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An Examination of the Integrative Relationship Among the Factors of Achievement Goal Theory and Self-Determination Theory: Addressing Existing Problems and Missing Links

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AN EXAMINATION OF THE INTEGRATIVE RELATIONSHIP AMONG THE FACTORS OF ACHIEVEMENT GOAL THEORY AND SELF-DETERMINATION THEORY: ADDRESSING EXISTING PROBLEMS AND MISSING LINKS

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ABSTRACT

For almost a decade researchers (Biddle, Soos, & Chatzisarantis, 1999; Wang & Biddle, 2007) have been advocating for studies that advance our understanding of the ways in which AGT and SDT are related in the exercise domain. Despite the fact that researchers have been stressing the importance of empirical tests of the convergence of the two theories, there has yet to be a satisfactory study in response to this demand. Further, existing studies that have attempted to even partially address the issue have been methodologically flawed (Biddle et al., 1999; Ntoumanis, 2001). The purpose of this study was to establish a conceptual model that consists of relating the dimensions of SDT and AGT to each other, and to test a model linking the two theories. A complete model of the relationships among the dimensions of the AGT and two subtheories of SDT (e.g., organismic integration theory and cognitive evaluation theory) was developed and tested using Structural Equation Modeling (SEM). Questionnaires developed based on the three theoretical explanations were completed online. The online survey was comprised of four measures: Perceptions of Success Questionnaire-Exercise (POSQ-E), Behavioral Regulation in Exercise Questionnaire: Intrinsic Motivation Subscale (BREQ), Exercise Motivation Scale (EMS), and Psychological Need Satisfaction in Exercise Scale (PNSE). Several structural models were tested to examine the integrative relationships among the theories. Results showed that, when compared with ego orientation, task orientation had a stronger influence on need satisfaction and internalized behavioral regulations. In addition, need satisfaction predicted behavioral regulations. Findings also suggested that both ego and task orientations not only influence behavioral regulations for exercise directly, but also indirectly through satisfaction of the needs for competence, autonomy, and relatedness.

CHAPTER 1
INTRODUCTION AND CURRENT STATE OF RESEARCH

Motivation is one of the most well-researched constructs in sport and exercise psychology (Roberts, 2001). Most of the research in exercise psychology focuses on initiating and maintaining exercise behavior. In other words, the concern is on what motivates an individual to begin exercise or to adhere to an exercise program. In addition, the continually decreasing physical activity habits and accompanying health problems make the need for understanding exercise motivation even more evident (Buckworth & Dishman, 2007).

There have been several attempts to develop new theories and apply existing theories of motivation to the exercise domain, however, according to Roberts (2001), two of the most widely researched theories of motivation are Self-Determination Theory (SDT, Deci & Ryan, 1985) and Achievement Goal Theory (AGT, Nicholls, 1989). There have been several attempts to apply the two theories to many domains, such as education and sport and exercise. Both of these theories are aimed at explaining human motivation based on the interaction between the individual and his/her environment. AGT focuses on the individual's perception of success as a reflection of his/her conception of ability. It is one's perception of success that drives the individual to engage in an activity (Nicholls, 1989). Several theorists have developed explanations of achievement goals (e.g., Ames, 1984; Dweck, 1986) however, Nicholls' conceptualizations are most applied to the area of physical activity, and will therefore be the focus of the current study. In turn, SDT proposes that the satisfaction of basic psychological needs determines the individual's reason for engaging in a behavior (Deci & Ryan, 2002). There are two relevant sub-theories of SDT: Cognitive Evaluation Theory (CET; Deci & Ryan, 1985), and Organismic Integration Theory (OIT; Deci & Ryan, 1985; Ryan & Connell, 1989). CET aims at describing certain social-contextual factors (competence, autonomy, and relatedness) that influence intrinsic motivation. OIT details various forms of extrinsic motivation, and posits that motivation exists as a continuum along which different types of behavioral regulations are located.

While AGT is a social-cognitive theory and SDT is a needs based theory with a social component, there are several areas in which the two theories appear to be related. Theoretically, satisfaction of the needs for autonomy, competence, and relatedness are suggested to be

associated with task orientation. Further, task orientation has been shown to be related to more self-determined forms of regulation (e.g., intrinsic motivation and identified regulation) whereas ego orientation has been shown to be related to less self-determined forms of regulation (e.g., external and introjected regulation). Built into SDT is the postulation that satisfaction of the needs for autonomy, competence, and relatedness facilitate more self-determined forms of regulation, specifically, intrinsic motivation (Deci & Ryan, 2002).

For almost a decade researchers have been advocating for studies that advance our understanding of the ways in which AGT and SDT are related in the exercise domain. For example, Biddle Soos, and Chatzisarantis (1999) stressed the importance of exploring the assimilation of SDT and goal orientations in order to "expand the research base in health and exercise psychology" (p. 85). Ntoumanis (2001) called for research that took a more complete integrative approach to the links between SDT and AGT that includes previously omitted constructs, such as perceived autonomy and relatedness. Most recently, Wand and Biddle (2007) endorsed the importance of a "holistic" understanding of the interactions among the constructs of SDT and AGT; specifically pointing out the need for an investigation of causal links between the constructs of the two theories.

Even with the existing demand for empirical evidence spanning across the last decade and theoretical explanations for the links among the constructs of AGT, CET, and OIT, little empirical research has actually been conducted. Further, those studies investigating the relationships among certain constructs have been methodologically flawed (e.g., using measures with poor reliability or leaving out relevant subscales; Standage, Duda, & Ntoumanis, 2003). Even with existing research there is still a considerable gap in the literature. For example, there has been little or no research on the direct relationship between CET factors (autonomy, competence, and relatedness) and goal orientation. Further, while there have been studies that have looked at the relationship among certain constructs of AGT, CET, and OIT, to the author's knowledge, there has yet to be a complete study that examines the relationship among all of the constructs.

In sum, there are a number of reasons that justify the need for examining the relationships among the constructs of CET, OIT, and AGT in the exercise domain, and its important contribution to the existing body of literature. While the theoretical explanation for why and how the constructs of the two theories should be related has been ascertained, it is

essential that empirical evidence must also support the links. Despite the fact that researchers have been stressing the importance of an empirical test of the convergence of the two theories for almost a decade now, there has yet to be a satisfactory study in response to this demand. Further, existing studies that have attempted to even partially address the issue have been methodologically flawed.

In addition to the contributions to the existing literature, enhanced knowledge of the nature of the relationships among the constructs of SDT and AGT can facilitate a more thorough understanding of the processes of exercise motivation (Ntoumanis, 2001). Specifically, insight into the converging nature of the constructs will shed light on the ways in which satisfaction of psychological needs and goal orientation may foster, or undermine, self-determined regulations for exercise. As stated in Rawsthorne and Elliot (1999), understanding the ways in which the two theories work together is "an issue of great applied importance in that it has direct implications for educational, occupational, and sport settings" (p.326). Furthermore, researchers have pointed to the possible implications of an integrating study for enhancing the success of exercise interventions (Standage et al., 2003;Wang & Biddle, 2007)

The purpose of this study is to (a) establish a conceptual model that consists of relating the dimensions of SDT and AGT to each other, and (b) to test a model linking the two theories. To do so, a brief review of the assumptions and theoretical frameworks of SDT and AGT are introduced, followed by emphasizing the theoretical dimensions which are inter-related and establish a model that will be tested.

CHAPTER 2
LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

The following section is a review of the two major theories (SDT and AGT) used to explain motivation in the exercise domain. A description of the theory's background and the assumptions of each theory are discussed. Also, a discussion of the theoretical links between the two theories is presented.

Self-Determination Theory (SDT)

Self-determination Theory (SDT; Ryan & Deci, 2000b) takes a dialectical approach to human motivation. It provides an explanation for human motivation through the interaction among humans' innate tendencies toward psychological integration and specific aspects of the environment. At the base of SDT is the assumption that humans possess an innate tendency to grow towards an integrated sense of self. It is this integration of the cognitive structures of the self, and with the cognitive structures of others that is essential for healthy social development and psychological well-being.

Integration into a coherent sense of self is only actualized when the social-contextual environment satisfies three inherent psychological needs: *competence, autonomy,* and *relatedness*. If the three psychological needs are not met, then growth is stunted and degraded; if met, proliferation occurs similarly to physiological needs. The need for competence refers to the necessity to experience oneself as proficient and efficacious in interactions with the social and physical environment (Deci, 1975). The need for competence drives individuals to pursue challenging activities that facilitate that proficiency, and provide opportunities to express one's capabilities (Deci & Ryan, 2002). Autonomy refers to the belief that one is the origin of his or her actions (Deci & Ryan, 1985). Autonomy is not expunged in the presence of external influences. If the individual accepts the externally imposed influence, feelings of value can be assimilated into oneself (Deci & Ryan, 2002). The need for relatedness refers to the need to be connected to a secure community, or group, and to be a cared for and valued member of that group (Baumeister & Leary, 1995).

Basic Components of SDT

Over the past few decades, SDT has grown to include several sub-theories. These sub-theories share the same underlying organismic assumptions and foundation of basic psychological needs. Each sub-theory represents one component of SDT and therefore, when combined, these components form the SDT framework. The four sub-theories that comprise SDT are: *Organismic Integration Theory, Cognitive Evaluation Theory, Causality Orientations Theory*, and *Basic Needs Theory.* The goals of the current paper are best described by the constructs of the *Organismic Integration Theory* and *Cognitive Evaluation Theory*; and therefore, the *Causality Orientations Theory* and *Basic Needs Theory* are omitted.

Organismic Integration Theory

Organismic Integration Theory (OIT, Deci & Ryan, 1985; Ryan & Connell, 1989) details various forms of extrinsic motivation, and posits that motivation exists as a continuum along which different types of behavioral regulations are located. In OIT, motivation ranges along the continuum from amotivation to intrinsic motivation, with each sub-type of motivation being progressively more internalized. In SDT, internalization is viewed "as the process of transforming external regulations into internal regulations and, when the process functions optimally, integrating those regulations into one's sense of self" (Deci, Eghrari, Patrick, & Leone, 1994, p. 120). Perceived self-determination (or autonomous self-regulation) increases along the continuum with intrinsic regulation reflecting the greatest perceived autonomy. There are six distinct types of behavioral regulation along the self-determination theory continuum. At the far left of the continuum is amotivation, which exists when there is no intention to engage in the behavior. The behavior is often not valued and/or the individual has low perceived competence for the task. There are four types of extrinsic motivation, each one increasingly more internalized although still driven towards some instrumental outcome. *External regulation* is the least autonomous or most controlling form of regulation, and occurs when behavior is controlled by external demands, rewards or punishment. In this case, internalization of the behavior is virtually non-existent. Next is *introjected regulation*, which occurs when internal pressures, such as avoiding guilt or attaining ego-enhancing pride direct behavior. Introjected regulations are partially internalized; the reasons for the behavior are not accepted as one's own, but they do come from within the individual. Further along the continuum is *identified regulation*, which takes place when the individual takes on the regulation as his or her own through identifying

with the personal importance of the task. Identified regulation is more internalized as it indicates that the individual has identified the value of the task. *Integrated regulation* occurs when a person engages in a behavior because it has been fully incorporated into the self. Integration transpires when an individual begins to assimilate regulations with his or her other values and needs. Even though integrated regulation is highly autonomous, it is still considered extrinsic because the behavior is driven by some instrumental value associated with an outcome separate from engaging in the behavior itself (Ryan & Deci, 2000a, b). Finally, the most autonomous form of regulation is *intrinsic motivation*. Individuals who are intrinsically motivated tend to engage in activities due to interest, enjoyment, or the challenge of the activity. Aspects inherent to the activity itself, not external factors, drive intrinsically motivated behavior(Ryan & Deci, 2000a, b).

