rewards or approval, or to avoid sanctions or meet the real or implied demands of others), or performance goals, which reflect approaches to behaviors and task performance as means to outperform others or reach normatively-referenced standards, have also been shown to be related to behavioral engagement and performance in these domains. However, it is autonomous forms of motivation and mastery goal orientations from each theory, respectively, that tend to be related to behavioral persistence, as well as more adaptive motivational outcomes (e.g., interest, enjoyment, perceived competence), rather than controlled motivation forms and performance goal orientations, particularly in

cases where the controlling contingency ceases or is removed, or individuals' competence is threatened, respectively.

A salient observation in research on motivation determinants, including in the sport, exercise, physical activity, and other performance-related contexts, is the considerable congruence in the conceptual bases and constructs of self-determination theory and achievement goals. This has resulted in research examining how constructs from each theory relate to each other and potentially offer complimentary explanations of behavior and account for variance in adaptive outcomes. Accordingly, this has led to the inception of integrated approaches to behavioral prediction, drawing from both theories and purposed to provide comprehensive, elaborated descriptions of motivation and behavior and the processes involved. Empirical tests of these integrated models have provided preliminary support for conceptually-consistent associations between the key determinants of each theory (Ntoumanis, 2001; Ryan & Deci, 1989; Chen et al., 2019; Standage et al., 2003; Hein & Hagger, 2007). Specifically, the goal orientation constructs from AGT, as generalized dispositional constructs, have been proposed as distal determinants of behavioral outcomes and may have an informational function for motivational constructs from self-determination theory as more immediate behavioral determinants. The latter constructs may, therefore, function as mediators of goal orientation-behavior relations. In the current research, we aim to leverage research synthesis techniques to provide large-sample tests of this integrated model based on data from the extant research testing associations between constructs from each theory and behavioral outcomes in sport, exercise, physical activity, and performance-related contexts. In addition, the research is expected to permit testing of potential study-level moderators of the predicted associations within the model. The value of this research is that it will provide researchers with large-sample estimates of the expected pattern of unique effects of the integrated model in subsequent tests of the theory in these behavioral domains, which has broad implications for the candidate processes that underpin motivated behavior, as well as conditions that may magnify or diminish the size of the model-implied effects. Such research may signal potential constructs that could be targeted in subsequent research testing the efficacy of messaging and behavioral interventions aimed at promoting motivation in sport, exercise, and physical activity contexts. In the next sections, we introduce AGT and SDT, outline how they inform the basis of the proposed integrated model and its predictions, summarize extant primary research on relations between constructs from each theory and their implications for the integrated model, and formally specify the aims and hypotheses of the current research synthesis aimed at testing the integrated model and the proposed moderators.

Achievement Goal Theory

According to AGT, individuals' motivation in achievement contexts is directly related to how they construe the goals they pursue and, specifically, how those goals relate to their perceived competence. AGT proposes that individuals' perceptions of competence with respect to performing tasks or behaviors are dependent on how they define success (Nicholls, 1984, 1989; Urdan & Kaplan, 2020). Specifically, the theory makes the distinction between two broad goal orientations, which reflect generalized tendencies on how success is interpreted: a task or mastery goal orientation and an ego or

performance goal orientation. These goal orientations represent "an integrated pattern of beliefs, attributions, and affect that produces the intentions of behavior" (Ames, 1992, p. 261). Individuals endorsing a task or mastery goal orientation tend to view success on tasks or behaviors in terms of self-related improvement through learning and personal development, while those holding an ego or performance goal orientation tend to interpret success in terms of performance relative to others such as better performance or higher levels of normatively-referenced achievement on the task or behavior (Dweck, 1986; Ames, 1992; Elliot & Church, 1997). Importantly, individuals endorsing task or mastery goal orientations tend to report more adaptive behavioral patterns (e.g., persistence, involvement) and outcomes (e.g., interest, well-being, selection of challenging tasks), relative to those endorsing ego or performance orientations, which tend to be related to less adaptive behavioral patterns (e.g., desistance, avoidance) and outcomes (e.g., disinterest, ill-being, selection of very easy or very difficult tasks; Elliot & Church, 1997; Elliot & Harackiewicz, 1996).

Research applying the theory has supported these predictions in multiple contexts and behaviors, particularly in relation to achievement, such as in sport or academic contexts. For example, research has indicated a link between holding a task orientation and better achievement as well as adaptative outcomes such as positive emotions, high levels of engagement, resilience, and interest (Stuntz & Weiss, 2009; Pintrich et al., 2001; Viira & Raudsepp, 2000). By contrast, holding an ego orientation is associated with lower achievement, cheating, and maladaptive outcomes such as giving up after failure (Antshel et al., 2021; Gonçalves et al., 2010; Miller et al., 2021). Importantly, researchers have also indicated that environmental conditions (e.g., the directions or structure of the tasks or activities provided by social agents such as leaders and mentors), often referred to as the *motivational climate* in which individuals (e.g., sport participants, learners in the classroom) are performing the behavior, task, or activity, that are informational on, or signal, personal improvement on the tasks or highlight competence as a successful outcome are more likely to 'activate' as task or mastery orientation (Halvari et al., 2011; Skjesol & Halvari, 2005). Such climates have, therefore, been related to behavioral persistence and the adaptive outcomes frequently observed among those endorsing a task or mastery goal orientation (Xiang et al., 2004; Bortoli et al., 2011). These findings point to a potential theory and evidence-based means derived from the theory that social agents may adopt to promote individuals' persistence in behaviors, activities, and tasks and concomitant adaptive outcomes (Reinboth & Duda, 2004; Treasure & Robert, 2001).

More recently, the theory has been extended to encompass dimensions of *approach* and *avoidance* within the two goal orientations, a modification purposed to provide a more comprehensive description of the types of motivational orientations individuals hold with respect to tasks and behaviors (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001). Specifically, a 2 x 2 model was proposed in which each type of goal orientation was characterized as either likely to lead to engagement in (approach), or desistance from (avoidance), a given task or behavior. Mastery-approach (MAp) and performance-approach (PAp) orientations reflect the extent to which endorsing a particular perspective on success, either through self-improvement (mastery) or comparisons with others' behavior (performance), was likely to motivate

individuals to engage in the task or behavior. By contrast, mastery-avoidance (MAv) and performance-avoidance (PAv) orientations were defined as a focus on avoidance of mastering a task or behavior, and avoidance of performing worse than others or appearing incompetent in comparison to others, respectively. Research has supported this distinction with theory-consistent patterns of effect for the four types of goal orientations on behavioral and psychological outcomes (Elliot & Church, 1997; Elliot & Covington, 2001; Elliot & Thrash, 2002; Katz-Vago & Benita, 2023; Guo et al., 2023; Wang et al., 2007; Elliot, 1999; Midgley et al., 2001; Smith et al., 2002). For example, studies generally indicate positive associations between MAv orientations and adaptative outcomes (e.g., effort, life satisfaction, positive affect, and resilience), although effects tend to be smaller than associations between MAp orientations, and positive associations between PAp and maladaptive consequences (e.g., threat appraisal, less self-regulated learning, procrastination, worry, low intrinsic motivation, and low performance;), although these effects tend to be smaller than associations between PAv and these outcomes.

Self-Determination Theory

SDT is a comprehensive organismic, needs-based theory identifying the forms of motivation that determine behavioral engagement and persistence and associated outcomes (e.g., involvement, enjoyment, well-being). Central to the theory is the broad distinction between autonomous and controlled forms of motivation. These forms reflect individuals perceived reasons or rationale for performing tasks and behaviors (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017a). Autonomous forms of motivation represent engaging in tasks or behaviors out of a sense of choice and performed for self-endorsed reasons. By contrast, controlled forms represent performing tasks for reasons perceived to emanate from outside the individual. The theory makes further distinctions between forms within these two broad categories, and proposes a continuum, known as the perceived locus of causality, which represents the degree of autonomy individuals experience when performing tasks and behaviors (Ryan & Connell, 1989). The prototypical form of autonomous motivation is intrinsic motivation, located at one extreme on the perceived locus of causality continuum. Intrinsic motivation represents performing behaviors for the inherent enjoyment and satisfaction derived from the behavior itself, and without any discernable external or reinforcing contingency. Another form of autonomous motivation, identified regulation, is situated directly adjacent to intrinsic motivation on the continuum and reflects performing behaviors and tasks to attain a self-endorsed or valued outcome, rather than for the inherently involving properties of the behavior itself. Introjected regulation is a form of controlled motivation situated alongside identified regulation on the continuum. It reflects performing behaviors out of a perceived sense of obligation to others, such as to gain approval of feel pride or to avoid feelings of shame or guilt. The prototypical form of controlled motivation, external regulation, is located alongside introjected regulation and reflects performing tasks and behaviors solely for externally referenced reasons, such as receiving rewards or avoiding punishments or sanctions. The theory also specifies further forms – amotivation and integrated regulation. Integrated regulation reflects fully internalized, self-endorsed reasons for performing a task or behavior, although research suggests

difficulties in discriminating this form from intrinsic motivation empirically (Ryan & Deci, 2017b; Howard et al., 2017). Amotivation is defined as a lack of interest or reasons for engaging in a behavior, and this type of motivation is seen as existing beyond the causality continuum (Ryan & Deci, 2017c).

Research applying the theory has demonstrated that individuals citing autonomous reasons for acting exhibit greater persistence and are more likely to report adaptive outcomes in multiple life domains (Ratelle et al., 2007; Van den Broeck et al., 2021; Ng et al., 2012; Jaakkola et al., 2013; Berlanga et al., 2018). By contrast, evidence suggests that individuals who cite controlled motives for acting are only likely to persist insofar as the controlling contingencies are present, but are less likely to experience adaptive outcomes (e.g., enjoyment, interest) and more likely to experience maladaptive outcomes (e.g., fatigue, anxiety, detachment; O'Rourke et al., 2017; Cresswell & Eklund, 2005a; Moreno-Murcia et al., 2008; Jeno et al., 2018; Vallerand et al., 1997).

As a needs-based theory, SDT also proposes that the extent to which actions and tasks satisfy individuals' basic psychological needs for autonomy, competence, and relatedness is likely to determine the forms of motivation experienced (Ryan & Deci, 2017d). To the extent that performing tasks or behaviors are perceived to satisfy psychological needs, individuals will experience them as autonomously motivated and will be more likely to seek to engage in those behaviors or tasks in the future. Importantly, contingencies in the social context can support or undermine psychological need satisfaction and, therefore, determine the forms of motivation experienced in behaviors performed in that context and, ultimately, influence persistence or desistance (Deci & Ryan, 2000; Reeve et al., 2004). For example, social agents such as leaders in an individual's social environment can support their psychological needs by communicating need-supporting aspects of the behavior (e.g., providing a rationale for the behavior, providing competence-enhancing feedback) or by displaying autonomy-supportive behaviors (e.g., providing choice, promoting involvement, avoiding controlling language; Reeve et al., 2006). In contrast, the social environment can undermine basic psychological needs when they communicate needs thwarting aspects of the behavior (e.g., providing feedback that emphasizes lack of personal agency, providing contingent praise or external rewards) or displaying controlling behaviors (e.g., using commands and pressuring language). Taken together, supporting psychological needs in the context in which a behavior or task is performed can foster autonomous motivation with respect to the behavior and lead individuals to seek out and persist with the behavior in the future. By contrast, failing to support or thwart psychological needs can lead individuals to experience controlled forms of motivation, and behavioral persistence is only likely if the controlling contingencies are omnipresent and may lead to desistence or avoidance in the future (Ryan & Deci, 2017d; Tang et al., 2020; Gnambs & Hanfstingl, 2015).

A Proposed Integrated Model

While SDT and AGT were developed independently, considerable commonalities in their conceptual underpinnings, such as conceptualizations of competence and achievement motivation (DeCharms, 1968; White, 1959), and convergence in their predictions in achievement-related contexts, have been noted (Butler, 1987; Ryan & Deci, 1989; Ntoumanis, 2001). Central to commentaries on the conceptual overlap in the

theories is the focus on how goal orientations lead individuals to interpret their competence in behavioral contexts, and the subsequent forms of motivation actors are likely to experience and the outcomes they realize as a result. Specifically, endorsement of a mastery goal orientation reflects interpreting success on tasks and behaviors through personal improvement and mastery. Such an orientation, therefore, entails a tendency toward adopting self-endorsed, self-determined reasons for task or behavioral performance, consistent with autonomous forms of motivation. By contrast, endorsement of a performance goal orientation reflects interpreting success on such tasks and behaviors by out-performing others. This orientation entails a tendency toward adopting other-endorsed or externally referenced reasons for performing the task or behavior, consistent with controlled forms of motivation. One likely mechanism for these tendencies is through psychological needs. Individuals reporting a task or mastery orientation are likely to approach tasks and behaviors that provide opportunities to demonstrate self-referenced competence, that is, personal improvement rather than comparisons with others. They are, therefore, likely to pursue activities likely to satisfy their need for competence.

Alongside these tendencies, research has indicated that contextual conditions that emphasize success as mastery and learning tend to foster both a mastery orientation and autonomous forms of motivation, whereas conditions that signal success in terms of out-performing others and social comparisons tend to foster a performance orientation as well as controlled forms of motivation (Rawsthorne & Elliot, 1999; Duda et al., 1995; Butler, 1989; Chen et al. 2019). In addition, endorsement of task orientation and conditions emphasizing mastery is likely to lead to the satisfaction of psychological needs, such as the needs for autonomy and competence, while endorsement of a performance orientation and conditions emphasizing performance relative to others and social comparisons are less likely to facilitate need satisfaction. Studies have also reported a negative relationship between performance orientation and relatedness need satisfaction, given that a performance orientation likely thwarts the need for relatedness since normative comparisons can potentially undermine social connections and reduce the sense of belonging (Duda, 1992; Ntoumanis, 2001; Sari, 2015).

From a cognitive and decision-making perspective, goal orientations likely serve as a source of information that individuals take into account when considering their reasons or rationale for performing future behaviors (Dweck & Leggett, 1988). Their orientations effectively serve as a tendency or bias that affects how they respond when prompted to items making reference to their motives (e.g., inventories interrogating the extent to which their reasons or rationale for performing a given action or task are autonomous or controlled). For example, an individual with an approach task or mastery orientation in a particular context is more likely to cite autonomous reasons for performing future actions or tasks in that context in the future when prompted. For example, they are likely to rate items referring to intrinsic or identified reasons for performing the action or behavior highly. A similar pattern is expected with psychological need satisfaction such that individuals' endorsement of a particular goal orientation is also likely to influence the extent to which they perceive performing actions or tasks in that domain will be satisfying or frustrating of their psychological needs.

Research in achievement contexts has confirmed these proposed patterns of association (Hein & Hagger, 2007; Wang & Biddle, 2001; Zanatta et al., 2018; Berlanga et al., 2018). Specifically, consistent links have been observed between task or mastery orientations and autonomous forms of motivation, adaptive outcomes, and behavioral persistence, as well as between ego or performance goal orientations and controlled forms of motivation, maladaptive outcomes, and desistance (Benita et al., 2014; Berlanga et al., 2018; Biddle et al., 2003). In addition, there is evidence that perceptions of autonomy support are linked with a perceived mastery-oriented motivational climate, suggesting that the interpersonal context fostered by leaders and significant others that support learning and personal improvement also fosters autonomous motivation (Ommundsen & Kvalo, 2007; Buch et al., 2015; Alesi et al., 2019). Research has also confirmed a theoretically consistent pattern of effects between mastery goal orientation and needs satisfaction, particularly autonomy and competence satisfaction, while performance orientation is not associated with need satisfaction and is, instead, linked to need thwarting, although evidence for these effects is relatively sparse (Cecchini et al., 2015; Ciani et al., 2010; Kaufman & Dodge, 2008). There is also research linking constructs from the 2 x 2 achievement goal framework and SDT constructs, such that approach goal orientations tend to have larger, more consistent effects on forms of motivation and need satisfaction from SDT relative to avoidance orientations (Madjar et al., 2017; Guo et al., 2023; Diaconu-Gherasim et al., 2023). However, research in this area is relatively limited and warrants further replication and corroboration in more populations and contexts (Senko et al., 2011; Senko, 2016; Harackiewicz et al., 2002).

Extending this research, studies have also tested integrated models that posit theoretically consistent patterns of effect among SDT and AGT constructs indicative of the process or mechanisms involved. For example, researchers have proposed that the positive relations between goal orientations and intentions to perform, and actual performance of, adaptive behaviors in achievement contexts (e.g., participation in physical activity in school physical education) are mediated by psychological need satisfaction and autonomous forms of motivation, while performance climate was neither related to autonomous motivation or intentions, nor was its effects mediated by need satisfaction (Ferrer-Caja & Weiss, 2000; Standage et al., 2003; Jaakkola et al., 2015; Rothes et al., 2022). This conceptual work on integrated models and subsequent empirical tests have provided an initial signal of the determinants of task and behavioral performance in multiple contexts, particularly in sport, exercise, physical activity, and other performance-related contexts, and, importantly, elaborate on the motivational processes that precede action.

However, there is a dearth of research testing integrated models, with studies confined to a limited number of behavioral contexts and populations (Ciani et al., 2011; Li et al., 2011; Fernández-Espínola et al., 2022). There is also indication of considerable variation in the size of the effects among the constituent constructs on these models across studies, variability which may be attributable to variations in the methods used, such as sample size, or broader contextual, or other contextual, methodological, or population moderators that may affect relations between the constructs (Niemivirta et al., 2019; Anderman & Anderman, 1999; Hutzler & Barak, 2013). For example, effects of

orientations and motivational constructs from the theories may vary across different tasks or behaviors or among groups of differing abilities. Furthermore, to date, there is a dearth of research examining process models that encompass the more elaborated constructs from AGT based on the 2 x 2 achievement goal framework (Harackiewicz et al., 2002; Senko et al., 2011).

Taken together, these limitations highlight the need to corroborate effects of an extended process model that incorporates a broad set of constructs from its constituent theories, AGT and SDT, across populations and contexts. One option to address this need is to systematically conduct large-sample tests of the model in diverse populations, behaviors, and contexts, as well as conduct formal comparisons across data derived from these tests. An alternative is to capitalize on existing data, examining links among the constructs from each theory and using it to test a proposed model, and, where data permits, the effects of salient contextual and population factors that may moderate these effects. Precedent for this comes from research that has meta-analytically synthesized data from studies reporting associations between theory constructs and using the pooled data to test the fit of a proposed model specifying theory-consistent effects among the constructs using meta-analytic structural equation modeling (Hagger & Hamilton, 2021).

The Present Study

In the present study, we aimed to use meta-analytically synthesized data to test the predictions of an integrated process model specifying relations between AGT and SDT constructs. The analysis was expected to provide robust evidence of relations between achievement goal orientation, forms of motivation from self-determination theory, and behavioral outcomes across the extant research literature consistent with the predictions of the integrated model as tested in prior primary research studies (e.g., Standage et al., 2003; Bieg et al., 2016; Janke & Dickhäuser, 2017). Such a test is expected to advance knowledge on the motivational determinants of behavior in multiple contexts, particularly sport, exercise, physical activity, and other performance-related contexts, and the processes involved by providing an indication of the pattern of effects among the integrated model informed by two leading motivational theories that might be expected in subsequent primary tests of the model.

Our proposed model is presented in Figure 1. In the model, motivational orientations of AGT, differentiated according to Elliot et al.'s 2 x 2 conceptualization of goal orientations, serve as distal determinants of behavior mediated by forms of motivation derived from the perceived locus of causality continuum of SDT, which serve as more proximal behavioral determinants. Specifically, we predicted positive effects of mastery-approach and avoidance goal orientations from AGT on autonomous forms of motivation, namely, intrinsic motivation (H1a, H1b) and identified regulation (H1c, H1d), and negative effects of these orientations on controlled forms of motivation, introjected regulation (H2a, H2b) and external regulation (H2c, H2d) from SDT. In addition, we hypothesized positive effects of performance approach and avoidance goal orientation on controlled forms of motivation, introjected (H3a, H3b) and external regulation (H3c, H3d), but also on autonomous forms of motivation, intrinsic motivation (H3e, H3f) and identified regulation (H3g, H3h), consistent with prior research (Kim, 2015; Gorozidis & Papaioannou, 2016; Méndez et al., 2012). The latter effects were

expected given that studies have typically conceptualized performance goals as competence demonstration rather than other comparisons or normatively-referenced performance outcomes (e.g., Senko et al. 2011). We also predicted positive effects of autonomous forms of motivation, intrinsic motivation (H4a) and identified regulation (H4b), on behavioral outcomes (e.g., behavioral intentions, actual behavioral performance) and negative effects of controlled forms of motivation, introjected (H4c) and external (H4d) regulation on these outcomes. Importantly, and consistent with our integrated process model based on prior theory and empirical tests (Lazarides & Rubach, 2017; Raska, 2014; Shih, 2008), we expected positive indirect effects of mastery-approach and avoidance goal orientations on behavior mediated by autonomous forms of motivation, intrinsic motivation (H5a, H5b) and identified regulation (H5c, H5d), and negative indirect effects of performance-avoidance and approach orientations on behavior mediated by controlled forms of motivation, introjected (H5e, H5f) and external (H5g, H5h) regulation.

In addition to testing the proposed effects of the integrated model in the full sample of studies, we also aimed to test the effects of key methodological moderators on the model-implied effects. Our proposed moderators related to the characteristics of individuals performing the tasks and behaviors in the included studies and the methods employed. First, we tested whether model effects were contingent on the validity or reliability, or both, of the AGT and SDT measures used. The well-documented variability in the measures that researchers in psychology adopt to represent constructs of interests (Hagger, 2025; Hagger et al., 2017; Le et al., 2010; Shaffer et al., 2016), including motivational constructs from specific theories like achievement goal and self-determination theory (Mallet et al., 2007; Benoit et al., 2025, under review), may introduce substantive method variance in tests of theory-implied effects across studies due to variation characteristics of each measure, such as construct reliability and their validity in tapping the construct of interest. As a consequence, we aimed to examine the extent to which such characteristics moderate the magnitude of construct effects on behavior and related outcomes of the integrated model in our analysis (Rawsthorne & Elliot, 1999; Lonsdale et al., 2014). Specifically, we predicted larger averaged effect sizes for model-predicted effects in groups of studies reporting evidence of reliability or validity of the construct measures, or both, relative to those that did not (H6).

In addition, we tested the moderating effect of the characteristics of the samples of the included studies on model effects. Research indicates that environmental factors such as monetary or other tangible, extrinsic rewards, and also frequent performance feedback and other external pressures are more pervasive in certain groups such as athletes (e.g., Endo et al., 2022; Mouratidis et al., 2008; Steele-Johnson et al., 2000) relative to non-athletes (e.g., high school students, recreational exercisers and physical activity participants, high school students, and employees). Further, athletes are more likely to be exposed to structured achievement contexts, competition-oriented environments, and similar motivational climates (Harwood et al., 2015; Ntoumanis & Biddle, 1999), which may amplify the salience of externally-referenced motivational contingencies (Papaioannou et al., 2004; Standage et al., 2003). Accordingly, we hypothesized that effects of performance orientations from AGT, and controlled forms of

motivation from SDT, on behavior in the proposed model would be larger in studies targeting athlete samples relative to those targeting non-athlete samples (H7).

Finally, assuming that the majority of studies testing the proposed effects are likely to be focused on physical activity contexts, based on our cursory review of prior research, we examined whether model effects varied according to the overall level of physical activity participation of the samples of the included studies. Prior research indicates that individuals with moderate-to-high levels of physical activity are not only more likely to endorse mastery goal orientations and autonomous forms of motivation, consistent with predictions of AGT and SDT, but these orientations and motives are likely more salient to their subsequent behavior behavioral outcomes compared to those with lower engagement levels (Francisco et al., 2018; Ullrich-French et al., 2013; Teixeira et al., 2012). However, as above, we also note the elevated salience of externally-referenced motives among athletes engaged in competitive sport. As a consequence, we expected larger effects of both mastery and performance goal orientations, and autonomous and controlled forms of motivation, on behavior in studies targeting samples engage in high-level of physical activity participation, referred to as competitive sport, relative to those engaged in recreational forms or non-participants in physical activity (H8).

We tested our proposed integrated process model using data extracted from studies reporting relations between AGT and SDT constructs using meta-analytic techniques. To do so, we first identified studies reporting relations among the model constructs in a systematic search of electronic research databases. To be included, studies were required to have reported associations between one or more goal orientation constructs from AGT and one or more motivational constructs from SDT or, a measure of a behavioral outcome (e.g., intention, actual behavioral performance), or both. After extracting relevant effect size data from these studies with appropriate conversions where necessary, we computed a pooled correlation matrix and associated sampling variance-covariance matrix using multilevel random-effects meta-analysis. This procedure also permitted control for key study-level covariates, namely, sample average age and sex distribution, sample type (student vs. non-student), and study quality (Wilson et al., 2016). Finally, we tested the fit of our proposed model with the resultant pooled correlation matrix using meta-analytic structural equation modeling (Cheung, 2015), which provided an evaluation of the sufficiency of the model as well as specific tests of each model effect.

Finally, consistent with prior meta-analyses, we anticipated that there would be relatively small numbers of studies in our sample testing effects of the differentiated forms of AGT and SDT constructs in groups of included studies defined by our moderator variables. This, therefore, posed a risk of small sample sizes or even an absence of studies contributing data to some cells of our pooled correlation matrix among study constructs and behavioral outcomes used as input for our model test in some moderator groups. As a consequence, we proposed a smaller model in which we aggregated the differentiated constructs from each theory into higher-order construct categories. Specifically, the approach and avoidant forms of each goal orientation were aggregated into broader performance and mastery forms, while the intrinsic motivation and identified regulation constructs, and the introjected and external regulation

constructs, were aggregated into broader autonomous and controlled motivation constructs, respectively. This truncated version of the model is presented in Figure 2. As mentioned above, we expected our overall hypotheses with respect to the pattern of effects in our proposed model (H1-H5) to hold in our aggregated model.

Chapter 2: Methods

Search Strategy

Eligible research items for inclusion in the current analysis were identified in a comprehensive, systematic search of the following digital databases: PsycArticles, Academic Search Complete, PubMed, PsychINFO, Web of Science, and Scopus. Keyword search terms for the searches were developed in accordance with the specifications of each database (see supplemental materials, S1).

Inclusion and Exclusion Criteria and Screening Procedure

We applied a systematic screening protocol against our inclusion criteria to assess the eligibility for inclusion in our analysis. Studies were marked for inclusion if they reported correlations between at least one measure of a form of motivation from SDT (e.g., autonomous motivation, controlled motivation, intrinsic motivation, intrinsic motivation, and integrated, identified, introjected, and external regulations), at least one measure of an AGT construct (e.g., mastery- and performance- orientations including approach and avoidant forms), and/or at least one measure of a behavior or behavioral outcome (e.g., frequency measures of behavior, behavioral intention). We did not restrict our searches by time frame or published language, nor did we restrict studies based on the targeted behavioral context, although, as before, we had a firm assumption based on our initial review of prior research that the vast majority of studies would focus on sport, exercise, physical activity, and other contexts in which motivation and performance were highly salient (e.g., academic and workplace contexts). Items reporting studies adopting quantitative designs including, but not limited to, cross-sectional or longitudinal correlational designs and intervention or experimental designs, were considered eligible. Studies were excluded if they measured the target variables but did not provide sufficient data to compute a usable effect size, and the authors did not supply the necessary data on request. Experimental and intervention studies reporting manipulations of AGT or SDT constructs were excluded if they did not report baseline measures or control group data and were not available from study authors on request.

Titles and abstracts of the initial pool of research items after duplicate removal (k = 21,287) were initially screened for eligibility against inclusion criteria by six researchers, who exhibited a high agreement on a sub-sample of double-screened items (average agreement = 93.20%; average Gwet (2008) AC1/AC2 agreement statistic = 0.865, $p < .001$). Inconsistencies were discussed among researchers, and inclusion decisions were made by consensus discussions, with a seventh researcher serving as an adjudicator, and post-discussion amendments to the screening protocol were made as necessary. The full texts of the retained research items were subsequently screened against the inclusion criteria by three researchers with very high agreement on double-screened items (AC1/AC2 = 0.920, $p < .001$), yielding in a final pool of 57 eligible studies with usable data for analysis. A further nine studies reported data from multiple samples, and each was treated as a separate study, resulting in a final sample of 66 studies for analysis. As expected, a substantial number of studies targeted competitive and recreational sport performance (k = 12), a small number of studies targeted formal exercise and recreational physical activity contexts (k = 3), while most studies targeted other performance-related contexts such as classroom performance in high school

students and performance in the workplace (k = 36). A PRISMA-compliant flow diagram summarizing the flow of research items through the screening protocol with reasons for exclusion at each stage (S1), a table summarizing studies with multiple samples (S2), and a list of the included studies (S3) are provided in our supplemental materials. The analysis was pre-registered in advance on the Open Science Framework: https://osf.io/twsxc/?view_only=3b8a6b0a48c14c39abb15286244a61af.