Cognitive Evaluation Theory

Cognitive Evaluation Theory (CET; Deci & Ryan, 1985) aims at describing certain social-contextual factors that influence intrinsic motivation. Specifically, the focus of CET is on environmental satisfaction of the needs for competence, autonomy, and relatedness (Deci & Ryan, 2002). Satisfaction of these three psychological needs is suggested to facilitate intrinsic motivation, the most self-determined form of behavioral regulation. Intrinsic motivation refers to carrying out an activity because the activity itself is inherently satisfying, enjoyable, and challenging (Ryan & Deci, 2000a, b). Intrinsically motivated behavior is completely self-determined as it is a result of pure choice via interest and enjoyment of the activity (Deci & Ryan, 2002).

Achievement Goal Theory (AGT)

Achievement goal theory resulted from collaborative efforts of several researchers in educational psychology (e.g. Ames, 1984; Maehr & Nicholls, 1980; Nicholls, 1989). The theory posits that understanding an individual's motivation requires knowledge of the individual's achievement behavior and goals. Specifically, one should know what the achievement behavior represents for the individual; this is expressed by the achievement goals one chooses to implement. It is argued that the achievement goal determines the amount of personal resources (time, effort, etc) an individual invests to accomplish a task (Roberts, Treasure, & Conroy, 2006). Several definitions of achievement goals were introduced, but Nicholls' (1984) is

considered as the most prominent conceptualization in the physical activity literature (Roberts et al., 2006), and therefore, will be the focus of this section.

Conceptions of Ability

Nicholls argued that an individual's achievement goals are driven by the desire to exhibit competence or to avoid appearing incompetent. However, since the term competence has several definitions, Nicholls proposed the use of the term *conception of ability* (Roberts, 2001). According to Nicholls (1989), there are at least two different conceptions of ability, undifferentiated and differentiated, that will subsequently guide achievement goals. The undifferentiated conception of ability is reflected when an individual does not distinguish ability from effort; either because they are cognitively unable to differentiate (often due to age) or because they choose not to differentiate. The individual associates an increase in effort with greater ability. Therefore, ability can be improved if there is sufficient effort put forth. Ability is judged based on task mastery and learning (Nicholls, 1989). High ability is demonstrated when a great amount of effort is exerted and task mastery is achieved (Nicholls, 1984, 1989). On the other hand, with a differentiated conception of ability, the individual distinguishes ability from effort (Nicholls, 1989). Ability and task difficulty are not judged based on task mastery, but rather on comparison with a normative reference group. Further, ability is viewed as high especially if the individual is perceived as exerting an equal or lesser amount of effort than those in the reference group (Nicholls, 1978). The degree to which effort can improve performance is limited by one's ability. Therefore, with a differentiated conception of ability, ability is thought of as current capacity (Nicholls, 1989). It is the individual's conception of ability that dictates which achievement goals are adopted (Nicholls, 1984, 1989).

Criteria for Judgments

One's conception of ability determines the reference point used in the evaluation of success and failure as well as in the determination of the individual's goal orientation. According to Nicholls (1984; 1989), an individual with an undifferentiated conception of ability reflects task orientation and ability is self-referenced, and is based on intrapersonal comparisons of mastery or improvement. The achievement goals of the task oriented individual focus on learning, improving, and mastering a skill (Nicholls, 1989). Therefore, success is achieved when a skill has been mastered or learning has occurred.

An individual with a differentiated conception of ability reflects an ego orientation. When an individual is ego oriented, the main driving goal is to exhibit higher ability than individuals in a normative reference group (Nicholls, 1989). Therefore, success is achieved when greater relative ability is exhibited. Further, greater success is achieved and higher ability is demonstrated when an individual outperforms others while exerting equal or lesser effort than those in the normative reference group (Nicholls, 1984, 1989). Ability is other-referenced because success is based on interpersonal performance comparisons with a normative reference group (Nicholls, 1989). However, since judgments about ability are solely based on success over others, it is possible that an individual can master a task and still not display high ability in reference to the normative group (Nicholls, 1989).

Theoretical Links and Empirical Evidence

SDT and AGT are both theories of motivation that have social components. There are a number of ways in which the theories are suggested to intertwine. The following section provides theoretical explanation and empirical evidence for the links among the theories.

CET and OIT

Early studies examining the effects of extrinsic reward on intrinsic motivation revealed that tangible rewards (i.e., money, awards) had a detrimental effect on intrinsic motivation when it was necessary to partake in the activity to receive the reward and the reward was perceived as controlling (Deci & Ryan, 2002, Ryan & Deci, 2000b). There has been a considerable amount of controversy over the evidence that extrinsic rewards can undermine intrinsic motivation. However, a 128-study meta-analysis (Deci, Koestner, & Ryan, 1999) reconfirmed that expected tangible rewards are antagonistic toward intrinsic motivation; however, verbal rewards can facilitate intrinsic motivation. Thus, CET posits that environmental events, such as feedback and verbal rewards, that promote feelings of competence during a behavior facilitate intrinsic motivation for that behavior (Ryan & Deci, 2000b). Vallerand and Reid (1984) examined the mediating role of perceived competence in the relationship between verbal feedback and intrinsic motivation. Path analysis revealed that perceived competence did act as a significant mediator between verbal feedback and intrinsic motivation. Further, Goudas and Biddle (1994) examined the relationship between the subscales of the Intrinsic Motivation Inventory (IMI, Ryan, 1982) in elementary aged physical education students. Results of a regression analysis indicated that

perceived competence was a significant predictor of interest and enjoyment, indicating a relationship between competence and intrinsic motivation.

Although evidence for the effects of perceived competence on intrinsic motivation is prevalent, CET posits that the need for autonomy (or in attributional terms, an internal perceived locus of causality; I-PLOC) must be satisfied for the effects of competence to be realized (DeCharms, 1968). The individual must perceive the origin of behavior to come from within one's self (I-PLOC) as opposed to from an external source (i.e., external perceived locus of causality; E-PLOC) (Deci & Ryan, 2000). Viewing oneself as the source of behavior allows one to feel more control and therefore more self-determined in his/her regulations. Behaviors resulting from an I-PLOC are viewed as being within the control of the individual, or autonomous. Research in a number of domains has shown that perceived autonomy can facilitate self-determined motivation. For example, Black and Deci (2000) found that greater relative autonomy was positively related to interest/enjoyment for learning in the classroom.

While the majority of research focuses on the effects of perceived competence and autonomy on intrinsic motivation, perceived relatedness is also a contributing factor to intrinsic motivation. While perceived relatedness is not the most salient component of CET, satisfaction of all three needs is necessary for integration and growth. Evidence originally emerged from the unanticipated results of research conducted on infants. In infants, intrinsic motivation is observable via observation of exploration. Anderson, Manoogian, and Reznick (1976) found that while working on an interesting task, children expressed low levels of intrinsic motivation when the adult present did not respond to solicited interaction from the child. Additional research on attachment has shown that security is associated with exploratory behaviors in infants (Frodi, Bridges, & Grolnick, 1985). Further evidence was provided by studies conducted by Ryan and Grolnick (1986) and Ryan, Stiller, and Lynch (1994), which suggested that students express more intrinsic motivation when their teachers were warm and caring.

Deci and Ryan (2000) maintained that "the need for relatedness plays a more distal role in the promotion of intrinsic motivation than do competence and autonomy" (Deci & Ryan, 2002, pp. 14). Satisfaction of the need for relatedness appears to be less essential for the facilitation of intrinsic motivation compared to competence and autonomy because its saliency is largely determined by the nature of the activity. For example, intrinsic motivation for some activities that are solitary in nature can be sustained without feelings of connectedness with other

individuals engaged in the activity. However, intrinsic motivation for many activities that are interpersonal in nature will only transpire in an environment that satisfies the need for relatedness (Deci & Ryan, 2002).

CET and AGT

For the task oriented individual, perceptions of competence are solely based on self-referenced aspects such as improvement or learning. Hence, the task oriented individual has control over perceptions of competence, and is more likely to have the need for competence satisfied. The ego oriented individual's success is other referenced. In order for the ego oriented individual to have positive perceptions of competence, the individual must have a high perception of ability to engage in the task in the first place (Nicholls, 1989). If the individual chooses to engage in the task, he/she must then outperform their opponent while exerting equal or lesser effort in order to perceive themselves as competent (Nicholls, 1989). Therefore, the ego oriented individual must often rely on the incompetence of others, and has less control over perceptions of competence (Duda, 1992). As a result, task orientation is more likely to satisfy the need for competence than ego orientation (Ntoumanis, 2001).

The focus of an ego oriented individual is on the outcome of the activity, not on aspects of the activity itself (i.e., learning) (Nicholls, 1989). Task outcomes, such as social appraisal and outperforming others control the individual, and no satisfaction is gained from inherent aspects of the activity or the process of task mastery. Therefore, the ego oriented individual possess controlling, or less self-determined, forms of extrinsic motivation (Ntoumanis, 2001). On the other hand, task oriented individuals are focused on inherent aspects of the activity, and not on controlling outcomes. Therefore, task orientation is more likely to satisfy the need for autonomy. There have been several studies that demonstrated the relationship between goal orientation and autonomous forms of regulation (e.g., Biddle et al., 1999; Biddle & Wang, 2003; Wang & Biddle, 2001), however; to the author's knowledge, there have been no studies directly assessing the association between satisfaction of the need for autonomy and goal orientation.

To date, there is no known empirical evidence for the direct relationship between relatedness need satisfaction and task or ego orientation. However, it logically follows that task orientation is less likely to impede the need for relatedness since there is little to no normative comparison to retard social links with others. On the other hand, ego oriented individual's

constant comparison and rivalry with others could possibly undermine advances in social relationships (Ntoumanis, 2001).

OIT and AGT

Since task orientation is more likely to satisfy the needs of autonomy, competence, and possibly relatedness, it follows that task oriented individuals should experience more self-determined forms of regulation than those who are ego oriented. There is a great amount of empirical evidence that illustrates the relationship between task and ego orientation and self-determined forms of regulation. At least two early studies found that task oriented participants showed more intrinsic motivation for working on puzzles compared to ego oriented participants (Koestner, Zuckerman, & Koestner, 1987; Ryan, 1982). Results of a meta-analysis of 30 studies indicated that, overall, mastery goals (task orientation) were significantly related to more interest and enjoyment than were performance goals (ego orientation) (Rawsthorne & Elliot, 1999). Also, results of studies using physical education students have shown that highly task oriented students have the highest levels of intrinsic motivation (Dorobantu & Biddle, 1997; Ferrer-Caja & Weiss, 2000; Vlachopoulos, Biddle, & Fox, 1996).

Empirical Evidence in Sport and Exercise

Standage, Duda, and Ntoumanis (2003) tested a model of contextual motivation in physical education. Participants completed questionnaires on motivational climate, perceived competence, relatedness, autonomy, and behavioral regulation for exercise. Structural equation modeling results revealed a significant positive relationship between satisfaction of competence, autonomy, and relatedness and self-determined regulations (intrinsic motivation and identified regulation), and a significant negative relationship with amotivation. Relatedness was significantly and positively related to introjected regulation. However, the questionnaire used to assess behavioral regulation (Sport Motivation Scale, SMS,; Pelletier et al., 1995) did not include an integrated regulation subscale. The subscale intercorrelations of self-determined regulations are suggested to reflect a simplex-like pattern that suggest the existence of a continuum. In other words, when subscale intercorrelations are placed in a matrix, a simplex pattern is expressed when the largest correlations are on the main diagonal. Further, subscales closest to one another on the continuum will have larger positive correlations with one another than those subscales that are further way from each other (Ryan & Connell, 1989). The extrinsic regulation subscale of

the SMS was problematic in that it did not comply with the simplex pattern of correlations with the other subscales.