Construct and Behavior Measure Classification

The studies in our final sample used multiple self-report scaled measures to assess AGT and SDT constructs and measures of behavioral outcomes. Given research indicating possible misclassification of measures due to incongruencies in item content and the definitions and conceptualization of constructs from the theories on which they are based, a potential source of measurement error in research syntheses, we applied a systematic procedure to ensure sufficient alignment of the construct measures used in each study with formal theory-based definitions of each. The procedure involved the initial development of definitions of AGT and SDT constructs, and behavioral outcomes based on prior conceptual reviews of each theory, followed by extraction of the item content of construct and behavior measures used in the included studies. Next, one trained member of the research team classified each measure into the logical categories of construct or behavior according to a priori definitions based on item content. The final classification of constructs and behavior measures matched with their definitions was independently verified by another team member with commensurate training to produce a final list. Details on construct and behavior definitions, measures employed in the included studies, and sample items for each measure are summarized in our supplemental materials (Table S4.1).

Effect Size Extraction

Effect size and sampling data among study constructs and behavioral outcomes were extracted for analysis from each included study. As anticipated, the vast majority of studies adopted correlational designs with data collected on single (cross-sectional designs) or multiple (prospective or longitudinal designs) occasions, and, as a consequence, we selected the zero-order correlation coefficient as the effect size metric. Few included studies employed intervention or experimental designs, and none exposed participants to manipulations or interventions that targeted change in the constructs of interest. These studies were treated as correlational in design, and only effect sizes reported at baseline, prior to any manipulation or intervention, or data from the control group, were used in our analysis to obviate effects of extraneous manipulations or intervention content that may have altered effect sizes. When zero-order correlations were unavailable, we used alternative effect size metrics, such as Cohen's d or f, or odds ratios, where available and converted them to correlations using standard formulae or used other data to calculate an effect size, such as means and standard deviations, F-ratios, and t-values from difference tests. We also extracted sample demographic characteristics, including sample average sample age and sex and their distribution in the sample, study characteristics such as design (e.g., cross-sectional, prospective, or longitudinal), and the time lag between measurement occasions in prospective or longitudinal studies. In addition, we extracted summary information on measures

employed to assess constructs from AGT and SDT and the operational definitions of the target behaviors. A summary of characteristics of included studies is presented in Table S5.1 of our supplemental materials (S5), and a full spreadsheet documenting extracted effect size data and study characteristics is archived online: https://osf.io/5p8zs/files/osfstorage?view_only=b94d2e92256c469abe99fb0e2485f50d

Moderator and Covariate Coding

We used reported sampling and methodological data to code our moderator variables: sample type (athletes vs. non-athletes), evidence of validity and/or reliability for the AGT and SDT measures, and level of physical activity (recreational vs. competitive)[1]. In addition, we coded the following variables treated as covariates in our analysis: sample age and gender distribution, sample type (e.g., student vs. non-student, clinical vs. non-clinical), study design (cross-sectional vs. prospective), and study quality (acceptable vs. questionable). The classification of the included studies into moderator and covariate categories is summarized in Table S5.1 (supplemental material, S5), and a spreadsheet summarizing study characteristics and moderator coding is available online: https://osf.io/5p8zs/files/osfstorage?view_only=b94d2e92256c469abe99fb0e2485f50d

Moderator Variables

Sample type. We classified studies according to participants' athletic involvement. Studies that reported participants' involvement in competitive sport or athletic training, broadly defined, were classified as "athletes". On the other hand, studies in which participants were involved in informal forms of exercise and non-competitive forms of exercise, or studies in which the sample came primarily from non-exercise or sport-related contexts, were classified as "non-athletes".

Scale validity and reliability. We also categorized included studies based on reported psychometric properties of the measures utilized to assess the validity or reliability, or both, of the AGT and SDT constructs. More specifically, validity evidence, such as factor analytic evaluation of the scales or reliability coefficients such as Cronbach alpha or Revelle's omega, were coded as present or absent in each study. Studies that reported satisfactory validity (e.g., conducted a factor analysis or concurrent or predictive validity test) or reliability (e.g., evidence of acceptable construct internal consistency or test-retest reliability), or both, of the AGT and SDT constructs were coded as "validity/reliability evidence provided", while studies that reported inadequate validity or reliability, or did not report evidence of either, or relied on evidence from previous studies were classified as "no validity/reliability evidence provided/evidence inferred".

Physical activity level. Studies were coded according to the level of physical activity of the sample participants. Samples comprising participants involved in unstructured leisure-time physical activities, or did not specify any level of activity participation, were classified as "recreational/unspecified", while those comprising participants engaging in structured sport programs, athletic training, or participation in

[1]We also aimed to test the moderating effects time lag in the measurement of theory constructs and behavior on model effects in studies employing prospective or longitudinal designs, consistent with prior meta-analyses (e.g., McEachan et al., 2011). However, there were insufficient studies employing these types of design, which precluded a measurement lag moderator analysis.

sport competition at regional, national, or international levels were categorized as "competitive".

Covariates

We also coded the following covariates for our analyses: average sample age, sample sex distribution, sample type, and study design. Samples with an average age below 40 years and a standard deviation less than 15 were coded as "younger", those with an average age of 40 years or above and a standard deviation less than 15 were coded as "older", and those that did not fit these criteria were coded as "balanced" in age. Studies targeting samples comprised of more than or equal to 75% of women were coded "predominantly women", comprised 25% or fewer of women were coded "predominantly male", and samples falling outside these ranges were coded "balanced" in sex distribution. Studies in which all construct or variable measures were taken on a single occasion were coded as "cross-sectional" in design and taking measures on multiple occasions were classified as "prospective" in design. The quality of the included studies was assessed using the 20-item Quality Assessment Checklist for Survey Studies in Psychology (Q-SSP; Protogerou & Hagger, 2020). Assessments were made by a team of five trained researchers, with high agreement across a subsample of multiple-coded studies for all checklist items (average agreement = 90.00%; average AC1/AC2 = 0.875, $p < .001$) and overall checklist average score (intraclass correlation, $R = 0.912$, $p < .001$). Discrepancies were resolved through collaborative discussion and assessment procedures refined and uniformly applied to the full set of studies accordingly. The overall checklist score for each study was used as a continuous covariate in our analysis. Q-SSP items and scoring protocol are provided in the supplementary materials (S6), and scores for each study included in the analysis are presented in Table S5.1.

Data Analysis

Multilevel meta-analytic structural equation modeling. Consistent with our proposed model, we tested the hypothesized effects of AGT constructs on behavior and the mediating role of SDT constructs using Wilson et al.'s (2016) multilevel implementation of Cheung's (2015) two-stage meta-analytic structural equation modeling (MASEM) approach. In the first stage, correlation matrices among constructs of the proposed model from each included study were transformed in a multivariate meta-analytic model to account for study-specific random effects to produce a pooled correlation matrix with an accompanying sampling variance-covariance matrix representing the estimated precision of each correlation in the matrix. The analysis yielded averaged point, and variability estimates of each correlation of the model-implied correlation matrix and accompanying heterogeneity indices for the overall model: the Q statistic and the I^2 statistic. A statistically significant Q value and an I^2 value exceeding 25% were considered indicative of substantive heterogeneity. In the second stage of the analysis, a model representing predicted relations among study constructs was fitted to the pooled matrix from the first stage. Model fit was evaluated using multiple goodness of fit indices: CFI, NNFI, SRMSR, and RMSEA, with satisfactory fit indicated by cut-off values of .90 for the CFI and NNFI, and .08 and .05 for the SRMSR and RMSEA, respectively. The analysis also yielded standardized parameter estimates representing the averaged effect size for each model path or effect with associated 96% confidence

intervals. In addition, effects of moderators on model effects were evaluated by estimating the MASEM models separately in groups of studies coded according to levels of key moderator variables: sample type (e.g., athletes vs. non-athletes), scale reliability/validity (evidence provided vs. no evidence/evidence inferred), and physical activity level (recreational vs. competitive). Differences in effects among model variables were tested using confidence intervals about the mean difference in the standardized parameter estimates (Schenker & Gentleman, 2014). Finally, we also controlled for our covariates in each case by estimating versions of our model: a model unadjusted for covariates and a covariate-adjusted version using Wilson et al.'s (2016) procedure. Analyses were implemented using the metafor (Viechtbauer, 2010) and metaSEM (Cheung, 2015) packages in R.

It is important to note that only three of the 66 independent samples included in our meta-analysis provided data for the effects of AGT and SDT constructs on behavior, resulting in small sample sizes for correlations of AGT and SDT constructs with behavioral outcomes, which would likely render these correlations substantively lower in statistical power relative to the other correlations in the pooled matrix. A further challenge was that these correlations were absent in groups of studies defined at some levels of our moderator variables, precluding model estimation. We, therefore, opted to employ existing meta-analytic data to impute the behavior data for these particular correlations in order to robustly estimate model effects in our subsequent model test. This method is consistent with similar procedures employed elsewhere, adopting similar model estimation methods that synthesize data to ours (see Slemp et al., 2018). Specifically, we sourced robust effect size estimates for the construct correlations with behavior from previously published meta-analyses of AGT and SDT in similar contexts (Ng et al., 2012; Biddle et al., 2003). We subsequently estimated two versions of our full model in the overall sample of studies, one that excluded the imputed values and one in which these values were included, permitting comparison of the effect of imputation on effect sizes and variability estimates of model parameters for past behavior. We used imputation for all moderator analyses to resolve the issue of empty cells for behavioral data in each case, although it should be noted that effect sizes involving behavior were effectively invariant across moderator groups as the imputed values were unaffected by our coded moderators and represents an inherent limitation of this approach.

Bias assessment. Small-study bias, considered an indicator of publication bias, was assessed using a series of bias correction techniques based on the 'funnel' plot of the effect sizes from each included study plotted against a measure of its precision (e.g., standard error) and selection models as recommended by Carter et al. (2019). Asymmetry in funnel plots is indicative of small-study bias. Tests based on funnel plots employed were Begg and Mazumdar's (1994) rank correlation test, Duval and Tweedie's (2000) 'trim and fill' analysis, Egger et al.'s (1997) regression-based method, and two alternative implementations suggested by Stanley and Doucouliagos (2014). Tests based on selection models were a modified version of the original selection model (Vevea & Hedges, 1995), the p-curve (Simonsohn et al., 2014) method, and the p-uniform* (van Aert & van Assen, 2021) method. A full description of the basis and implementation of each analysis, including criteria for bias indication, is presented in our supplemental materials (S7).

Chapter 3: Results

Multi-Level Multivariate Meta-Analysis of Correlations

We first focus on the pattern of bias-corrected averaged zero-order correlations and variability estimates among study constructs derived from the multivariate multi-level meta-analysis that comprised the first stage of our analysis. Findings of the analyses, including model results with heterogeneity and selection statistics for versions that included imputed values for the behavioral correlations and versions unadjusted and adjusted for our covariates, are reported in Tables S8.1 to S8.3 (supplemental materials, S8). We noted only modest differences in model selection criteria, AIC, and BAIC values, signaling that imputation and covariate adjustment had a trivial impact on model fit and findings. As a consequence, we report results from the imputed and covariate-adjusted versions of the model, and we direct interested readers to consult our supplement for results of the other versions of the model. Finally, it is important to note that all models were associated with substantive heterogeneity, as indicated by statistically significant *Q*-values and I^2 values that exceeded 25%.

We observed patterns of correlations consistent with the predictions of our proposed model and the theories on which it is based. Specifically, we observed non-zero, positive, small-to-medium-sized correlations between mastery goal orientation, including approach and avoidant forms, and performance-approach orientation, with all forms of motivation from SDT (*r* range = .057 to .478, *ps* < .043). The only exceptions were correlations between mastery-approach motivation and external regulation and between mastery-performance orientation and behavior, which did not differ from the null. We also found non-zero, positive, small-sized correlations of performance-avoidance orientation with the identified, introjected, and external regulation constructs and behavior (*r* range = .157 to .358, *ps* < .001). Finally, congruent with SDT, we observed non-zero positive small-sized correlations between intrinsic motivation, the identified and introjected regulations, and behavior (*r* range = .120 to .315, *ps* < .001).

Hypothesis Tests Using Meta-Analytic Structural Equation Modeling

Full Sample Analyses. Results of the estimation of the full and truncated versions of our model in the full sample of studies, including fit statistics, model selection criteria, and heterogeneity estimates, are presented in Table S9.1 (supplemental materials, S9). Both models exhibited fit statistics that met our cutoff criteria. Standardized parameter and variability estimates for the hypothesized effects of each model are presented in Table 1. In the next sections, we summarize the pattern of effects and hypothesis tests of each model.

Full model. Focusing first on the direct effects, consistent with hypotheses, we observed non-zero, positive, small-to-medium-sized effects of mastery-approach orientation on intrinsic motivation (H1a), and identified (H1c) and introjected (H2a) regulations. We found non-zero small-sized effects of performance avoidance on identified (H3h) and introjected (H3b) regulations and of performance approach on introjected and external regulations and intrinsic motivation. Effects of the orientations on other SDT motivation forms were no different from the null. While we observed positive effects of autonomous forms of motivation on behavior, none of the effect sizes differed from the null. As a consequence, we observed no non-zero indirect effects of

specific goal orientation constructs on behavior mediated by motivational forms from SDT. However, we observed non-zero sums of indirect effects of mastery orientations, comprising effects of both approach and avoidant forms, on behavior mediated by autonomous forms of motivation, comprising intrinsic motivation and identified regulation (H5a-H5d). We observed these effects because the size of the specific indirect effects of which the sums of indirect effects were comprised was small in relation to the breadth of their respective confidence intervals, increasing the probably of encompassing the null, but when summed, their effect size was sufficient to present as non-zero, albeit remaining small in size[2].

Truncated model. Most direct effects were as expected and consistent with our hypotheses: we observed non-zero, positive, small-sized effects of mastery orientation and performance orientation on autonomous motivation (H1 and H3e-H3h). Similarly, we also found non-zero, positive, small-sized effects of performance orientation on controlled motivation (H3a-H3d). However, contrary to our hypothesis H2, effects of mastery orientation on controlled motivation, were non-zero, positive, and small-sized. The analysis also revealed non-zero, positive, small-sized effects of autonomous motivation on behavior, but effects of controlled motivation on behavior were no different from the null. As a result, we only observed non-zero, positive, and small-sized indirect effects of mastery orientation on behavior mediated by autonomous motivation. A similar pattern of effect was also found in the sums of indirect effects of mastery orientation on behavior mediated by autonomous and controlled forms of motivation.

Moderator Analyses

Next, we outline the key findings from each of our moderator analyses. Standardized parameter estimates and 95% confidence intervals for the truncated model, along with difference tests across moderator groups, are summarized in Tables S10.1 to S10.4 (supplemental materials, S10).

Validity or reliability of AGT and SDT scales. Consistent with our hypothesis 6, we observed a larger direct effect of performance goals on autonomous motivation in studies that employed SDT scales with reported evidence of reliability and/or validity and a larger direct effect of mastery goals on controlled motivation in studies using AGT scales that provided reliability and/or validity evidence. Beyond these specific instances, the remaining direct and indirect effects were largely consistent across moderator groups, irrespective of whether studies reported validity and/or reliability evidence, suggesting general consistency in the model across psychometric properties.

Sample type. In line with our hypothesis H7, direct effects of performance goals on autonomous motivation, and of mastery goals on controlled motivation, were larger studies on athlete samples compared to effects in studies involving non-athletes. Although this pattern offered partial support for our predictions, our analysis also revealed that studies on non-athlete samples exhibited larger direct effects of mastery goals on autonomous motivation, as well as larger indirect effects of mastery goals on

[2]It should also be noted that parameter estimates in the models estimated using imputed values for correlations with behavior were no different to models estimated without imputation, corroborating the virtually null differences observed across these models in model selection criteria.

behavior via autonomous motivation, relative to studies on athlete samples. We observed similar patterns of direct effects of mastery goals on autonomous motivation and controlled motivation across athlete and non-athlete subgroups.

Physical Activity Level. Congruent with our hypothesis H8, we observed a larger direct effect of performance goals on autonomous motivation in studies targeting participants engaged in more structured and competitive forms of physical activity relative to studies comprising participants in recreational forms of activity. However, contrary to expectations, we observed larger indirect effects—particularly those linking mastery goals to behavior via autonomous motivation—among studies on participants participating in recreational forms of activity relative to those on samples participating in structured and competitive forms. Aside from these effects outlined, the majority of direct and indirect pathways, including the effects of mastery goals on autonomous and controlled motivation, were comparable across subgroups, indicating general consistency in model effects across activity levels.

Bias analysis. The full results of the bias analyses conducted on the averaged correlations among the AGT constructs, SDT constructs, and behavior in the current meta-analysis are presented in Table S11.1 (supplemental materials, S11). Based on Carter et al.'s (2019) recommendation to adopt multiple criteria, our analysis revealed no converging evidence of systematic bias in the correlations in the present analysis[3].

[3]Findings should be interpreted with the caveat that the precision of many of the bias analysis techniques do not perform well under conditions of high between-study heterogeneity, as is the case for the correlations in the current analysis.

Chapter 4: Discussion

In the current analysis, we leveraged synthesized data from studies in the extant research literature to test an integrated theoretical model specifying the motivational determinants of adaptive behaviors and outcomes in sport, exercise, physical activity, and other performance-related contexts and the processes involved. The model integrated motivational constructs, namely, dispositional achievement goal orientations and context-tied forms of motivation from two leading theories of motivation, AGT and SDT, respectively, as key determinants of behavioral outcomes, and specified a key process-related mechanism involved. Specifically, our model hypotheses proposed that associations between AGT mastery and performance goal orientations and behavioral outcomes would be mediated by autonomous and controlled forms of motivation from SDT, consistent with conceptual and initial empirical work evaluating models integrating these theories (Ntoumanis, 2001; Ryan & Deci, 1989; Chen et al., 2019; Benita et al., 2014; Berlanga et al., 2018). The value of the model is that it is expected not only to provide robust estimates of the expected size and variability in effects among its constituent constructs and behavioral outcomes but also to infer a candidate mechanism by which these constructs relate to behavior. In addition, our leveraging of synthesized data enabled us to test effects of salient methodological and sample-related factors on which effects of our proposed model may depend, specifically measurement validity or reliability, sample type (athlete vs. recreational samples), and sample activity level.

Our model test lent initial support for our key hypotheses: conceptually-consistent direct effects of AGT constructs, particularly both mastery and performance achievement goal orientations, on autonomous forms of motivation from SDT, and effects of autonomous forms of motivation on behavioral outcomes. Importantly, we observed indirect effects of both mastery goal orientation on behavior mediated by autonomous forms of motivation as expected. Although we observed substantive consistency in model effects across groups of studies defined by our moderators, we also observed some notable differences such as larger effects of mastery goals on controlled motivation, and of performance goals on autonomous motivation in athlete samples, and larger indirect effects of mastery goals on behavior mediated by autonomous in recreational athlete samples. Next, we outline the most implications of the most salient findings of our current analysis in the context of prior research and the extant literature, identify some further issues and research questions arising from our analysis and how the current analysis may set an agenda for inform future research, and discuss some limitations of our analysis and suggest how they may be resolved in future.

The Integrated Model and Implications for Motivation

A headline finding of our current analysis was the conceptually-consistent, model-compliant pattern of unique effects observed between the motivational constructs of the constituent theoretical perspectives that form the basis of our model and, in general, corroborate patterns observed in primary research (Biddle et al., 2003; Ryan & Deci, 1989). In particular, our findings lend robust support for effects of types of mastery goal orientation, both approach and avoidant forms, on autonomous forms of motivation, namely intrinsic motivation and identified regulation, of types of performance goal orientation on forms of controlled motivation, particularly introjected regulation, and,

contrary to predictions, types of mastery goal orientation on particular forms of controlled motivation. Individuals endorsing mastery goals, reflecting a general disposition to interpret success in terms of personal growth, learning, and self-development, had a tendency to cite autonomous motives for engaging in behaviors in achievement-related contexts. The latter motives tend to be adaptive with respect adoption of, and persistence with, behaviors that are likely to lead to adaptive outcomes and are also linked to concomitant adaptive outcomes such as interest, psychological well-being, and positive affect, as stipulated in SDT, and supported empirically (Ratelle et al., 2007; Ng et al., 2012; O'Rourke et al., 2017; Jeno et al., 2018). This highlights the value of our integrated model insofar as it demonstrates that individuals' motives are informed, at least in part, from their generalized motivational dispositions, particularly their overarching values on what constitutes success in performance contexts. This aligns well with generalized perspectives from trait theories, which state that individuals' dispositions inform behavior across multiple contexts and behaviors, and prior research adopting dispositional-belief-motivational perspectives on action that demonstrate the partial role of traits on action. Although untested in the current analysis, SDT cites psychological need satisfaction as a salient mechanism in this proposed pattern of effects – individuals with tendencies to view success in terms of mastery of tasks and attaining competence are more likely to experience satisfaction of their psychological needs when considering tasks in performance contexts and, therefore, more likely to seek out or approach such tasks as they are viewed as opportunities to further satisfy and nurture those needs. This also highlights the prescience of approach motives in the process, and it is these forms of goal orientations with the largest effects on autonomous motives in the current study.

By contrast, our findings indicate that individuals endorsing a performance goal orientation suggesting a tendency to interpret success in terms of performance relative to others and social-comparative outcomes, were more likely to specify controlled reasons for engaging in actions in performance contexts, that is, externally-referenced motives and reasons for acting that emanate from outside, or are inconsistent with, a genuine sense of self. Motives of this type might be to avoid feelings of guilt or shame—for example, attending a fitness class with a friend to avoid negative self-judgment or social disapproval. Although controlled motives can prompt behavioral engagement, they are not related to long-term persistence as the external contingency may not endure as it may be removed or become less salient, and they are also associated with adaptive outcomes like interest or positive affect and may induce maladaptive outcomes such as boredom or negative affect. Analogous to the effects of mastery goal orientations and autonomous motivation, a further mechanistic interpretation is offered by SDT. Endorsement of performance goals signals success in terms of externally-referenced criteria, indicating that the behavioral context is unlikely to satisfy psychological needs for autonomy and competence, and may even undermine or thwart psychological needs, and signal the context is unlikely one offering the opportunity for need satisfaction, and may be subsequently reflected in motives for acting in the domain, namely, acting for controlled reasons.

A further key finding of our integrated model test is the indirect effects of goal orientations on behavioral outcomes mediated by the forms of motivation from SDT, which implies a key mechanism by which dispositional motivational constructs relating to success interpretation serve as distal correlates of behavioral outcomes. Specifically, we found that the effects of mastery goal orientation on behavior were fully mediated by autonomous forms of motivation. This finding aligns with previous empirical work (Spray et al., 2006) and provides cumulative support that individuals who tend to focus on self-referenced improvement and personal growth engage in adaptive behavioral outcomes, and this association is attributable to their endorsement of autonomous motives. As before, a key responsible mechanism implied in the mediated effects is that individuals who generally interpret success in terms of personal improvement and gaining self-referenced competence are more likely to view activities as having the potential to satisfy psychological needs and align their motives toward tasks and behaviors in performance accordingly. They are, therefore, more likely to seek out, pursue, and adopt behaviors likely to be experienced as autonomously motivated and need satisfying, particularly needs for autonomy and competence, which increases the likelihood of behavioral engagement in performance-related settings. Taken together, these results underscore the distinct role of mastery goal orientation—rather than performance goal orientation—as a salient basis for the adaptive forms of motivation that facilitate future behavioral enactment.

Effects of Moderators

Our analysis also afforded us the opportunity to test the effects of salient methodological and contextual moderators on the effects of our proposed integrative model. Our moderators represent conditions expected to magnify or diminish model effects and test the robustness of the model in providing a viable account of the motivational determinants of adaptive outcomes across contexts as well as delineating potential auxiliary assumptions that represent caveats to its applicability and generalizability that should be considered in future studies and model tests. A key moderator was the validity or reliability, or both, of measures used to tap the salient constructs of our proposed model. We reasoned that effect sizes among model constructs in studies that explicitly reported evidence in support of measure validity or reliability would be larger attributable to lower error variance relative model effects in studies that did not explicitly report such evidence. Consistent with our prediction, studies employing scales with reported evidence of validity or reliability, or both, were associated with larger effects of key constructs on outcomes in our model, particularly effects of performance goals on autonomous motivation and of mastery goals on controlled forms of motivation. Our findings align with the limited previous research indicating that psychometric properties of motivational measures moderate associations among motivational constructs and between these constructs and behavioral outcomes (Hulleman et al., 2010; Lonsdale et al., 2014). However, it is notable that the effects of our moderator were not observed for the indirect effects of AGT orientations on behavior, a finding likely attributable to the relatively modest size of the moderating effects, which did not carry to scale when computing indirect effects, which are based on multiplicative composites of the component effects. Nevertheless, our findings provide some evidence

underscoring the value of adopting psychometrically robust measures when testing relations between motivational constructs from these theories. Our findings also reinforce longstanding recommendations of theory proponents to prioritize the adoption of valid and reliable measures (Pelletier et al., 2013; Mallet et al., 2007). Finally, it is important to note that because we used imputed data for our behavioral outcomes, effectively rending effects involving behavior constant across moderator groups, may have masked effects of this moderator on effects involving behavior in our study. This represents a key caveat of this moderator analysis, and current data should not consequently be taken as definitive evidence that the indirect effects in our model are comparatively robust in terms of variations in measurement validity or reliability.

We also tested for differences in proposed model effects according to contextual moderating factors, namely, sample characteristics and physical activity level. Focusing on sample type, we expected to observe larger effects of performance goal orientations, and of controlled forms of motivation, in studies focused on samples participating in structured sport and athletic contexts to studies on the general population or non-athlete samples. Current findings partially corroborated this hypothesis – studies involving athlete samples exhibited larger direct effects of performance goal orientations on autonomous motivation, and of mastery goal orientations on controlled motivation. Prior research adopting a profile approach to the motivational orientations of individuals involved in highly competitive activities indicates that they tend to endorse both mastery and performance forms of goal orientations (Smith et al., 2006; Van Yperen, 2006). Athletes, in particular, may have a greater propensity to be oriented toward successful interpretations in terms of self-referenced improvement as well as through comparison with others. Such dual endorsement of goals may enhance the internalization of performance striving, and lead to larger effects of performance goals on autonomous motivation. By contrast, individuals adopting mastery goals may, paradoxically, view performing to very high internal, personally-held standards may represent a source of pressure, thus amplifying their effect on controlled motivation. Of course, we stress that these effects are relative, insofar as effects of mastery goal orientations on autonomous forms of motivation, and of performance goal orientations on controlled motivational forms, in both athlete and non-athlete groups remained, and tended to be the larger effects. They merely indicate that multiple dispositional orientations may be more motivationally salient in athlete groups.

We also observed larger direct effects of mastery goals on autonomous motivation, as well as larger indirect effects of mastery goals on behavior via autonomous motivation, in studies targeting non-athlete samples relative to those targeting athlete samples. These findings are unsurprising given that those engaged in activities and tasks in non-sport contexts likely pursue different goals, such as prioritizing personal improvement or participation goals when compared to athletes, and performance in relation to others and normative standards are likely to be less salient. This greater emphasis is reflected in the substantively larger contribution of mastery orientations, and the adoption of autonomous motives for action, to subsequent behavior engagement. In addition, consistent with the proposed need-satisfying mechanism to which the indirect effect may be attributed. Recreational and non-competitive contexts and activities have a

good fit with the generalized perspective on success of individuals who tend to endorse a mastery goal orientation; that is, they view success as mastering and attaining competence on tasks, and are, as a consequence, likely to view tasks in these contexts as need satisfying and cite autonomous motives. Taken together, our findings illustrate the greater role that performance orientations have in the motivational determinants of individuals acting in competitive environments, such as athletes, relative to those from non-athlete groups, and such differences should be taken into account when identifying motivational determinants of the behavior of different groups and the contexts in which they act.