Wilson, Rodgers, Blanchard, and Gessell (2003) investigated the relationship between need satisfaction and behavioral regulation for exercise. Correlations revealed that competence need satisfaction was significantly related to intrinsic and identified regulation, and autonomy need satisfaction was significantly related to identified regulation, but relatedness need satisfaction was not. However, the sample size used in the study was small (N = 53), and the measure used to assess need satisfaction was a general measure intended to be applied to any activity. The authors suggested that the measure may not have been effectively representative of relatedness need satisfaction in the physical activity domain, and that future research is needed developing and using need satisfaction measures developed for the exercise domain.

Edmunds, Ntoumanis, and Duda (2006) investigated the relationship between need satisfaction (competence, autonomy, relatedness) and behavioral regulations for exercise. Correlations showed that satisfaction of the three needs were positively related to intrinsic motivation and identified regulation, and negatively related to extrinsic regulation. Hierarchical regression analysis revealed that competence need satisfaction significantly predicted intrinsic motivation but autonomy and relatedness need satisfaction did not. However, there were limitations to the measures used in the study. The measure used for behavioral regulation did not include an integrated regulation subscale. Also, the coefficient alphas of the autonomy and competence subscale were weak (both .65). This may have been due to the fact that the measure was developed for use in the work setting.

Cluster analyses conducted by Wang and Biddle (2001) and Biddle and Wang (2003) examined the motivational profiles of physical activity in adolescents. In both studies, participants completed the Task and Ego Orientation Questionnaire (TEOSQ, Duda & Whitehead, 1998), the English version of the Conceptions of the Nature of Athletic Ability Questionnaire Version 2 (CNAAQ0-2, Wang & Biddle, 2001), the Perceived Locus of Causality Scale (Goudas & Biddle, 1994), the amotivation subscale of the Academic Motivation Scale (Vallerand, et al 1992, 1993), and the Sport Competence and Physical Self-Worth items from the children's version of the Physical Self-Perception Profile (PSPP-C, Fox & Corbin, 1989). Results of both studies revealed that those in the high motivation cluster had the highest task orientation scores, highest scores on perceived competence, and more self-determined

regulations for exercise. However, both studies used a relative autonomy index (RAI) to make statements about behavioral regulations. Therefore, it is unclear as to where one would fall on the continuum of behavioral regulation proposed by Deci and Ryan (2002). According to Wilson, Blanchard, Gratten, Nehl, and Baker (2007) using the combined score of the RAI results in a significant loss of pertinent information. The authors were only able to distinguish between more and less self-determined regulation, and therefore, limit the knowledge gained about the relationship between goal orientations and various forms of exercise regulations.

Biddle, Soos, and Chatzisarantis (1999) examined goal orientation and behavioral regulation for exercise as predictors of exercise intentions. Participants completed the TEOSQ, Sport Competence items from the PSPP-C, and a modified version of the Self-Regulation Scale (Ryan & Connell, 1989). Results indicated that task orientation was significantly and positively related to intrinsic motivation and identified regulation. Also, ego orientation was significantly and positively related to external regulation and amotivation in children. Results showed no difference in the correlations between competence and task orientation, and competence and ego orientation, indicating that perceived competence was equally related to the two types of goal orientations. However, the question format of the measure used to assess perceived competence (PSPP-C) was changed from the original alternative forced-choice format to a Likert scale format, and the internal consistencies of the modified subscale were not strong (.70 and .65). In addition, as previously discussed, satisfaction of the need for competence has the strongest effect on intrinsic motivation when accompanied by satisfaction of the need for autonomy. Biddle et al. did not directly assess satisfaction of the need for autonomy. Therefore, it is unclear if a lack of satisfaction of autonomy undermined the role of perceived competence. Finally, the scale used to assess behavioral regulations did not include an integrated subscale.

Ntoumanis (2001) conducted a study examining the relationship between SDT and AGT in sport. Participant completed measures of goal orientation, behavioral regulation, and perceived competence. Hierarchical regression results indicated that task orientation was a significant predictor of intrinsic motivation and identified regulation. Ego orientation was a significant predictor of introjected and extrinsic regulation. Finally, perceived competence was a significant predictor of intrinsic motivation as well as external regulation. The surprising relationship between perceived competence and external regulation may be explained by the use of the SMS. The same scale was used by Standage et al. (2003). Standage et al. found that the external

regulation subscale of the SMS did not follow the simplex pattern of associations with the other subscales. They suggested that after closer examination of the subscale, the items appeared to be assessing physical competence to others, which would explain the strong relationship with perceived competence subscale in Ntoumanis (2001). There were other limitations to the study as well. Ntoumanis (2001) not only failed to examine the role of the satisfaction of autonomy and relatedness needs, but the OIT measure did not include an integration subscale. Further, the study attempted to examine the mediating role of perceived competence as AGT suggests that the impact of perceived competence is dependent on the individual's goal orientation (Nicholls, 1989). Results of the interaction were non-significant. However, as SDT states, satisfaction of the need for competence will not be realized in the absence of satisfaction of the need for autonomy (Deci & Ryan, 2002). The participants may have not felt autonomous and therefore, the effects of satisfying the need for competence could have been stifled. While the study did further the understanding of the relationship among certain constructs of the theories, it hardly provided a complete picture.

Limitations of the Literature

Aside from the methodological limitations discussed in the studies described above, the body of literature on the relationship between AGT and SDT dimensions has a number of limitations. First, there is the lack of empirical evidence on the relationship among the satisfaction of competence, autonomy, and relatedness needs and goal orientation. While there are few empirical findings on competence and some theoretical basis for the influence of autonomy and relatedness, there has been little research conducted in this area. There is also very little empirical research on the link between autonomy and relatedness need satisfaction and self-determined forms of regulation. Finally, although there have been studies that have looked at the relationship among certain constructs of AGT, CET, and OIT, to the author's knowledge, there has yet to be a complete study that examines the relationship among all of the constructs of the theories.

Summary

In this review of literature, a need was established for examining the areas in which AGT and SDT are theoretically and empirically related. AGT and SDT are two of the most researched motivational theories applied to the exercise domain. There has been a considerable amount of

research and theoretical discussion on the relationship among AGT and SDT. Research has shown that satisfaction of the need for competence is related to task orientation (Goudas & Biddle, 1994; Ntoumanis, 2001). Also, several studies have demonstrated a strong relationship between task orientation and highly self-determined forms of regulation, and between ego orientation and less self-determined forms of regulation (i.e., Ntoumanis, 2001; Standage et al., 2003). While only a small number of studies have provided empirical evidence for the relationship (Edmunds et al., 2006; Standage et al., 2003; Wilson et al., 2003), theoretical links have been drawn between autonomy and task orientation, and between relatedness and task orientation. However, existing studies have been methodologically limited, and there are still substantial gaps in the body of empirical research examining the links between AGT and SDT. Further, there has been a consistent call for a complete test of the integration of the two theories that has yet to be answered. Therefore, there is a need to provide a methodologically sound and complete investigation of the relationships among all constructs of AGT, CET, and OIT.

Purpose and Hypotheses of the Present Study

While several studies in the exercise domain have attempted to investigate the relationship among SDT and AGT constructs, these studies are incomplete and methodologically limited. Therefore, this study was to address the previously identified limitations to the literature linking SDT and AGT. A complete model of the relationships among the dimensions was developed and tested using Structural Equation Modeling (SEM). Questionnaires developed based on the three theoretical explanations of exercise motivation (AGT, OIT, and CET) were completed online. The aim of this study was to test a number of structural models (Figures 5 - 9) detailing the relationships among the latent dimensions of the theories.

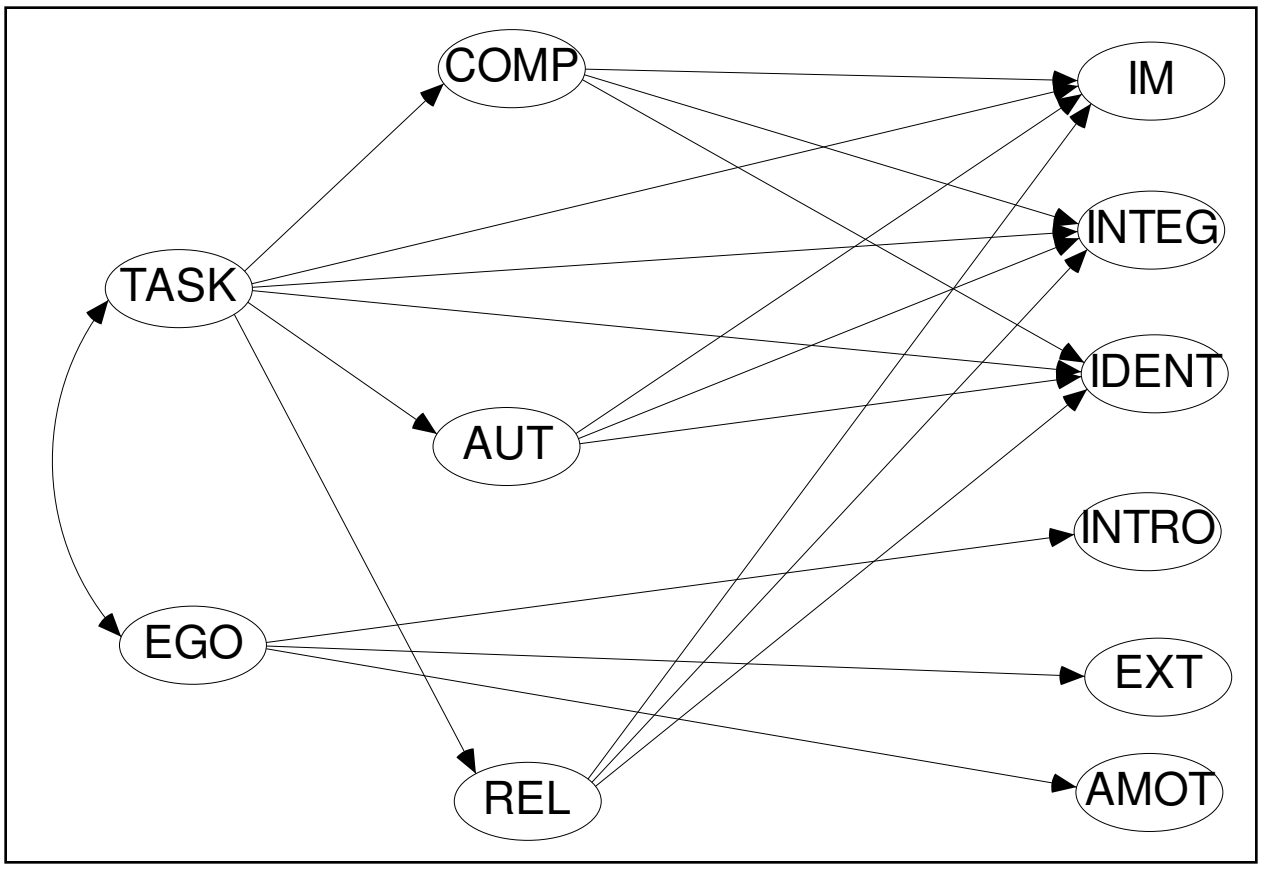

Figure 1: Hypothesized model

Note: TASK=Task Orientation, EGO=Ego Orientation, COMP=Competence Need Satisfaction, AUT =Autonomy Need Satisfaction, REL=Relatedness Need Satisfaction, IM=Intrinsic Motivation, INTEG=Integrated Regulation, IDENT=Identified Regulation, INTRO=Introjected Regulation, EXT=External Regulation, AMOT=Amotivation.