Strengths, Limitations, and Avenues for Future Research

The present study offers several notable strengths that advance current theory on the motivational determinants of behavioral outcomes in physical activity and other performance-related contexts and candidate mechanisms derived from two leading theories, AGT and SDT. Foremost among these is providing an initial test of the predictions of an integrated predictive model based on the premises of AGT and SDT using data from a synthesis of the extant research applying the theories in these contexts. Specifically, the analysis provides a rigorous test of a motivational sequence in which dispositional AGT goal orientation constructs are proposed as distal determinants of behavioral outcomes in these contexts mediated by SDT forms of motivation. The model provides some indication of the bases of motivational forms that reflect the quality of motivation that individuals likely experience in these contexts and the extent to which they relate to competence perceptions and psychological needs. Findings provide initial empirical support for the mediation of the relationship between mastery goal orientations and behavioral outcomes in physical activity and performance-related contexts by autonomous forms of motivation, signaling potential constructs that could serve as candidate targets for change in subsequent research to identify intervention strategies purposed to promote motivation in these contexts. In addition, the current analysis permitted testing of key methodological and contextual moderators representing key conditions under which the proposed effects of our integrated model effects may vary and provided a test of the extent to which the model may generalize as an account of the motivation in these contexts. Our findings identified some notable differences in model effects, particularly larger model effects in studies with evidence of construct validity or reliability, or both, and the increased salience of performance goal orientations on autonomous motivational forms and mastery goal orientations on controlled forms in studies on samples of athletes and those in competitive sport. Further strengths include the adoption of rigorous, evidence-based procedures in study identification, screening, and selection, classification of theory constructs, and control for study-level covariates relating to sample and methodological characteristics in the model test.

However, it is important to identify some key caveats and limitations that should be considered when evaluating the findings of the current analysis. First, studies included in the current analysis relied exclusively on correlational research designs. These types of design precluded any directional or causal inference in the effects of the model estimate in the current analysis, and any such inferences are drawn solely from theory rather than the data. The prevalence of correlational research in the existing literature underscores the

importance of prioritizing the adoption of alternative study designs that better equip researchers to make such inferences in future investigations testing the component effects of the proposed integrated model. For example, we advocate researchers adopt randomized controlled study designs (e.g., experiments, interventions) that involve systematic manipulation of, or exposure of participants to, intervention content targeting change in AGT and SDT constructs with subsequent evaluation of their effects on behavioral outcomes. As the evidence base expands through the utilization of alternative study designs, researchers will be better positioned to draw more robust directional and causal conclusions in subsequent research syntheses testing the predictions of the integrated model.

Second, recognizing a dearth or complete absence of studies in the current sample for some of the correlations between the motivational constructs and behavior, we used a recommended data imputation approach using prior meta-analytic data to impute the low sample or missing effect sizes from the pooled correlation matrix used to test the model. Although this method allowed for model estimation, it comes with the notable caveat that the correlation and variance estimates for the imputed correlations were not comparable to those for which we had sufficient effect sizes derived from currently available data extracted from the studies we located in our searches. Even though we took care in identifying prior meta-analytic estimates for the behavioral correlations with a good fit to the current sample and data, the effect sizes are likely to far have smaller variance estimates and narrowed confidence intervals due to the large sample. In addition, they have also been subjected to correction for methodological artifacts, namely sample weighting, through the application of the meta-analytic techniques adopted (for a critique of this practice, see Hagger & Hamilton, 2025). In addition, as the imputed effect sizes were not able to be classified according to our moderators, the imputed effect sizes were invariant across moderator groups, attenuating, or, in the case of completely missing correlations, rendering redundant, any differences across groups in our moderator tests. Conclusions drawn from the model effects involving behavior in our current analysis should, therefore, be interpreted with this caveat in mind. The necessity for imputation signals a clear need for research directly assessing and reporting associations between motivational constructs from AGT and SDT and salient behavioral outcomes and, as data accumulates, enable full tests of the current model without the necessity of imputation.

Finally, we also acknowledge that although we tested for the effects of salient methodological and contextual moderators on effects of our integrated model in the current analysis, our analysis was confined to a small group of moderators. The relatively small pool of studies and lack of available data reported to code study-level sample characteristics precluded testing of additional moderators such as specific forms of behavioral outcome such as different physical activities or participant socio-economic status, race or ethnic origin, and cultural orientation. The lack of capacity to test additional moderators means that effects among constructs in our proposed model across studies were associated with substantive residual variation in observed effect sizes after artifactual correction that remained unresolved. Resolution lies in future primary studies that systematically test associations among AGT and SDT constructs and behavior in large, representative samples and report study-level or, preferably, individual participant-

level data on variables that would permit future syntheses to test these moderator effects in tests of the integrated model. Such studies could also test for the effects of the moderators within the sample, which would also provide an initial signal of moderator effects as data accumulates in advance of synthesis attempts.

Conclusion

Given the central role of motivation, particularly motivational quality, in the uptake and maintenance of behaviors likely to yield adaptive outcomes in physical activity, sport, and performance and related contexts, we tested a novel integrated model examining relations between motivational determinants of behavioral outcomes from two leading motivational theories in these contexts across synthesized data from studies applying these theories in the extant research literature. Specifically, the integrated model proposed associations between dispositional constructs from AGT, namely, mastery and performance forms of goal orientations, and SDT, namely, autonomous and controlled forms of motivation, and behavioral outcomes in physical activity, sport, and performance contexts. In addition, SDT motivational forms were proposed to mediate relations between AGT goal orientations and behavioral outcomes, as an indication of the origins of these constructs and a candidate mechanism by which these dispositional constructs relate to behavior. A test of our model in synthesized data extracted from studies applying these theories identified in a systematic literature search provided robust support for conceptually-consistent effects among the AGT and SDT constructs and, specifically, the mediation of mastery goal orientations on behavioral outcomes by autonomous motivation, in line with model hypotheses. In addition, tests of the effects of salient methodological and contextual moderators that represent the conditions under which model effects were expected to vary indicated the particular importance of measurement validity or reliability and sample type on model effects, particularly the larger model effects identified in studies reporting evidence of construct validity or reliability and heightened importance of performance goal orientations on autonomous forms of motivation, and mastery forms of goal orientations on controlled motivation, in athlete samples. Findings contribute to the development of an evidence base of associations between AGT and SDT constructs, consistent with the premise that they share conceptual bases as well as their associated effects on behavior. Most importantly, our model test lends support to the theoretical proposal that SDT forms of motivation serve as a possible mechanism by which the dispositional constructs from AGT relate to behavioral outcomes. The current research may provide a basis for future research adopting designs that further verify associations between constructs from both theories, and, in particular, the mediational process. Such studies would do well to adopt designs that better permit causal inferences implied in the current model test, and, importantly, utilize methods that may seek to promote motivation toward and actual participation in behaviors that promote adaptive outcomes in these contexts.

References

Alesi, M., Gómez-López, M., Chicau-Borrego, C., Monteiro, D., & Granero-Gallegos, A. (2019). Effects of a motivational climate on psychological needs satisfaction, motivation and commitment in teen handball players. *International Journal of Environmental Research and Public Health, 16*(15), 1-13. https://doi.org/10.3390/ijerph16152702

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*(3), 261–271. https://doi.org/10.1037//0022-0663.84.3.261

Anderman, L. H., & Anderman, E. M. (1999). Social predictors of changes in students' achievement goal orientations. *Contemporary educational psychology*, *24*(1), 21-37. https://doi.org/10.1006/ceps.1998.0978

Antshel, K. M., Parascandola, T., Taylor, L. E., & Faraone, S. V. (2021). Achievement goal orientation and stimulant misuse in college students. *Journal of American College Health, 69*(2), 125–133. https://doi.org/10.1080/07448481.2019.1656635

Barkoukis, V., Hagger, M. S., Lambropoulos, G., & Tsorbatzoudis, H. (2010). Extending the trans-contextual model in physical education and leisure-time contexts: Examining the role of basic psychological need satisfaction. *British Journal of Educational Psychology, 80*(4), 647–670. Portico. https://doi.org/10.1348/000709910x487023

Begg, C. B., & Mazumdar, M. (1994). Operating characteristics of a rank correlation test for publication bias. *Biometrics, 50*(4), 1088-1101. https://doi.org/10.2307/2533446

Benita, M., Roth, G., & Deci, E. L. (2014). When are mastery goals more adaptive? It depends on experiences of autonomy support and autonomy. *Journal of Educational Psychology, 106*(1), 258–267. https://doi.org/10.1037/a0034007

Benoit, T. Z., & Hagger, M. S. (2024). Sport motivation scale: A meta-analysis. Manuscript under review for publication in *International Review of Sport and Exercise Psychology* (under review).

Berlanga, L. A., Palomino Devia, C., Ruiz-Juan, F., & Gonzalez-Jurado, J. A. (2018). Grado de predicción de la motivación hacia las actividades físicodeportivas a través de la orientación de metas, la percepción del éxito y el grado de satisfacción. Un análisis transcultural. *Universitas Psychologica, 17*(1), 1–14. https://doi.org/10.11144/javeriana.upsy17-1.gpma

Bieg, S., Reindl, M., & Dresel, M. (2016). The relation between mastery goals and intrinsic motivation among university students: a longitudinal study. *Educational Psychology, 37*(6), 666–679. https://doi.org/10.1080/01443410.2016.1202403

Biddle, S. J., Wang, C. J., Chatzisarantis, N. L., & Spray, C. M. (2003). Motivation for physical activity in young people: Entity and incremental beliefs about athletic ability. *Journal of Sports Sciences, 21*(12), 973–989. https://doi.org/10.1080/02640410310001641377

Bortoli, L., Bertollo, M., Comani, S., & Robazza, C. (2011). Competence, achievement goals, motivational climate, and pleasant psychobiosocial states in youth sport. Journal of sports sciences, 29(2), 171–180. https://doi.org/10.1080/02640414.2010.530675

Buch, R., Nerstad, C. G. L., & Säfvenbom, R. (2015). The interactive roles of mastery climate and performance climate in predicting intrinsic motivation. *Scandinavian Journal of Medicine & Science in Sports, 27*(2), 245–253. https://doi.org/10.1111/sms.12634

Butler, R. (1987). Task-involving and ego-involving properties of evaluation: Effects of different feedback conditions on motivational perceptions, interest, and performance. *Journal of Educational Psychology, 79*(4), 474–482. https://doi.org/10.1037//0022-0663.79.4.474

Carter, E. C., Schonbrodt, F., Gervais, W., & Hilgard, J. (2019). Correcting for bias in psychology: A comparison of meta-analytic methods. *Advances in Methods and Practices in Psychological Science, 2*(2), 115-144. https://doi.org/10.1177/2515245919847196

Cecchini, J. A., Fernández-Rio, J., & Méndez-Giménez, A. (2015). Connecting athletes' self-perceptions and metaperceptions of competence: A structural equation modeling approach. *Journal of Human Kinetics, 46*(1), 189–198. https://doi.org/10.1515/hukin-2015-0047

Ciani, K., Ferguson, Y., Bergin, D., & Hilpert, J. (2010). Motivational influences on school-prompted interest. *Educational Psychology, 30*(4), 377–393. https://doi.org/10.1080/01443411003660232

Ciani, K. D., Sheldon, K. M., Hilpert, J. C., & Easter, M. A. (2011). Antecedents and trajectories of achievement goals: A self-determination theory perspective. *British Journal of Educational Psychology, 81*(2), 223–243. Portico. https://doi.org/10.1348/000709910x517399

Cresswell, S. L., & Eklund, R. C. (2005). Changes in athlete burnout and motivation over a 12-week league tournament. *Medicine & Science in Sports & Exercise, 37*(11), 1957–1966. https://doi.org/10.1249/01.mss.0000176304.14675.32

Chen, C., Elliot, A. J., & Sheldon, K. M. (2019). Psychological need support as a predictor of intrinsic and external motivation: The mediational role of achievement goals. *Educational Psychology, 39*(8), 1090–1113. https://doi.org/10.1080/01443410.2019.1618442

Cheung, M. (2015) *Meta-Analysis: A structural equation modelling approach* (1st ed.). John Wiley & Sons. https://doi.org/10.1002/9781118957813

Cheung, M. W.-L. (2015). MetaSEM: an R package for meta-analysis using structural equation modeling. *Frontiers in Psychology, 5*, 1521. https://doi.org/10.3389/fpsyg.2014.01521

Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality, 19(*2), 109–134. https://doi.org/10.1016/0092-6566(85)90023-6

Deci, E. L., & Ryan, R. M. (2000). The "what" and" why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01

DeCharms, R., & Muir, M. S. (1978). Motivation: Social approaches. *Annual Review of Psychology, 29*(1), 91-113. https://doi.org/10.1146/annurev.ps.29.020178.000515

DeCharms, R. (1968). *Personal causation: The internal affective determinants of behavior* (1st ed.). Academic Press. https://doi.org/10.4324/9781315825632

Diaconu-Gherasim, L. R., Brumariu, L. E., Moore, M. T., & Kerns, K. A. (2023). School and career future time perspective and academic-related outcomes in early adolescence: Are mastery goals mediators?. *Educational Psychology, 43*(2), 119-136. https://doi.org/10.1080/01443410.2022.2136361

Dompnier, B., Darnon, C., & Butera, F. (2009). Faking the desire to learn: A clarification of the link between mastery goals and academic achievement. *Psychological Science, 20*(8), 939–943. https://doi.org/10.1111/j.1467-9280.2009.02384.x

Duda, J. L. (1992). Motivation in sport settings: A goal per-spective approach. In G. C. Roberts (Ed.), *Motivation in Sport and Exercise* (1st ed, pp. 57-91). Human Kinetics.

Duda, J. L., Chi, L., Newton, M. L., Walling M. D., & Catley, D. (1995). Task and ego orientation and intrinsic motivation in sport. *International Journal of Sport Psychology* 26, 40–63. https://psycnet.apa.org/record/1995-42241-001

Duval, S., & Tweedie, R. L. (2000). Trim and fill: A simple funnel plot based method of testing and adjusting for publication bias in meta-analysis. *Biometrics, 56*(2), 455-463. https://doi.org/10.1111/j.0006-341X.2000.00455.x

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*(10), 1040–1048. https://doi.org/10.1037/0003-066X.41.10.1040.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*(2), 256–273. https://doi.org/10.1037//0033-295x.95.2.256

Egger, M., Smith, D. G., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ, 315*, 629-634. https://doi.org/10.1136/bmj.315.7109.629

Elliot, A., J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist, 34*(3), 149-169. https://doi.org/10.1207/s15326985ep3403_3

Elliot, A. J., & Covington, M. V. (2001). Approach and avoidance motivation. *Educational Psychology Review, 13*(2), 73–92. https://doi.org/10.1023/A:1009009018235

Elliot, A., & Church, M. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72*(1), 218-232. https://doi.org/10.1037//0022-3514.72.1.218

Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology, 70*(3), 461–475. https://doi.org/10.1037/0022-3514.70.3.461

Elliot, A. J., & McGregor, H. A. (2001). A 2×2 achievement goal framework. *Journal of Personality and Social Psychology, 80*(3), 501–519. https://doi.org/10.1037/0022-3514.80.3.501

Elliot, A. J., & Thrash, T. M. (2002). Approach-avoidance motivation in personality: approach and avoidance temperaments and goals. *Journal of personality and social psychology*, *82*(5), 804–818. https://doi.org/10.1037//0022-3514.82.5.804

Fernández-Espínola, C., Almagro, B. J., Tamayo-Fajardo, J. A., Paramio-Pérez, G., & Saénz-López, P. (2022). Effects of interventions based on achievement goals and self-determination theories on the intention to be physically active of physical education students: A systematic review and meta-analysis. *Sustainability*, *14*(22), 1-11. https://doi.org/10.3390/su142215019

Ferrer-Caja, E., & Weiss, M. R. (2000). Predictors of intrinsic motivation among adolescent students in physical education. *Research quarterly for exercise and sport*, *71*(3), 267–279. https://doi.org/10.1080/02701367.2000.10608907

Francisco, C., Arce, C., Sánchez-Romero, E., & Vílchez, M. (2018). The mediating role of sport self-motivation between basic psychological needs satisfaction and athlete engagement. *Psicothema, 4*(30), 421–426. https://doi.org/10.7334/psicothema2018.117

Geen, R. G. (1995). *Human motivation: A social psychological approach*. Thomson Brooks/Cole Publishing Co.

Gnambs, T., & Hanfstingl, B. (2015). The decline of academic motivation during adolescence: an accelerated longitudinal cohort analysis on the effect of psychological need satisfaction. *Educational Psychology, 36*(9), 1691–1705. https://doi.org/10.1080/01443410.2015.1113236

Gonçalves, C. E., Coelho e Silva, M. J., Cruz, J., Torregrosa, M., & Cumming, S. (2010). The effect of achievement goals on moral attitudes in young athletes. *Journal of Sports Science & Medicine*, *9*(4), 605–611.

Gorozidis, G. S., & Papaioannou, A. G. (2016). Teachers' achievement goals and self-determination to engage in work tasks promoting educational innovations. *Learning and Individual Differences, 49*, 46–58. https://doi.org/10.1016/j.lindif.2016.05.014

Guo, J., Hu, X., Elliot, A. J., Marsh, H. W., Murayama, K., Basarkod, G., Parker, P. D., & Dicke, T. (2023). Mastery-approach goals: A large-scale cross-cultural analysis of antecedents and consequences. *Journal of Personality and Social Psychology, 125*(2), 397–420. https://doi.org/10.1037/pspp0000436

Gwet K. L. (2008). Computing inter-rater reliability and its variance in the presence of high agreement. *The British Journal of Mathematical and Statistical Psychology, 61*(1), 29–48. https://doi.org/10.1348/000711006X126600

Hagger, M. S. (2025). Psychological determinants of health behavior. *Annual Review of Psychology, 76*, 821-850. https://doi.org/10.1146/annurev-psych-020124-114222

Hagger, M. S., Chatzisarantis, N. L. D., & Harris, J. (2006). From psychological need satisfaction to intentional behavior: Testing a motivational sequence in two behavioral contexts. *Personality and Social Psychology Bulletin, 32*(2), 131-148. https://doi.org/10.1177/0146167205279905

Hagger, M. S., Gucciardi, D. F., & Chatzisarantis, N. L. D. (2017). On nomological validity and auxiliary assumptions: The importance of simultaneously testing effects in social cognitive theories applied to health behavior and some guidelines. *Frontiers in Psychology, 8*, 1933. https://doi.org/10.3389/fpsyg.2017.01933

Hagger, M. S., & Hamilton, K. (2021). General causality orientations in self-determination theory: Meta-analysis and test of a process model. *European Journal of Personality, 35*(5), 710-735. https://doi.org/10.1177/0890207020962330

Halvari, H., Skjesol, K., & Bagøien, T. E. (2011). Motivational climates, achievement goals, and physical education outcomes: A longitudinal test of achievement goal theory. *Scandinavian Journal of Educational Research, 55*(1), 79–104. https://doi.org/10.1080/00313831.2011.539855

Harackiewicz, J. M., Barron, K. E., Pintrich, P. R., Elliot, A. J., & Thrash, T. M. (2002). Revision of achievement goal theory: Necessary and illuminating. *Journal of Educational Psychology, 94*(3), 638–645. https://doi.org/10.1037//0022-0663.94.3.638

Hein, V., & Hagger, M. S. (2007). Global self-esteem, goal achievement orientations, and self-determined behavioural regulations in a physical education setting. Journal of sports sciences, 25(2), 149–159. https://doi.org/10.1080/02640410600598315

Higgins, J. P., & Thompson, S. G. (2002). Quantifying heterogeneity in a meta-analysis. *Statistics in medicine*, *21*(11), 1539–1558. https://doi.org/10.1002/sim.1186

Howard, J. L., Gagné, M., & Bureau, J. S. (2017). Testing a continuum structure of self-determined motivation: A meta-analysis. *Psychological Bulletin, 143*(12), 1346–1377. https://doi.org/10.1037/bul0000125

Hulleman, C. S., Schrager, S.M., Bodmann, S. M., & Harackiewicz, J. M. (2010). A meta-analytic review of achievement goal measures: Different labels for the same constructs or different constructs with similar labels? *Psychological Bulletin, 136*(3), 422–449. https://doi.org/10.1037/a0018947

Hutzler, Y., Oz, M., & Barak, S. (2013). Goal perspectives and sport participation motivation of special Olympians and typically developing athletes. *Research in Developmental Disabilities, 34*(7), 2149–2160. https://doi.org/10.1016/j.ridd.2013.03.019

Iyengar, S., & Greenhouse, J. B. (1988). Selection models and the file drawer problem. *Statistical Science*, *3*(1), 109-117. https://www.jstor.org/stable/2245925

Jaakkola, T. T., Sääkslahti, A., Yli-Piipari, S., Manninen, M., Watt, A., & Liukkonen, J. (2013). Student motivation associated with fitness testing in the physical education context. *Journal of Teaching in Physical Education, 32*(3), 270–286. https://doi.org/10.1123/jtpe.32.3.270

Jaakkola, T., Yli-Piipari, S., Barkoukis, V., & Liukkonen, J. (2015). Relationships among perceived motivational climate, motivational regulations, enjoyment, and PA participation among Finnish physical education students. *International Journal of Sport and Exercise Psychology, 15*(3), 273–290. https://doi.org/10.1080/1612197x.2015.1100209

Janke, S., & Dickhäuser, O. (2017). A situated process model of vocational achievement goal striving within members of the academic staff at university. *Motivation and Emotion, 42*(4), 466–481. https://doi.org/10.1007/s11031-017-9657-z

Jeno, L. M., Danielsen, A. G., & Raaheim, A. (2018). A prospective investigation of students' academic achievement and dropout in higher education: A self-determination theory approach. *Educational Psychology, 38*(9), 1163–1184. https://doi.org/10.1080/01443410.2018.1502412

Katz-Vago, I., & Benita, M. Mastery-approach and performance-approach goals predict distinct outcomes during personal academic goal pursuit. *British Journal of Educational Psychology, 00*, 1-19. https://doi.org/10.1111/bjep.12645

Kaufman, A., & Dodge, T. (2008). Student perceptions and motivation in the classroom: Exploring relatedness and value. *Social Psychology of Education, 12*(1), 101–112. https://doi.org/10.1007/s11218-008-9070-2

Kim, J.-I. (2015). American high school students from different ethnic backgrounds: the role of parents and the classroom in achievement motivation. *Social Psychology of Education, 18*(2), 411–430. https://doi.org/10.1007/s11218-014-9285-3

Lazarides, R., & Rubach, C. (2017). Instructional characteristics in mathematics classrooms: relationships to achievement goal orientation and student engagement. *Mathematics Education Research Journal, 29*(2), 201–217. https://doi.org/10.1007/s13394-017-0196-4

Le, H., Schmidt, F. L., Harter, J. K., & Lauver, K. J. (2010). The problem of empirical redundancy of constructs in organizational research: An empirical investigation. *Organizational Behavior and Human Decision Processes, 112*(2), 112-125. https://doi.org/10.1016/j.obhdp.2010.02.003

Li, C. H., Chi, L., & Yeh, S. R. (2011). Prediction of intrinsic motivation and sports performance using 2x2 achievement goal framework. *Psychological Reports, 108*(2), 625-37. https://doi.org/10.2466/05.11.14.PR0.108.2.625-637

Lonsdale, C., Hodge, K., Hargreaves, E. A., & Ng, J. Y. Y. (2014). Comparing sport motivation scales: A response to Pelletier et al. *Psychology of Sport and Exercise, 15*(5), 446–452. https://doi.org/10.1016/j.psychsport.2014.03.006

Madjar, N., Bachner, Y. G., & Kushnir, T. (2019). Mastery avoidance: An overlooked aspect of medical students' motivation. *The National medical journal of India*, *32*(5), 298–302. https://doi.org/10.4103/0970-258X.296240

Mallett, C., Kawabata, M., & Newcombe, P. (2007). Progressing measurement in sport motivation with the SMS-6: A response to Pelletier, Vallerand, and Sarrazin. *Psychology of Sport and Exercise, 8*, 622-631. https://doi.org/10.1016/j.psychsport.2007.05.001

Mallett, C., Kawabata, M., Newcombe, P., Otero-Forero, A., & Jackson, S. (2007). Sport motivation scale-6 (SMS-6): A revised six-factor sport motivation scale. *Psychology of Sport and Exercise, 8*(5), 600–614. https://doi.org/10.1016/j.psychsport.2006.12.005

Maslow, A. H. (1943). Preface to motivation theory. *Psychosomatic Medicine, 5,* 85–92. https://doi.org/10.1097/00006842-194301000-00012

McClelland, C. A. (1959). A Classification of international relations theory. *Political Research, Organization and Design*, *2*(4), 32-34. https://doi.org/10.1177/000276425900200413

Méndez-Giménez, A., Fernández-Río, J., & Cecchini-Estrada, J. A. (2012) Análisis de un modelo multiteórico de metas de logro, metas de amistad y autodeterminación en educación física. *Estudios de Psicología, 33*(3), 325-336. http://dx.doi.org/10.1174/021093912803758110

Midgley, C., Kaplan, A., & Middleton, M. (2001). Performance-approach goals: Good for what, for whom, under what circumstances, and at what cost? *Journal of Educational Psychology, 93*(1), 77–86. https://doi.org/10.1037//0022-0663.93.1.77

Miller, A. L., Fassett, K. T., & Palmer, D. L. (2021). Achievement goal orientation: A predictor of student engagement in higher education. *Motivation and Emotion, 45*(3), 327–344. https://doi.org/10.1007/s11031-021-09881-7

Moreno-Murcia, J. A., Marín, L. C., Gómez, P. H., Rodríguez, G. H., Lacárcel, J. A., and Gimeno, E. C. (2008). Predicción de la motivación autodeterminada según las estrategias para mantener la disciplina y la orientación motivacional en estudiantes adolescentes de educación física [Prediction of self-determined motivation according to strategies to maintain discipline and motivational orientation in adolescent physical education students]. *Apuntes de Psicología, 26(*3), 501-516.

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91*(3), 328–346. https://doi.org/10.1037/0033-295X.91.3.328

Nicholls, J. G. (1989). *The competitive ethos and democratic education*. Harvard University Press.

Niemivirta, M., Pulkka, A. T., Tapola, A., & Tuominen, H. (2019). Achievement goal orientations: A person-oriented approach. In K. A. Renninger & S. E. Hidi (Eds.), *The Cambridge handbook of motivation and learning* (pp. 566–616). Cambridge University Press. https://doi.org/10.1017/9781316823279.025

Ng, J. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-determination theory applied to health contexts: A meta-analysis. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science, 7*(4), 325–340. https://doi.org/10.1177/1745691612447309

Ntoumanis, N. (2001). Empirical links between achievement goal theory and self-determination theory in sport. *Journal of Sports Sciences*, *19*(6), 397-409. https://doi.org/10.1080/026404101300149357

O'Rourke, D. J., Smith, R. E., Punt, S., Coppel, D. B., & Breiger, D. (2017). Psychosocial correlates of young athletes' self-reported concussion symptoms during the course of recovery. *Sport, Exercise, and Performance Psychology, 6*(3), 262–276. https://doi.org/10.1037/spy0000097

Ommundsen, Y. & Kval∅, S. E. (2007). Autonomy–mastery, supportive or performance focused? Different teacher behaviours and pupils' outcomes in physical education. *Scandinavian Journal of Educational Research, 51*(4), 385-413. https://doi.org/10.1080/00313830701485551

Pelletier, L. G., Rocchi, M. A., Vallerand, R. J., Deci, E. L., & Ryan, R. M. (2013). Validation of the revised sport motivation scale (SMS-II). *Psychology of Sport and Exercise, 14*(3), 329–341. https://doi.org/10.1016/j.psychsport.2012.12.002

Pintrich, P. R., Zusho, A., Schiefele, U., & Pekrun, R. (2001). Goal orientation and self-regulated learning in the college classroom: A cross-cultural comparison. In F. Salili, C. Chiu & Y. Hong (Eds.), *Student motivation: The culture and context of learning; Student motivation: The culture and context of learning* (pp. 149-169, Chapter xxiv, 364 Pages). Kluwer Academic Publishers. https://doi.org/10.1007/978-1-4615-1273-8_8

Protogerou, C., & Hagger, M. S. (2020). A checklist to assess the quality of survey studies in psychology methods in psychology. *Methods in Psychology, 3*, 100031. https://doi.org/10.1016/j.metip.2020.100031

Raska, D. (2014). Excited, proud, and accomplished: Exploring the effects of feedback supllemented with web-based peer benchmarking on self-regulated learning in marketing classrooms. *Journal of Marketing Education, 36*(3), 258–271. https://doi.org/10.1177/0273475314552325

Ratelle, C. F., Guay, F., Vallerand, R. J., Larose, S. and Senecal, C. (2007). Autonomous, controlled, and amotivated types of academic motivation: A person-oriented analysis. *Journal of Educational Psyhcology, 99*(4), 734–746. https://doi.org/10.1037/0022-0663.99.4.734

Rawsthorne, L. J., & Elliot, A. J. (1999). Achievement goals and intrinsic motivation: A meta-analytic review. *Personality and Social Psychology Review, 3*, 326-344. https://doi.org/10.1207/s15327957pspr0304_3

Reeve, J., Jang, H., Carrell, D., Jeon, S., & Barch, J. (2004). Enhancing students' engagement by increasing teachers' autonomy support. *Motivation and Emotion, 28*(2), 147-169. https://doi.org/10.1023/B:MOEM.0000032312.95499.6f

Reeve, J., Ryan, R., Deci, E. L., & Jang, H. (2008). Understanding and promoting autonomous self-regulation: A self-determination theory perspective. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 223–244). Lawrence Erlbaum Associates Publishers.