Based on theoretical explanation and empirical evidence, it was hypothesized that

a) There will be positive direct paths from task orientation to autonomy, competence, and relatedness need satisfaction.
b) There will be positive direct paths from task orientation to intrinsic motivation, integrated regulation, and identified regulation.
c) There will be positive indirect paths from task orientation to intrinsic motivation, integrated regulation, and identified regulation via autonomy, competence, and relatedness need satisfaction.

d) There will be positive direct paths from ego orientation to introjected regulation, external regulation, and amotivation.

CHAPTER 3
METHOD

Participants and Procedures

Participants were 1244 adults (66.2% female and 33.7% male) with a mean age of 26.4 (SD = 8.69). Participants were asked to indicate their current exercise behaviors. Results revealed that 76.8% of the participants were currently exercising at the time of the study, 12% were not currently exercising but were thinking about beginning to exercise, and 1.2% were not currently exercising and were not thinking about beginning to exercise. After institutional review board approval (Appendix H), an email requesting participation was sent to several instructors of graduate and undergraduate courses at a number of universities in the Southeastern United States (Appendix A). The course instructors were informed of the purpose of the study and asked to forward the link to an online survey to their students. Following completion of the survey, the participant and researcher received a confirmation email stating that the survey was completed.

Measures

Several questionnaires were administered to the participants: Demographic Information, Perceptions of Success Questionnaire-Exercise (POSQ-E), Behavioral Regulation in Exercise Questionnaire: Intrinsic Motivation Subscale (BREQ), Exercise Motivation Scale (EMS), and Psychological Need Satisfaction in Exercise Scale (PNSE).

Demographic Information Questionnaire (Appendix F). Participants were asked to indicate their age, gender, and current physical activity behavior.

Perceptions of Success Questionnaire-Exercise (POSQ-E; Zizzi, Keeler, & Watson, 2006, Appendix B). Zizzi et al. (2006) developed an exercise version of the 12-item POSQ (Roberts & Balague, 1991). Participants are asked to rate their agreement with the items beginning with the phrase, "I feel successful in sport when…" on a 5-point Likert-type scale with anchors ranging from *strongly agree* to *strongly disagree*. The POSQ-E includes a change in the response prompt to "When exercising, I feel most successful when…" Also, one stem was changed from "I beat other people" to "I exercise longer than other people." In addition, the item, "I outperform my opponents" was dropped; leaving 11 items total.

Exploratory analysis revealed a two-factor structure (task and ego). The inter-factor correlation was .20, confirming the orthogonality of the two factors. Further, predictive validity was indicted by associations between high task/high ego orientation and participation in regular exercise and stages of change. Specifically, high task/high ego participants (37.3%) were more likely to be regular exercisers, while the low task/low ego participants (40.7%) were more likely to be non-exercisers. Cronbach's alpha for the task and ego subscales of the POSQ-E in this sample were .91 and .88, respectively. The POSQ-E was selected because other measures based on AGT that are commonly used, such as the Task and Ego Orientation in Sport Questionnaire (TEOSQ; see Duda & Whitehead, 1998), have been shown to be problematic. Further, the POSQ-E has been proven to have sound psychometric properties.

Behavioral Regulation in Exercise Questionnaire: Intrinsic Motivation Subscale (BREQ; Mullan, Markland, & Ingledew, 1997, Appendix C). The BREQ was developed based on Deci and Ryan's (Deci & Ryan, 1985) Organismic Integration Theory (OIT) in which behavioral regulation exists, and can be illustrated on a continuum. Items assessed participants' reasons for exercising on a Likert-type scale ranging from 0 (*not true for me*) to 4 (*very true for me*). Confirmatory factor analysis of the full scale suggested an acceptable fit of a four-factor structure. Cronbach alpha coefficients were also acceptable (external = 0.79, introjected = 0.76, identified = 0.78, intrinsic = 0.90), and ordered correlations along the continuum suggested a simplex pattern. An examination of 95% confidence intervals of the inter-correlations did not capture 1.0, indicating discriminant validity of the subscales. While the full version contains subscales for external regulation, introjected regulation, identified regulation, and intrinsic motivation, for the purpose of the current study only the intrinsic motivation subscale will be used. Cronbach's alpha for intrinsic motivation subscale of the BREQ in this sample was .94.

Exercise Motivation Scale (EMS; Li, 1999, Appendix D). The EMS was developed to evaluate the multidimensional framework of motivation in the exercise domain. A 32-item measure was created with four items for each of eight subscales. The eight subscales consist of external, introjected, identified, and integrated regulation, amotivation (from Deci & Ryan, 1985) and three forms of intrinsic motivation (IM to know, IM to accomplish things, and IM to experience stimulation) proposed by Vallerand, Blais, Briere, and Pelletier (1989). However, since the current study is not concerned with Vallerand et al's (1989) multiple conception of intrinsic motivation only the five subscales of external, introjected, identified, and integrated

regulation, amotivation were used. A 6-point Likert scale was employed, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*); all participants took part in some type of exercise, and were asked to indicate their degree of agreement with the prompt, "Why do you currently participate in this activity?"

A test of model fit indicated a poor fit to the data. However, once a problematic amotivation item was removed, the fit was improved. All factor loadings were significant and ranged from .59 - .88. Acceptable reliability was determined via internal consistencies (ranging from .75 - .90) and test-retest reliability (ranging from .78 - .88). In a second study, internal consistencies of the factor ranged from .77 - .85. The subscales of the EMS are suggested to form a simplex pattern of intercorrelations. If the subscale intercorrelations are placed in a matrix, a simplex pattern is expressed when the largest correlations are on the main diagonal. Further, subscales closest to one another on the continuum will have larger positive correlations with one another than those subscales that are further way from each other (Ryan & Connell, 1989). Both Li (1999) and Wininger (2007) confirmed the simplex pattern of the subscales of the EMS. Cronbach's alpha for the integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation subscales of the EMS in this sample were .82, .76, .75, .84, and .88, respectively. The EMS was selected because of the inclusion of an integrated regulation subscale which many of the measures based on OIT have omitted. Further, the EMS was specifically developed for use in the exercise setting and therefore has direct implications for the current study.

Psychological Need Satisfaction in Exercise Scale (PNSE, Wilson, Rogers, Rodgers, & Wild, 2006 Appendix E). The PNSE was developed to assess psychological needs satisfaction in the physical activity setting, and was therefore chosen for the current study. The PNSE is an 18-item scale with 6 items in each of the subscales (competence, autonomy, and relatedness). The response format is a 6-point Likert-type scale ranging from 1 (*false*) to 6 (*true*). The instructions for the scale are as follows: "the following statements represent different feelings people have when they exercise. Please answer the following questions by considering how you typically feel while you are exercising."

Exploratory factor analysis results revealed a 3-factor structure with the model accounting for 63.3% of the variance. The perceived competence, autonomy, and relatedness subscales had coefficient alphas of .91, .91, and .90, respectively. The fit of the three-factor

model was invariant across gender groups. Predictive validity of the three subscales was demonstrated by significant correlations between (a) perceived competence subscale and the perceived competence subscale of the IMI (Ryan, 1982), (b) autonomy subscale and the perceived choice subscale of the IMI, and (c) relatedness subscale and the affiliation scale of the Exercise Motivation Inventory-2 (EMI-2, Markland & Ingledew, 1997). Cronbach's alpha for the competence, autonomy, and relatedness need satisfaction subscales of the PNSE in this sample were .94, .94, and .93, respectively.

Statistical Analysis

First, coefficient alphas were calculated to assess the reliabilities of each of the subscales of the POSQ-E, BREQ, EMS, and PNSE. Confirmatory Factor Analysis (CFA) models were then used to test and confirm the factor structures of the POSQ-E, BREQ, EMS, and PNSE. Next, a measurement model was used to test the full structural model. The model was tested using *Mplus* (Muthen & Muthen, 2005) with maximum likelihood estimation. All 11 factors of the model are considered latent variables because they were not directly observed. Each latent variable consists of multiple observed indicators measured by the corresponding subscale items. Task orientation and ego orientation are both exogenous latent variables, or latent independent variables, as they are not predicted by any other latent variables in the model. Autonomy need satisfaction, competence need satisfaction, relatedness need satisfaction, intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation are all endogenous latent variables, or latent dependent variables, as each is predicted by at least one other latent variable in the model. The structural models are a recursive model in that all causal pathways are unidirectional and therefore there are no causal feedback loops.

The adequacy of the overall fit of the model was tested using the χ^2 fit index. Based on the χ^2 fit index, a perfect fit is indicated by a resulting value of zero and a nonsignificant χ^2 value indicates acceptable fit. As suggested by Hu and Bentler (1999), a combinational approach was used to test the covariance structures in which both absolute fit indices and incremental fit indices will be examined. Absolute fit indices provided by M*plus* include Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR). RMSEA is a measure of the difference between the observed and reproduced covariance matrices per degree of freedom. SRMR is a measure of how well the a priori model structure

reproduces the data. RMSEA values of .06 or lower and SRMR values .08 or lower are indicative of acceptable model fit (Hu & Bentler, 1999). The incremental fit index that was used is the comparative fit index (CFI). The CFI is a measure of how well the hypothesized model fits compared to a null model. Values of at least .95 for the CFI are considered to be indicative of acceptable fit (Hu & Bentler, 1999). Modification indices were examined and applied if theoretically appropriate. Once the measurement model was found acceptable then the structural model was tested to examine the relationship between the latent factors. The same fit indices used to assess the measurement model were used to assess the fit of the structural model.

CHAPTER 4
RESULTS

Descriptive Statistics

The means, standard deviations, and possible value ranges for all observed variables used in the models are presented in Table 1. Univariate analyses of normality were conducted using a skewness of ± 2 and a kurtosis of ± 7 (West, Finch, & Curran, 1995). Skewness and kurtosis values for all items are also presented in Table 1. Results revealed that two items, EMS11 (skewness = 2.28) and EMS16 (skewness = -2.29, kurtosis = 7.43), were out of the normal range. Since the two variables were barely significantly skew and the standard errors of the robust estimates were almost identical to the maximum likelihood estimates, maximum likelihood estimation was used for all analyses.

Table 1: Descriptive Statistics for Observed Variables.

Item	Mean	Standard Deviation	Possible value ranges	Skewness	Kurtosis
BREQ1	3.26	1.23	1.00-5.00	-.317	-.809
BREQ2	3.64	1.15	1.00-5.00	-.528	-.539
BREQ3	3.55	1.20	1.00-5.00	-.484	-.687
BREQ4	3.98	1.11	1.00-5.00	-.923	.049
PNSE1	4.70	1.07	1.00-6.00	-.667	.398
PNSE2	3.80	1.71	1.00-6.00	-.386	-1.03
PNSE3	4.04	1.58	1.00-6.00	-.569	-.614
PNSE4	4.16	1.39	1.00-6.00	-.530	-.383
PNSE5	3.92	1.55	1.00-6.00	-.525	-.619
PNSE6	4.62	1.20	1.00-6.00	-.739	.242
PNSE7	4.16	1.53	1.00-6.00	-.665	-.383
PNSE8	5.16	1.07	1.00-6.00	-1.42	2.17
PNSE9	5.27	1.03	1.00-6.00	-1.57	2.52
PNSE10	4.82	1.15	1.00-6.00	-.984	.827
PNSE11	5.32	1.01	1.00-6.00	-1.18	3.19
PNSE12	5.35	1.41	1.00-6.00	-.711	-.218
PNSE13	5.42	.92	1.00-6.00	-1.85	3.91
PNSE14	4.14	1.54	1.00-6.00	-.673	-.400
PNSE15	4.89	1.17	1.00-6.00	-1.11	1.15
PNSE16	4.57	1.35	1.00-6.00	-1.05	.793
PNSE17	5.43	.95	1.00-6.00	-1.98	4.43

Table 1: Descriptive Statistics for Observed Variables Continued.