Reinboth, M., & Duda, J. L. (2004). The motivational climate, perceived ability, and athletes' psychological and physical well-being. *The Sport Psychologist, 18*(3), 237-251. https://doi.org/10.1123/tsp.18.3.237

Rothes, A., Lemos, M. S., & Gonçalves, T. (2022). The influence of students' self-determination and personal achievement goals in learning and engagement: A mediation model for traditional and nontraditional students. *Education Sciences, 12*(6), 369. https://doi.org/10.3390/educsci12060369

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology, 57*(5), 749–761. https://doi.org/10.1037/0022-3514.57.5.749

Ryan, R. M., & Deci, E. L. (1989). Bridging the research traditions of task/ego involvement and intrinsic/extrinsic motivation: Comment on Butler (1987). *Journal of Educational Psychology, 81*(2), 265–268. https://doi.org/10.1037/0022-0663.81.2.265

Ryan, R. M., & Deci, E. L. (2017a). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford publications.

Ryan, R. M., & Deci, E. L. (2017b). Organismic integration theory: Internalization and differentiation of extrinsic motivation. In R. M. Ryan & E. L. Deci (Eds), *Self-*

determination theory: Basic psychological needs in motivation, development, and wellness (1st ed., pp. 179–215). The Guilford Press.

Ryan, R. M., & Deci, E. L. (2017c). Self-determination theory: An introduction and overview. In R. M. Ryan & E. L. Deci (Eds), *Self-determination theory: Basic psychological needs in motivation, development, and wellness* (1st ed., pp. 3–25). The Guilford Press.

Ryan, R. M., & Deci, E. L. (2017d). Psychological needs: Varied concepts and a preliminary description of SDT's approach. In R. M. Ryan & E. L. Deci (Eds), Self-determination theory: Basic psychological needs in motivation, development, and wellness (1st ed., pp. 80–101). The Guilford Press.

Sari, I. (2015). Satisfaction of basic psychological needs and goal orientation in young athletes: A test of basic psychological needs theory. *Kinesiology*, *47*(2.), 159-168. https://hrcak.srce.hr/file/221521

Senko, C. (2016). Achievement Goal Theory: A story of early promises, eventual discords, and future possibilities. In K. R., Wentzel, & D. B. Miele (Eds). *Handbook of motivation at school* (2nd ed., pp. 1-23). https://doi.org/10.4324/9781315773384

Senko, C., Hulleman, C. S., & Harackiewicz, J. M. (2011). Achievement goal theory at the crossroads: Old controversies, current challenges, and new directions. *Educational Psychologist*, *46*(1), 26-47. https://doi.org/10.1080/00461520.2011.538646

Schenker, N., & Gentleman, J. F. (2001). On judging the significance of differences by examining the overlap between confidence intervals. *The American Statistician, 55*(3), 182-186. https://doi.org/10.1198/000313001317097960

Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). p-curve and effect size: Correcting for publication bias using only significant results. *Perspectives on Psychological Science, 9*(6), 666–681. https://doi.org/10.1177/1745691614553988

Shaffer, J. A., DeGeest, D., & Li, A. (2016). Tackling the problem of construct proliferation: A guide to assessing the discriminant validity of conceptually related constructs. *Organizational Research Methods, 19*(1), 80-110. https://doi.org/10.1177/1094428115598239

Shih, S. (2008). The relation of self-determination and achievement goals to Taiwanese eighth graders' behavioral and emotional engagement in schoolwork. *The Elementary School Journal, 108*(4), 313–334. https://doi.org/10.1086/528974

Skjesol, K., & Halvari, H. (2005). Motivational climate, achievement goals, perceived sport competence, and involvement in physical activity: structural and mediator models. *Perceptual and motor skills, 100*(2), 497–523. https://doi.org/10.2466/pms.100.2.497-523

Slemp, G. R., Kern, M. L., Patrick, K. J., & Ryan, R. M. (2018). Leader autonomy support in the workplace: A meta-analytic review. *Motivation and Emotion, 42*(5), 706–724. https://doi.org/10.1007/s11031-018-9698-y

Smith, A. L., Balaguer, I., & Duda, J. L. (2006). Goal orientation profile differences on perceived motivational climate, perceived peer relationships, and motivation-related responses of youth athletes. Journal of Sports Sciences, 24(12), 1315–1327. https://doi.org/10.1080/02640410500520427

Smith, M., Duda, J., Allen, J., & Hall, H. (2002). Contemporary measures of approach and avoidance goal orientations: Similarities and differences. *British Journal of Educational Psychology, 72*(2), 155–190. https://doi.org/10.1348/000709902158838

Spray, C. M., John Wang, C. K., Biddle, S. J. H., & Chatzisarantis, N. L. D. (2006). Understanding motivation in sport: An experimental test of achievement goal and self determination theories. *European Journal of Sport Science, 6*(1), 43–51. Portico. https://doi.org/10.1080/17461390500422879

Standage, M., Duda, J. L., & Ntoumanis, N. (2003). A model of contextual motivation in physical education: Using constructs from self-determination and achievement goal theories to predict physical activity intentions. *Journal of Educational Psychology, 95*(1), 97–110. https://doi.org/10.1037/0022-0663.95.1.97

Stanley, T. D., & Doucouliagos, H. (2014). Meta-regression approximations to reduce publication selection bias. *Research Synthesis Methods, 5*(1), 60-78. https://doi.org/10.1002/jrsm.1095

Sterne, A. C., Becker, B. J., & Egger, M. (2005). The funnel plot. In H. R. Rothstein, A. J. Sutton, & M. Borenstein (Eds.), *Publication bias in meta-analysis: prevention, assessment and adjustments* (1st ed., pp. 73-98). John Wiley & Sons. https://doi.org/10.1002/0470870168.ch5

Stuntz, C. P., & Weiss, M. R. (2009). Achievement goal orientations and motivational outcomes in youth sport: The role of social orientations. *Psychology of Sport and Exercise, 10*(2), 255–262. https://doi.org/10.1016/j.psychsport.2008.09.001

Tang, M., Wang, D., & Guerrien, A. (2020). A systematic review and meta-analysis on basic psychological need satisfaction, motivation, and well-being in later life: Contributions of self-determination theory. *PsyCh Journal, 9*(1), 5–33. https://doi.org/10.1002/pchj.293

Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: a systematic review. The international journal of behavioral nutrition and physical activity, 9, 78. https://doi.org/10.1186/1479-5868-9-78

Treasure, D. C., & Robert, G. C. (2001). students' perceptions of the motivational climate, achievement beliefs, and satisfaction in physical education. *Research Quarterly for Exercise and Sport, 72*(2), 165–175. https://doi.org/10.1080/02701367.2001.10608946

Ullrich-French, S., Cox, A. E., & Bumpus, M. F. (2013). Physical activity motivation and behavior across the transition to university. *Sport, Exercise, and Performance Psychology, 2*(2), 90–101. https://doi.org/10.1037/a0030632

Urdan, T., & Kaplan, A. (2020). The origins, evolution, and future directions of achievement goal theory. *Contemporary Educational Psychology*, *61*, 1-10. https://doi.org/10.1016/j.cedpsych.2020.101862

Vallerand, R. J., Fortier, M. S., & Guay, F. (1997). Self-determination and persistence in a real-life setting: Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology, 72*(5), 1161–1176. https://doi.org/10.1037/0022-3514.72.5.1161

Van den Broeck, A., Howard, J. L., Van Vaerenbergh, Y., Leroy, H., and Gagné, M. (2021). Beyond intrinsic and extrinsic motivation: A meta-analysis on self-determination theory's multidimensional conceptualization of work motivation. *Organizational Psychology Review, 11*(3), 240–273. https://doi.org/10.1177/20413866211006173

Van Yperen, N. W., Blaga, M., & Postmes, T. (2015). A meta-analysis of the impact of situationally induced achievement goals on task performance. *Human Performance, 28*(2), 165–182. https://doi.org/10.1080/08959285.2015.1006772

Van Yperen, N. W. (2006). A novel approach to assessing achievement goals in the context of the 2 × 2 framework: identifying distinct profiles of individuals with different dominant achievement goals. *Personality and Social Psychology Bulletin, 32*(11), 1432–1445. https://doi.org/10.1177/0146167206292093

van Aert, R. C. M., & van Assen, M. A. L. M. (2021). Correcting for publication bias in a meta-analysis with the p-uniform* method. *MetaArXiv*. https://doi.org/10.31222/osf.io/zqjr9

Vevea, J. L., & Hedges, L. V. (1995). A general linear model for estimating effect size in the presence of publication bias. Psychometrika, 60, 419-435. https://doi.org/10.1007/BF02294384

Viira, R., & Raudsepp, L. (2000). Achievement goal orientations, beliefs about sport success and sport emotions as related to moderate to vigorous physical activity of adolescents. *Psychology & Health, 15*(5), 625–633. https://doi.org/10.1080/08870440008405475

Wang, C. K. J., & Biddle, S. J. H. (2001). Young people's motivational profiles in physical activity: a cluster analysis. *Journal of Sport and Exercise Psychology, 23*(1), 1–22. https://doi.org/10.1123/jsep.23.1.1

Wang, C. K., Biddle, S. J. H., & Elliot, A. J. (2007). The 2×2 achievement goal framework in a physical education context. *Psychology of Sport and Exercise, 8*(2), 147–168. https://doi.org/10.1016/j.psychsport.2005.08.012

Weiner, B. (1990). *Human motivation*. Erlbaum.

Wilson, S. J., Polanin, J. R., & Lipsey, M. W. (2016). Fitting meta-analytic structural equation models with complex datasets. *Research Synthesis Methods*, *7*(2), 121. https://doi.org/10.1002/jrsm.1199

White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review, 66*, 297-333. https://doi.org/10.1037/h0040934

Xiang, P., Bruene, A., & McBride, R. E. (2004). Using achievement goal theory to assess an elementary physical education running program. *The Journal of school health, 74*(6), 220–225. https://doi.org/10.1111/j.1746-1561.2004.tb07936.x

Zanatta, T., Rottensteiner, C., Konttinen, N., & Lochbaum, M. (2018). Individual motivations, motivational climate, enjoyment, and physical competence perceptions in finnish team sport athletes: A prospective and retrospective study. *Sports, 6*(4), 165.

Table 1. Parameter Estimates for Full Model.

Effect	No imputation						Behavior correlations imputed					
	Unadjusted model			Covariate-adjusted model[a]			Unadjusted model			Covariate-adjusted model[a]		
	β	95% CI		β	95% CI		β	95% CI		β	95% CI	
		LL	UL		LL	UL		LL	UL		LL	UL
Direct effects												
ER→Beh	-.016	-.363	.330	-.010	-.361	.341	-.057	-.303	.190	-.054	-.302	.195
Id→Beh	.326	-.120	.772	.343	-.113	.799	.313	-.007	.633	.323	-.003	.649
Ij→Beh	.072	-.336	.480	.076	-.341	.494	.068	-.221	.357	.071	-.222	.365
IM→Beh	.010	-.298	.317	.003	-.312	.318	.053	-.191	.297	.049	-.200	.298
Map→ER	-.074	-.158	.011	-.070	-.155	.016	-.074	-.158	.010	-.070	-.156	.015
Mav→ER	.085	-.076	.247	.088	-.076	.253	.086	-.075	.247	.089	-.074	.252
Pap→ER	.149**	.062	.236	.154**	.065	.243	.148**	.061	.234	.152**	.064	.240
Pav→ER	.122	-.006	.249	.125	-.005	.256	.121	-.006	.249	.125	-.005	.254
Map→Id	.393***	.308	.479	.401***	.314	.488	.394***	.309	.479	.400***	.314	.487
Mav→Id	-.021	-.185	.142	-.022	-.189	.145	-.021	-.185	.142	-.022	-.188	.145
Pap→Id	.062	-.026	.149	.064	-.025	.153	.060	-.026	.147	.062	-.026	.151
Pav→Id	.140*	.010	.270	.144*	.011	.277	.142*	.011	.272	.145*	.012	.278
Map→Ij	.129**	.044	.215	.134**	.047	.221	.129**	.044	.215	.133**	.046	.220
Mav→Ij	.064	-.098	.226	.065	-.100	.230	.064	-.097	.226	.065	-.099	.230
Pap→Ij	.118**	.030	.205	.120**	.031	.209	.117**	.030	.204	.120**	.031	.208
Pav→Ij	.243***	.115	.370	.247***	.117	.378	.243***	.116	.370	.247***	.118	.377
Map→IM	.480***	.419	.541	.489***	.427	.551	.481***	.420	.541	.488***	.426	.549
Mav→IM	-.059	-.175	.058	-.060	-.180	.059	-.059	-.175	.058	-.060	-.179	.059
Pap→IM	.081*	.018	.145	.085*	.021	.150	.082*	.019	.145	.085*	.021	.150
Pav→IM	-.040	-.134	.054	-.038	-.135	.058	-.040	-.134	.054	-.039	-.135	.057
Indirect effects												
Map→IM→Beh	.005	-.143	.152	.001	-.153	.155	.026	-.092	.143	.024	-.097	.145
Mav→IM→Beh	-.001	-.019	.018	.000	-.019	.019	-.003	-.019	.013	-.003	-.019	.013
Pap→IM→Beh	.001	-.024	.026	.000	-.027	.027	.004	-.016	.025	.004	-.017	.026
Pav→IM→Beh	.000	-.013	.012	.000	-.012	.012	-.002	-.013	.009	-.002	-.013	.009
Map→Id→Beh	.128	-.049	.306	.138	-.048	.323	.123	-.006	.252	.129	-.005	.263
Mav→Id→Beh	-.007	-.062	.048	-.008	-.066	.051	-.007	-.058	.045	-.007	-.061	.047
Pap→Id→Beh	.020	-.022	.062	.022	-.023	.067	.019	-.016	.053	.020	-.016	.056
Pav→Id→Beh	.046	-.030	.121	.049	-.031	.129	.044	-.017	.106	.047	-.017	.111
Map→Ij→Beh	.009	-.044	.062	.010	-.046	.066	.009	-.029	.047	.009	-.030	.049