Item	Mean	Standard Deviation	Possible value ranges	Skewness	Kurtosis
PNSE18	5.40	.98	1.00-6.00	-1.95	4.16
EMS1	3.01	1.43	1.00-6.00	.160	-1.06
EMS2	4.10	1.41	1.00-6.00	-.520	-.520
EMS3	5.15	.89	1.00-6.00	-1.20	1.98
EMS4	4.58	1.14	1.00-6.00	-.701	.231
EMS5	1.73	1.05	1.00-6.00	1.94	4.14
EMS6	2.20	1.25	1.00-6.00	.915	-.062
EMS7	4.95	1.06	1.00-6.00	-1.30	2.17
EMS8	3.47	1.46	1.00-6.00	-.126	-.925
EMS9	2.10	1.23	1.00-6.00	1.14	.570
EMS10	4.20	1.39	1.00-6.00	-.587	-.413
EMS11	1.59	.97	1.00-6.00	2.28	6.00
EMS12	4.93	.99	1.00-6.00	-1.21	2.24
EMS13	3.74	1.46	1.00-6.00	-.249	-.832
EMS14	4.52	1.15	1.00-6.00	-.786	.483
EMS15	1.64	.92	1.00-6.00	1.88	4.11
EMS16	5.52	.78	1.00-6.00	-2.28	7.43
EMS17	2.38	1.36	1.00-6.00	.786	-.329
EMS18	4.26	1.20	1.00-6.00	-.621	.096
EMS19	3.53	1.53	1.00-5.00	-.164	-1.06
POSQ1	2.85	1.12	1.00-5.00	-.010	-.791
POSQ2	2.39	1.17	1.00-5.00	.424	-.803
POSQ3	2.42	1.20	1.00-5.00	.442	-.825
POSQ4	4.27	.81	1.00-5.00	-1.42	2.94
POSQ5	4.23	.81	1.00-5.00	-1.11	1.57
POSQ6	3.29	1.17	1.00-5.00	-.372	-.669
POSQ7	4.31	.78	1.00-5.00	-1.25	2.09
POSQ8	4.27	.75	1.00-5.00	-1.14	2.15
POSQ9	4.25	.80	1.00-5.00	-1.15	1.72
POSQ10	2.42	1.17	1.00-5.00	.471	-.577
POSQ11	4.30	.80	1.00-5.00	-1.27	2.02

Note: BREQ=Behavioral Regulations in Exercise Questionnaire, PNSE=Psychological Need Satisfaction in Exercise, EMS=Exercise Motivation Scale, POSQ=Perceptions of Success Questionnaire for Exercise

Identification of Models

All of the measurement models were identified under the two-indicator rule in which a model is identified if two of the four following statements are satisfied: “every factor has at least

two indicators, no manifest variable is indicator for more than one factor, the error terms are not correlated, the covariance matrix for the latent variables does not contain zeros" (Blunch, 2008, pp. 129). Since recursive models are known to be identified, all structural models were also identified.

Measurement Models

The two-step strategy was implemented where the measurement models were first analyzed and then the structural models were analyzed. Using the two-step strategy allows the researcher to determine if problems in the model are due to unreliability of measures, or the theory (Blunch, 2008). Further, as suggested by Joreskog (1993), an individual measurement model reflecting each of the theories was first tested followed by a composite measurement model of all individual measurement models.

All models were tested using MPLUS (Muthen & Muthen, 2005). The adequacy of the overall fit of the model was tested using the χ^2 fit index. Based on the χ^2 fit index, a perfect fit is indicated by a resulting value of zero and a nonsignificant χ^2 value indicates acceptable fit. Since the χ^2 fit index can be sensitive to sample size, more importance was placed on other fit indices. As suggested by Hu and Bentler (1999), a combinational approach was used to test the covariance structures in which both absolute fit indices and incremental fit indices were examined. Absolute fit indices provided by M*plus* include Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR). RMSEA is a measure of the difference between the observed and reproduced covariance matrices per degree of freedom. SRMR is a measure of how well the a priori model structure reproduces the data. RMSEA values of .06 or lower and SRMR values .08 or lower are indicative of acceptable model fit (Hu & Bentler, 1999). The incremental fit index that was used is the comparative fit index (CFI). The CFI is a measure of how well the hypothesized model fits compared to a null model. Values of at least .90-.95 for the CFI are considered to be indicative of good fit (Bentler, 1990).

AGT model. The AGT measurement model that was tested is presented in Figure 2, and the factor loadings of each latent variable on its corresponding observed variables are included in the figure. The model contains two latent variables (task and ego orientation) that were allowed to be correlated. Although the chi-square value was significant and therefore, indicative of a poor fitting model, other fit indices suggested a good fit to the data ($\chi^2 = 347.60$, $df = 43$, $p < .001$,

CFI = .96, *RMSEA* = .075, *SRMR* = .054). Task orientation and ego orientation correlated (*r* = .41). Modification indices are sensitive to sample size possibly leading to large modification indices that would result in marginal changes (Brown, 2006). Therefore, more importance was placed on expected parameter change (EPC) values when evaluating model fit. Results for the AGT measurement model revealed no EPC values that warranted model modifications.

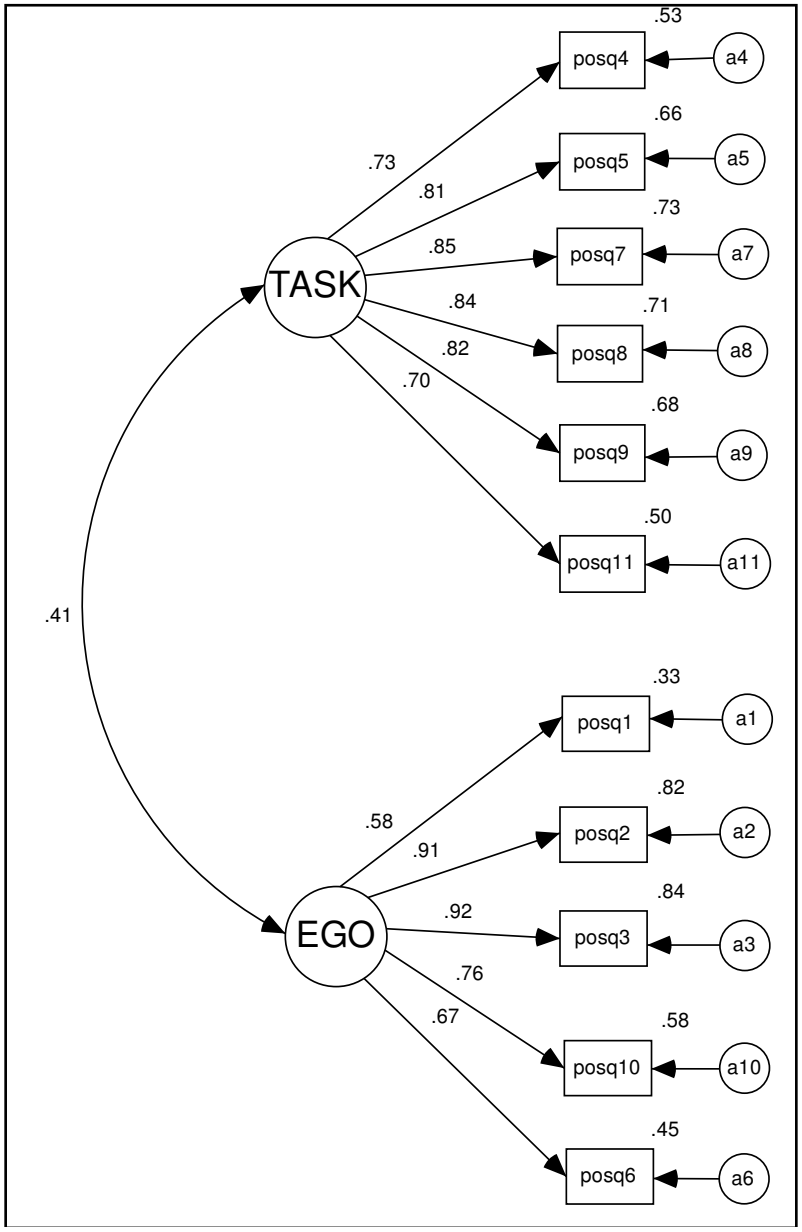

Figure 2: AGT measurement model.

CET model. The CET measurement model that was tested is presented in Figure 3, and the factor loadings of each latent variable on its corresponding observed variables are included in the figure. The three latent variables (competence need satisfaction, autonomy need satisfaction, and relatedness need satisfaction) were allowed to correlate. Although the chi-square value was significant, the other fit indices revealed a good fit of the model to the data (χ^2 = 1131.68 *df* = 132, $p < .001$, *CFI* = .95, *RMSEA* = .078, *SRMR* = .049). No modifications were suggested. The subscale correlations are presented in Table 2.

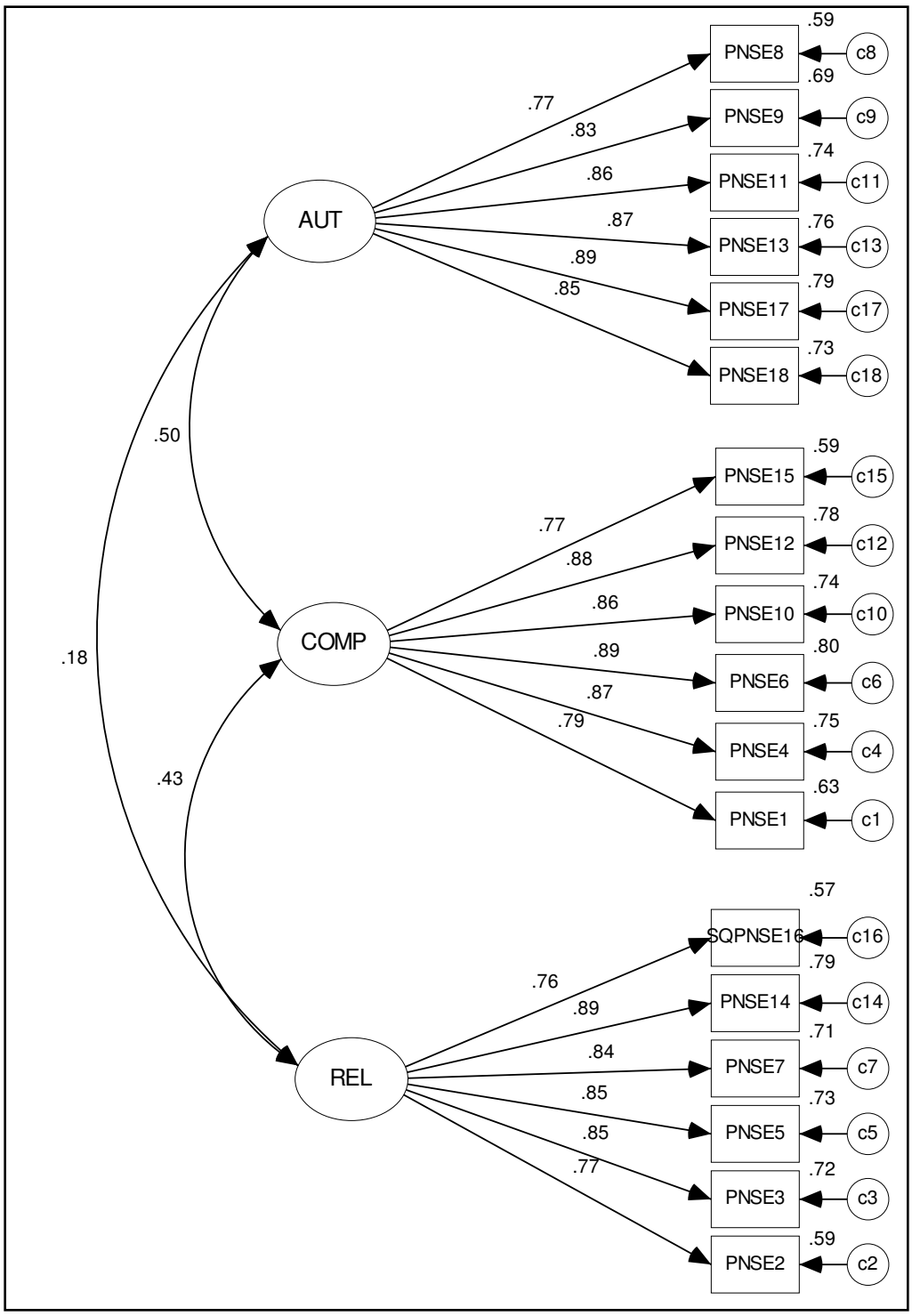

Figure 3: CET measurement model.

Table 2: Subscale Intercorrelations for CET Measurement Model.

	COMP	AUT	REL
COMP	--		
AUT	.504	--	
REL	.429	.179	--

Note: COMP=Competence Need Satisfaction, AUT =Autonomy Need Satisfaction, REL=Relatedness Need Satisfaction.

OIT model. The OIT measurement model that was tested is presented in Figure 4 and the factor loadings of each latent variable on its corresponding observed variables are included in the figure. The subscale intercorrelations are presented in Table 3. Subscale intercorrelations were examined to test the simplex-like pattern on the latent subscales (the largest intercorrelations exist along the main diagonal and adjacent subscales had larger positive correlations than the subscales that were further apart on the continuum). Results revealed that the simplex-like pattern was supported. CFA results revealed an acceptable fit to the data ($\chi^2 = 1105.916$ $df = 215$, $p < .001$, $CFI = .93$, $RMSEA = .058$, $SRMR = .069$). A large EPC valued indicated that item EMS7 ("Because I think that exercise allows me to feel better about myself") cross-loaded on the integrated regulation latent construct. However, this is not surprising since identified regulation and integrated regulation are adjacent on the more internalized end of the self-determination continuum. Despite the suggested cross-loading, the model resulted in an acceptable fit that adequately explained the covariances among the items. Therefore, it was decided to keep EMS 7 in the model. However, since the most parsimonious model should be sought (Schumacker & Lomax, 2004), there was no path added between EMS 7 and the integrated regulation latent variable.

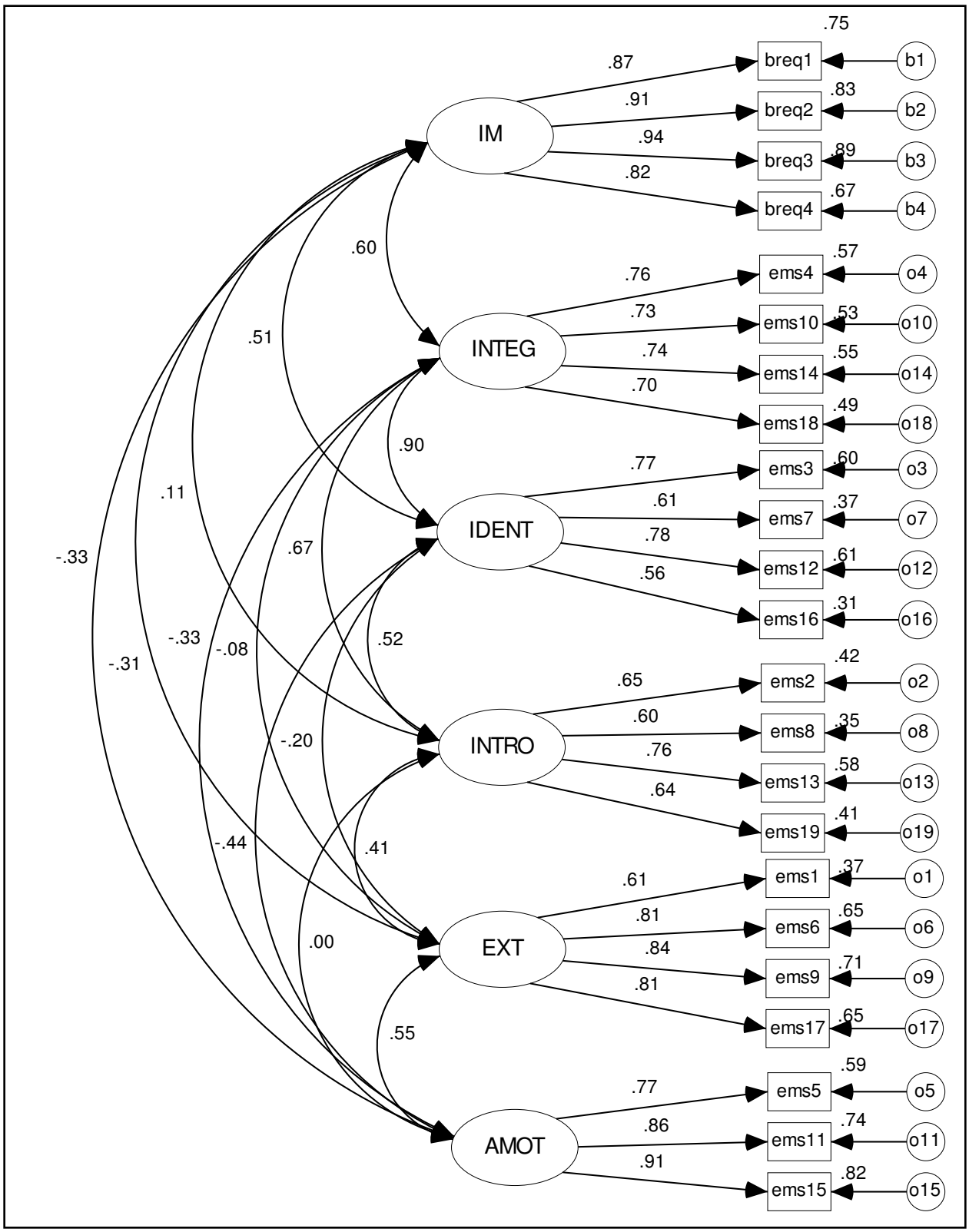

Figure 4: OIT measurement model.

Table 3: Subscale Intercorrelations for OIT Measurement Model.

	IM	INTEG	IDENT	INTRO	EXT
IM	--				
INTEG	.602	--			
IDENT	.511	.895	--		
INRTO	.111	.665	.522	--	
EXT	-.312	-.082	-.204	.409	--
AMOT	-.332	-.328	-.443	.004	.552

Note: IM=Intrinsic Motivation, INTEG=Integrated Regulation, IDENT=Identified Regulation, INTRO=Introjected Regulation, EXT=External Regulation, AMOT=Amotivation.

Combined measurement model. The combined measurement model that was tested is presented in Figure 5. All Results (other than the chi-square value) revealed a good fit to the data ($\chi^2 = 4330.657$, $df = 1219$, $p < .001$, $CFI = .93$, $RMSEA = .045$, $SRMR = .055$). No modifications were suggested based on EPC values. All latent variable correlations are presented in Table 4. Correlations ranged from .00 to .90. AGT and CET latent variables correlated positively with more internalized forms of exercise regulation and correlated negatively with the less internalized forms of exercise regulations. Task and ego orientation correlated most strongly with competence need satisfaction.

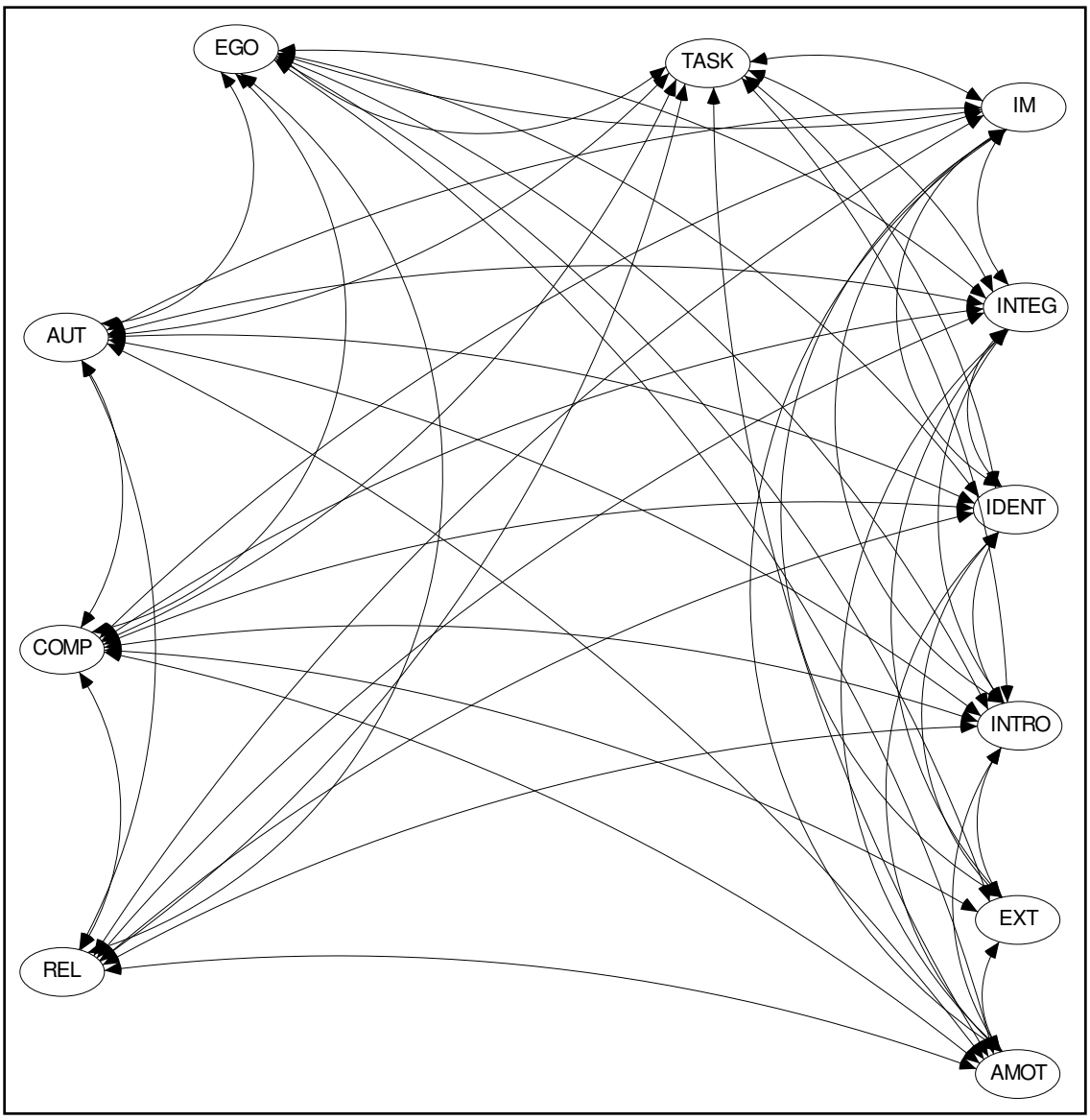

Figure 5: Combined measurement model.