Mav→Ij→Beh	.005	-.024	.033	.005	-.025	.034	.004	-.017	.026	.005	-.018	.027
Pap→Ij→Beh	.008	-.041	.057	.009	-.042	.061	.008	-.027	.043	.009	-.028	.045
Pav→Ij→Beh	.017	-.082	.117	.019	-.085	.123	.017	-.054	.087	.018	-.056	.091
Map→ER→Beh	.001	-.024	.027	.001	-.024	.025	.004	-.015	.023	.004	-.014	.022
Mav→ER→Beh	-.001	-.031	.028	-.001	-.032	.030	-.005	-.028	.018	-.005	-.029	.019
Pap→ER→Beh	-.002	-.054	.049	-.002	-.056	.052	-.008	-.045	.028	-.008	-.046	.030
Pav→ER→Beh	-.002	-.044	.040	-.001	-.045	.043	-.007	-.038	.024	-.007	-.038	.025
Sums of indirect effects												
Map/Mav→IM/Id→Beh[b]	.125*	.011	.240	.131*	.013	.249	.139**	.048	.230	.143**	.051	.236
Pap/Pav→ER/Ij→Beh[b]	.021	-.088	.131	.025	-.087	.138	.009	-.072	.091	.011	-.072	.095
Correlations												
Id↔ER	.070*	.006	.134	.073*	.009	.137	.070*	.007	.134	.072*	.009	.136
Ij↔ER	.285***	.219	.350	.287***	.222	.352	.285***	.220	.350	.287***	.222	.352
IM↔ER	.029	-.030	.089	.034	-.025	.094	.029	-.030	.088	.033	-.026	.093
IM↔Id	.349***	.293	.406	.351***	.294	.407	.349***	.293	.405	.350***	.294	.407
Id↔Ij	.277***	.210	.344	.277***	.210	.344	.277***	.210	.343	.277***	.210	.343
IM↔Ij	.228***	.169	.287	.231***	.171	.290	.228***	.168	.287	.230***	.171	.289
Map↔Mav	.408***	.329	.486	.418***	.339	.496	.408***	.330	.486	.416***	.338	.494
Map↔Pap	.233***	.187	.278	.242***	.197	.287	.233***	.188	.278	.241***	.196	.285
Mav↔Pap	.320***	.239	.401	.330***	.249	.410	.320***	.240	.400	.328***	.248	.408
Map↔Pav	.148***	.087	.209	.158***	.097	.219	.149***	.088	.209	.157***	.096	.217
Mav↔Pav	.429***	.348	.510	.439***	.359	.520	.429***	.349	.510	.438***	.357	.518
Pap↔Pav	.506***	.441	.572	.516***	.451	.581	.507***	.442	.572	.515***	.450	.579

Note. None of the parameter estimates were statistically significantly different ($p < .05$) across models using Schenker and Gentleman's (Schenker, N., & Gentleman, J. F. (2001). On judging the significance of differences by examining the overlap between confidence intervals. *The American Statistician, 55*(3), 182-186. https://doi.org/10.1198/000313001317097960) 'standard method' based on confidence intervals. [a]Model parameters were adjusted for the following covariates: age, sex, sample type (student vs. non-student), study design, and study quality. [b]Sum of indirect effects of mastery goal constructs (approach and avoidance) on behavior through autonomous motivation forms (intrinsic motivation and identified regulation). [c]Sum of indirect effects of performance goal constructs (approach and avoidance) on behavior through controlled motivation forms (external regulation and introjected regulation). β = Standardized parameter estimate; 95% CI = 95% confidence interval of parameter estimate; LL = Lower limit of 95% CI; ER = External regulation; Id = Identified regulation; Ij = Introjected regulation; IM = Intrinsic motivation; Map = Mastery-approach goal orientation; Mav = Mastery-avoidance goal orientation; Pap = Performance- approach goal orientation; Pav = Performance-avoidance goal orientation; Beh = Behavior. $^{***}p < .001$ $^{**}p < .01$ $^{*}p <$

Table 2. Parameter Estimates for Truncated Model.

Effect	No imputation						Behavior correlations imputed					
	Unadjusted model			Covariate-adjusted model[a]			Unadjusted model			Covariate-adjusted model[a]		
	β	95% CI		β	95% CI		β	95% CI		β	95% CI	
		LL	UL		LL	UL		LL	UL		LL	UL
Direct effects												
Mastery→Aut Mot	.413***	.375	.450	.411***	.374	.449	.413***	.376	.451	.411***	.374	.448
Perform→Aut Mot	.053**	.019	.087	.053**	.019	.087	.054**	.020	.088	.053**	.019	.087
Aut Mot→Beh	.126	-.027	.278	.123	-.029	.275	.177**	.052	.302	.174**	.049	.298
Con Mot→Beh	.056	-.125	.237	.055	-.126	.236	.004	-.136	.145	.003	-.137	.143
Mastery→Con Mot	.078**	.034	.122	.078***	.034	.122	.078***	.034	.122	.078***	.034	.121
Perform→Con Mot	.256***	.212	.300	.254***	.211	.298	.256***	.212	.299	.253***	.210	.297
Indirect effects												
Mastery→Aut Mot→Beh	.052	-.012	.115	.051	-.013	.114	.073**	.020	.126	.071**	.019	.124
Perform→Aut Mot→Beh	.007	-.003	.016	.007	-.003	.016	.010*	.000	.019	.009	.000	.018
Mastery→Con Mot→Beh	.004	-.010	.019	.004	-.010	.019	.000	-.011	.011	.000	-.011	.011
Perform→Con Mot→Beh	.014	-.032	.061	.014	-.032	.060	.001	-.035	.037	.001	-.035	.036
Sums of indirect effects												
Mastery→Aut/Con Mot→Beh[b]	.056	-.004	.117	.055	-.005	.115	.074**	.023	.124	.072**	.021	.122
Perform→Aut/Con Mot→Beh[c]	.021	-.024	.066	.021	-.024	.065	.011	-.025	.046	.010	-.025	.045
Correlations												
Aut Mot↔Con Mot	.172***	.135	.210	.172***	.134	.209	.172***	.135	.210	.171***	.134	.208
Mastery↔Perform	.256***	.214	.298	.254***	.212	.296	.257***	.215	.299	.253***	.211	.295

Note. None of the parameter estimates were statistically significantly different ($p < .05$) across models using Schenker and Gentleman's (Schenker, N., & Gentleman, J. F. (2001). On judging the significance of differences by examining the overlap between confidence intervals. The American Statistician, 55(3), 182-186. https://doi.org/10.1198/000313001317097960) 'standard method' based on confidence intervals. [a]Model parameters were adjusted for the following covariates: age, sex, sample type (student vs. non-student), study design, and study quality. [b]Sum of indirect effects of mastery goal on behavior through autonomous and controlled motivation. [c]Sum of indirect effects of performance goal on behavior through autonomous and controlled motivation. β = Standardized parameter estimate; 95% CI = 95% confidence interval of parameter estimate; LL = Lower limit of 95% CI; Mastery = Mastery goal orientation; Perform = Performance goal orientation; Aut Mot = Autonomous motivation; Con Mot = Controlled motivation; Beh = Behavior. $^{***}p < .001$ $^{**}p < .01$ $^{*}p < .05$

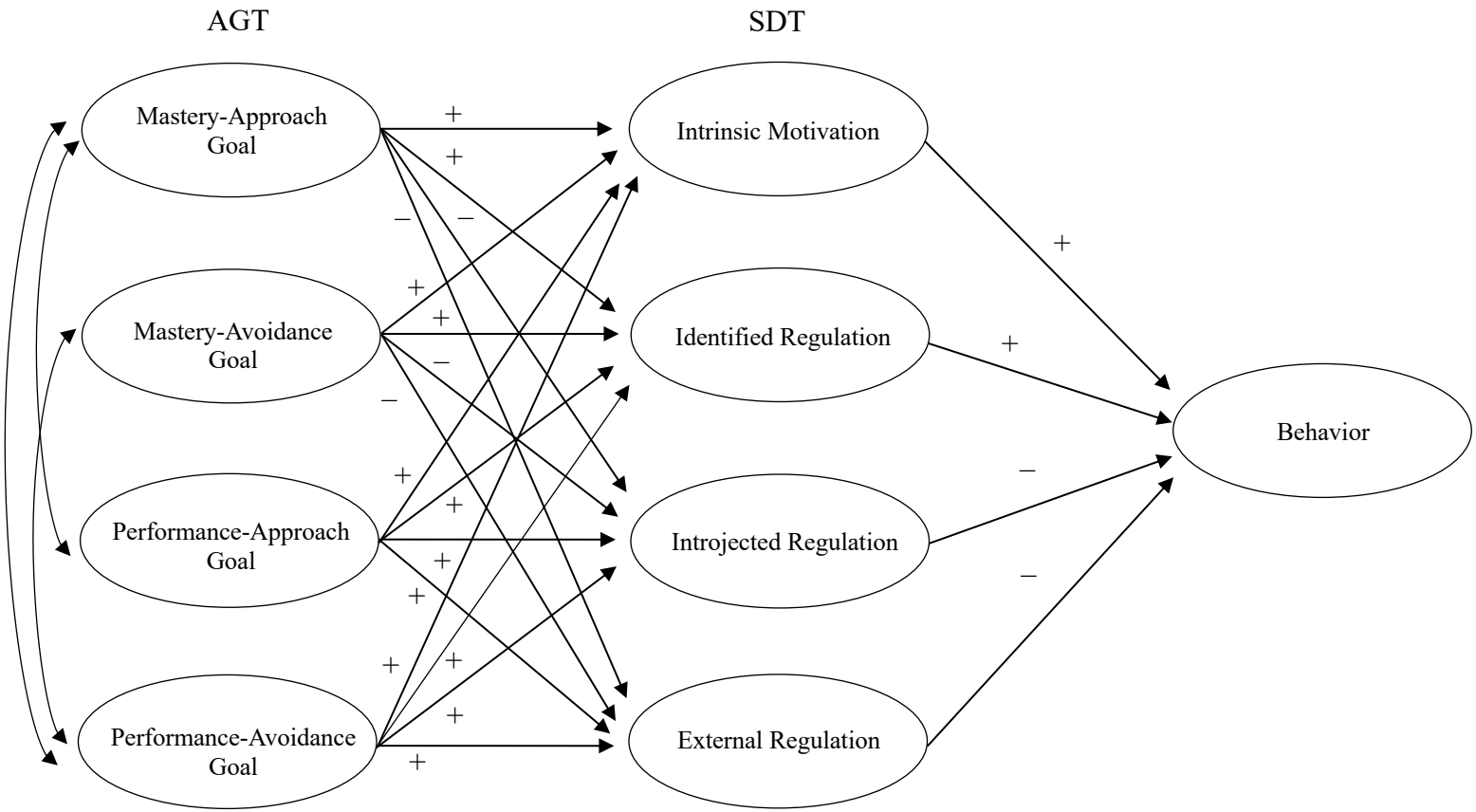

Figure 1. Hypothesized Multilevel Structural Pathways for the Full AGT-SDT Integrated Model.

Note. Proposed process model summarizing effects of achievement goal orientation constructs from achievement goal theory on behavior mediated by forms of motivation from self-determination theory. The sign denotes the predicted direction of each effect. Correlations among the endogenous latent variables for the SDT constructs are omitted for clarity.

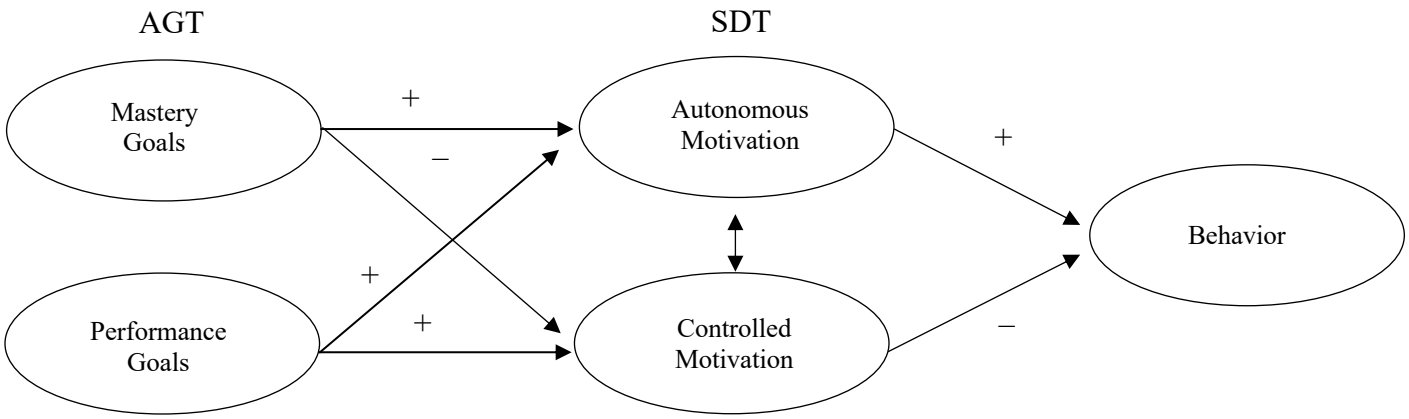

Figure 2. Hypothesized Multilevel Structural Pathways for the Truncated AGT-SDT Integrated Model.

Note: Truncated model outlining effects of goal orientation constructs from achievement goal theory on behavior mediated by aggregated motivational constructs from self-determination theory. The sign denotes the predicted direction of each effect.