Table 4: Latent Variable Correlations for Combined Measurement Model.

	TASK	EGO	COMP	AUT	REL	IM	INTEG	IDENT	INTRO	EXT
TASK	--									
EGO	.406	--								
COMP	.414	.268	--							
AUT	.269	.056	.504	--						
REL	.293	.187	.430	.179	--					
IM	.369	.202	.618	.357	.402	--				
INTEG	.349	.211	.505	.303	.440	.603	--			
IDENT	.394	.146	.433	.423	.340	.512	.896	--		
INTRO	.082	.258	.078	.044	.185	.111	.665	.523	--	
EXT	-.189	.080	-.295	-.369	.001	-.313	-.084	-.205	.408	--
AMOT	-.310	.021	-.283	-.319	-.135	-.332	-.329	-.445	.004	.552

Note: TASK=Task Orientation, EGO=Ego Orientation, COMP=Competence Need Satisfaction, AUT =Autonomy Need Satisfaction, REL=Relatedness Need Satisfaction, IM=Intrinsic Motivation, INTEG=Integrated Regulation, IDENT=Identified Regulation, INTRO=Introjected Regulation, EXT=External Regulation, AMOT=Amotivation.

Several multiple group CFAs were conducted to determine gender invariance of the combined measurement model (Table 5). The minimum condition for factorial invariance is the equivalence of the factor loadings (no constraints) and each subsequently constrained model provided more support for equivalence across the groups (Raju, Laffitte, & Byrne, 2002). Therefore, analyses were conducted in a hierarchical manner with each subsequent model containing additional parameter constraints. At the first level, Model 1 was an initial analysis with no constraints placed on the model. At the second level, Model 2 imposed constrained factor loadings (providing measurement equivalence). Finally, in level three, Model 3 tested the equivalence of factor loadings and factor variances and covariances (providing structural equivalence) (Raju et al., 2002). Equivalent variances and covariances should only be tested when it has already been determined that factor loadings are invariant across the groups (Byrne, 1998).

Results of all models of the multiple group CFAs for gender are presented in Table 5. In Model 1, the factor structure was fitted to both gender groups simultaneously with no invariance constraints imposed. The fit of Model 1 was acceptable according to each of the fit indices (see

Table 5). In Model 2, the factor loadings were constrained to be equal across gender groups. Equivalent of factor loadings is often considered the minimum requirement for measurement invariance. Fit indices of Model 2 were virtually identical to those of Model 1. Therefore, results strongly suggest factor loading equivalence. In Models 3 the variance and covariances were constrained. Again, the fit indices were nearly identical to those in Model 1 suggesting invariant covariances of the combined measurement model across gender groups.

Table 5: Indices of Fit for Gender Groups.

Model	χ^2	df	$\Delta\chi^2$	Δdf	RMSEA	SRMR	CFI
1	5392.292*	2482	--	--	.043	.058	.924
2	5401.425*	2520	9.133	38	.043	.059	.925
3	5521.255*	2569	119.83	49	.043	.075	.923

Note: * Indicates significance at p <0.05, 1, initial model with no constraints, 2, factor loadings constrained, 3, loadings, variances and covariances constrained.

Structural Model Analyses

Hypothesized model. The first structural model (Model 1) tested is presented in Figure 6. Indirect effects are presented in Table 6. Model 1 tested the indirect effects of task orientation on the three most internalized exercise regulations (intrinsic motivation, integrated regulation, and identified regulation) through competence, autonomy, and relatedness need satisfaction. Also included in the model are the direct effects of goal orientations on exercise regulations. The model exhibited acceptable fit (χ^2 = 4343.557, *df* = 1224, $p < .001$, *CFI* = .93, *RMSEA* = .045, *SRMR* = .056). A chi-square difference test was conducted with the full measurement model and results suggested that the hypothesized structural model was not significantly different from the measurement model. The first hypothesis that there would be positive direct paths from task orientation to autonomy, competence, and relatedness need satisfaction was supported. The largest direct path was between task orientation and competence need satisfaction. The second hypothesis that there would be positive direct paths from task orientation to intrinsic motivation,

integrated regulation, and identified regulation was also supported. Although the path coefficients were small (ranging from .085 to .190) there were still significant. The third hypothesis that there would be positive indirect paths from task orientation to intrinsic motivation, integrated regulation, and identified regulation via autonomy, competence, and relatedness need satisfaction was partially supported. Specifically, the indirect paths from task orientation to intrinsic motivation and integrated regulation through autonomy need satisfaction were not significant. Finally, the last hypothesis that there would be positive direct paths from ego orientation to introjected regulation, external regulation, and amotivation was partially supported. The direct path from ego orientation to amotivation was not significant.

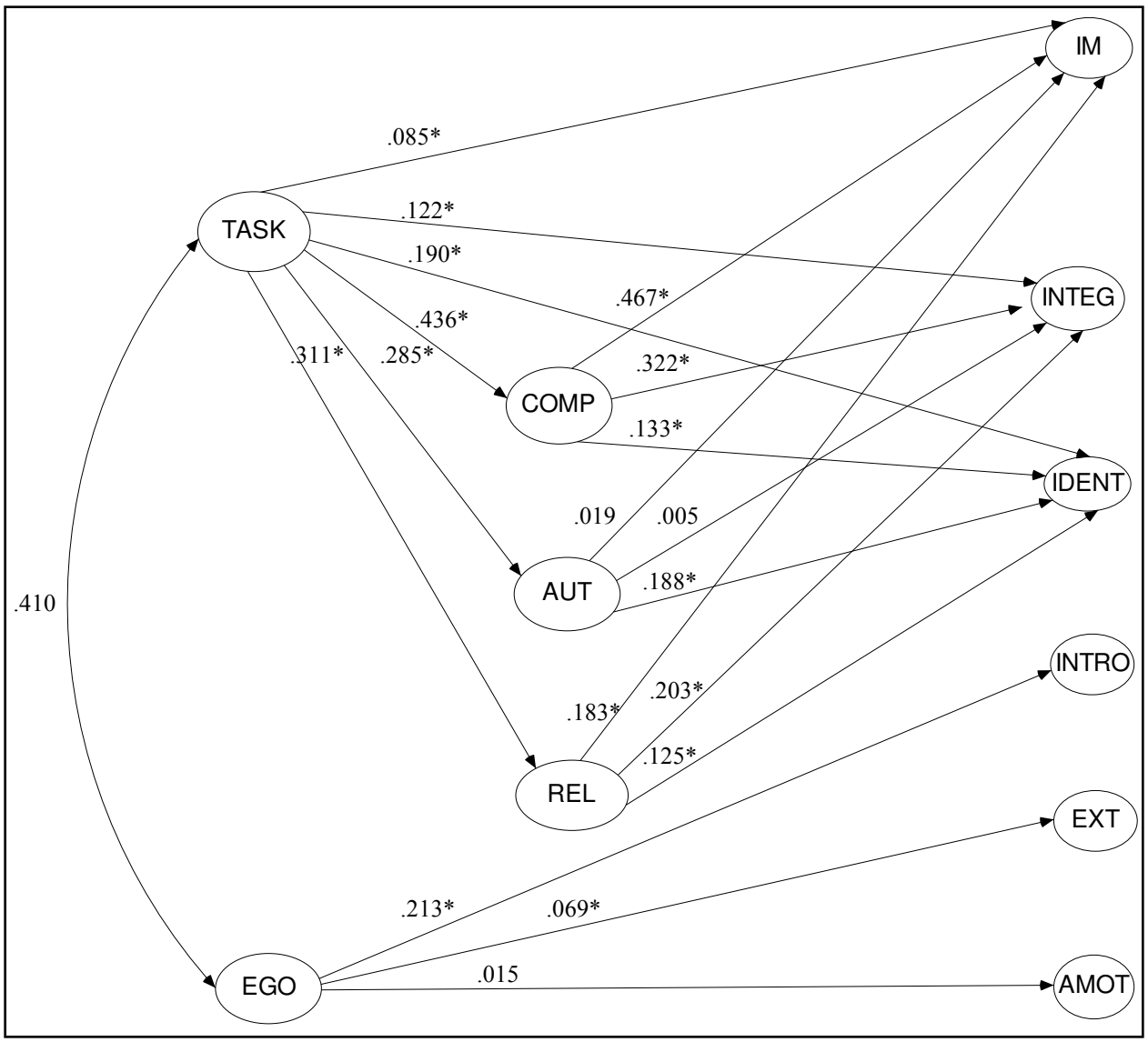

Figure 6: Structural model of indirect and direct relationships for task orientation through competence, autonomy, and relatedness need satisfaction (Model 1).

Table 6: Indirect Relationships for Task Orientation Through Competence, Autonomy, and Relatedness Need Satisfaction (Model 1).

Predictor	Mediating Variable		Outcome Variable	Indirect Effects
TASK	COMP	→	IM	.039*
TASK	COMP	→	INTEG	.099*
TASK	COMP	→	IDENT	.021*
TASK	AUT	→	IM	.001
TASK	AUT	→	INTEG	.001
TASK	AUT	→	IDENT	.020*
TASK	REL	→	IM	.011*
TASK	REL	→	INTEG	.045*
TASK	REL	→	IDENT	.014*

* Indicates Significance
Note: TASK=Task Orientation, COMP=Competence Need Satisfaction, AUT =Autonomy Need Satisfaction, REL=Relatedness Need Satisfaction

Exploratory models: Competence, autonomy, and relatedness need satisfaction. While Model 1 provided a good fit to the data, other models were tested to further examine the relationships among the latent variables. The second model (Model 2) tested is presented in Figure 7. Indirect effects are presented in Table 7. The model tested the indirect effects of both task and ego orientation on exercise regulations through competence, autonomy, and relatedness need satisfaction. Most indices revealed that the model exhibited acceptable fit ($\chi^2 = 4418.128$, $df = 1230$, $p < .001$, $CFI = .93$, $RMSEA = .046$, $SRMR = .064$). Results revealed that competence need satisfaction acted as a significant mediator between task and ego orientation for all forms of exercise regulation except introjected regulation. There was a significant indirect relationship between task orientation and all forms of exercise regulation except introjected regulation through autonomy need satisfaction. There was a significant indirect relationship between ego orientation on all forms of exercise regulation except introjected regulation and amotivation through autonomy need satisfaction. There was a significant indirect relationship between task

and ego orientation and all internalized forms of exercise regulation (intrinsic motivation, integrated regulation, identified regulation, introjected regulation) through relatedness need. In model 3 (Figure 8), direct paths from goal orientations to exercise regulations were added to the model in Figure 7. Indirect effects are presented in Table 8. There was a slight improvement in model fit ($\chi^2 = 4400.986$, $df = 1225$, $p < .001$, $CFI = .93$, $RMSEA = .046$, $SRMR = .058$). Chi-square difference tests revealed that the two models were not significantly different.

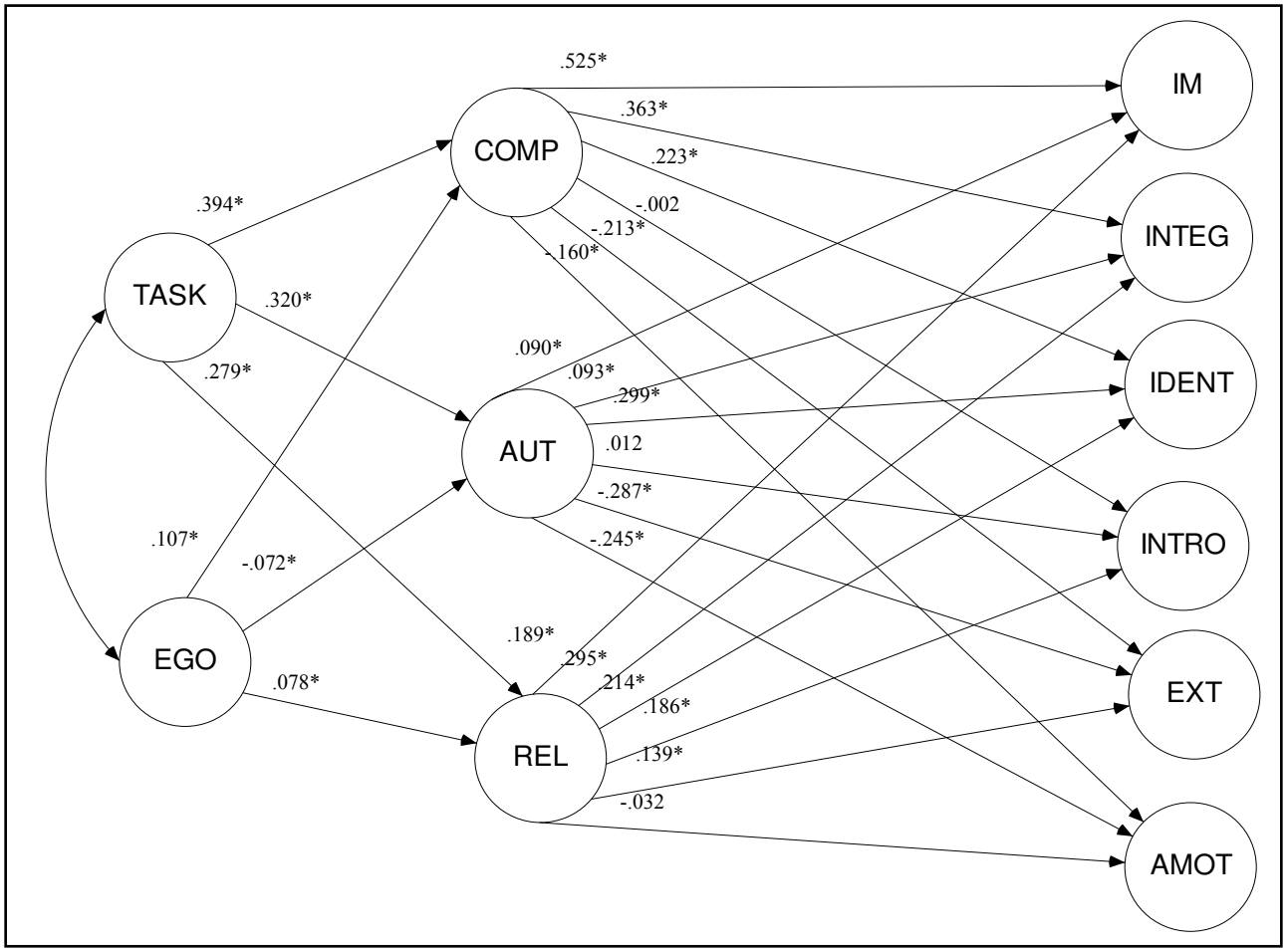

Figure 7: Structural model of indirect relationships through competence, autonomy, and relatedness need satisfaction (Model 2).

Table 7: Indirect Relationships Through Competence, Autonomy, and Relatedness Need Satisfaction (Model 2).

Predictor	Mediating Variable		Outcome Variable	Indirect Effect
TASK	COMP	→	IM	.354*
TASK	COMP	→	INTEG	.199*
TASK	COMP	→	IDENT	.097*
TASK	COMP	→	INTRO	-.001
TASK	COMP	→	EXT	-.120*
TASK	COMP	→	AMOT	-.084*
TASK	AUT	→	IM	.049*
TASK	AUT	→	INTEG	.042*
TASK	AUT	→	IDENT	.106*
TASK	AUT	→	INTRO	.006
TASK	AUT	→	EXT	-.137*
TASK	AUT	→	AMOT	-.104*
TASK	REL	→	IM	.090*
TASK	REL	→	INTEG	.020*
TASK	REL	→	IDENT	.066*
TASK	REL	→	INTRO	.079*
TASK	REL	→	EXT	.055
TASK	REL	→	AMOT	-.012
EGO	COMP	→	IM	.088*
EGO	COMP	→	INTEG	.050*
EGO	COMP	→	IDENT	.024*
EGO	COMP	→	INTRO	.000
EGO	COMP	→	EXT	-.030*
EGO	COMP	→	AMOT	-.021
EGO	AUT	→	IM	-.010
EGO	AUT	→	INTEG	-.009
EGO	AUT	→	IDENT	-.022*
EGO	AUT	→	INTRO	-.001

Table 7: Indirect Relationships Through Competence, Autonomy, and Relatedness Need Satisfaction (Model 2) Continued.

Predictor	Mediating Variable		Outcome Variable	Indirect Effect
EGO	AUT	→	EXT	-.028*
EGO	AUT	→	AMOT	.022*
EGO	REL	→	IM	.023*
EGO	REL	→	INTEG	.030*
EGO	REL	→	IDENT	.017*
EGO	REL	→	INTRO	.020*
EGO	REL	→	EXT	.014
EGO	REL	→	AMOT	-.003

* Indicates Significance

Note: TASK=Task Orientation, EGO=Ego Orientation, COMP=Competence Need Satisfaction, AUT =Autonomy Need Satisfaction, REL=Relatedness Need Satisfaction, IM=Intrinsic Motivation, INTEG=Integrated Regulation, IDENT=Identified Regulation, INTRO=Introjected Regulation, EXT=External Regulation, AMOT=Amotivation.

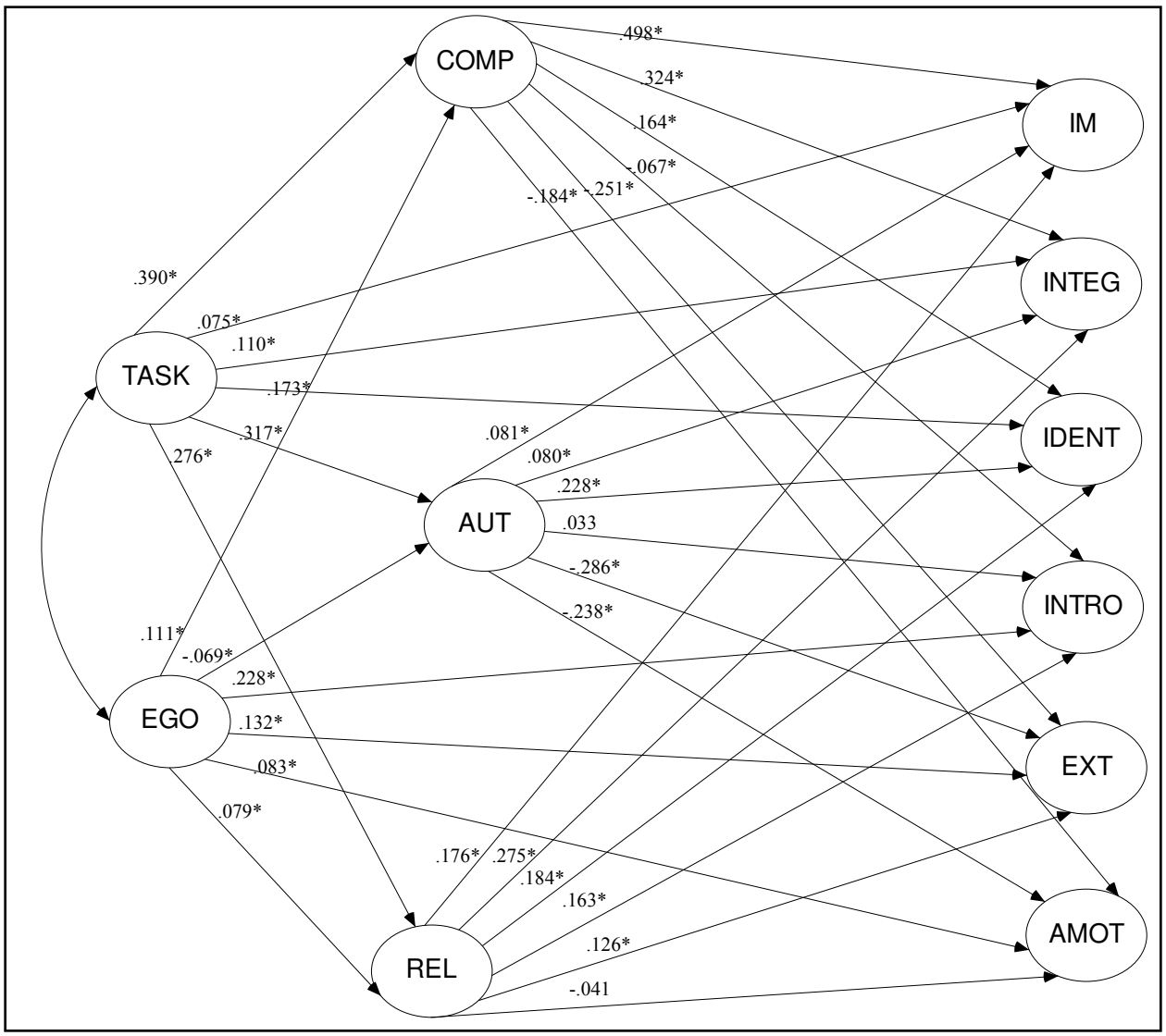

Figure 8: Structural model of indirect and direct relationships through competence, autonomy, and relatedness need satisfaction (Model 3).

Table 8: Indirect Relationships Through Competence, Autonomy, and Relatedness Need Satisfaction (Model 3).

Predictor	Mediating Variable		Outcome Variable	Indirect Effect
TASK	COMP	→	IM	.334*
TASK	COMP	→	INTEG	.177*
TASK	COMP	→	IDENT	.071*
TASK	AUT	→	IM	.044*
TASK	AUT	→	INTEG	.036*
TASK	AUT	→	IDENT	.098*
TASK	REL	→	IM	.083*
TASK	REL	→	INTEG	.106*
TASK	REL	→	IDENT	.056*
EGO	COMP	→	INTRO	-.010
EGO	COMP	→	EXT	-.036*
EGO	COMP	→	AMOT	-.025*
EGO	AUT	→	INTRO	-.003
EGO	AUT	→	EXT	.026
EGO	AUT	→	AMOT	.010
EGO	REL	→	INTRO	.018*
EGO	REL	→	EXT	.013
EGO	REL	→	AMOT	-.004

* Indicates Significance

Note: TASK=Task Orientation, EGO=Ego Orientation, COMP=Competence Need Satisfaction, AUT =Autonomy Need Satisfaction, REL=Relatedness Need Satisfaction, IM=Intrinsic Motivation, INTEG=Integrated Regulation, IDENT=Identified Regulation, INTRO=Introjected Regulation, EXT=External Regulation, AMOT=Amotivation.

Exploratory models: Competence need satisfaction. Since competence need satisfaction is suggested to have the strongest relationship with the latent variables of AGT and OIT, models were tested in which the only mediating latent variable was competence need satisfaction. The nest structural model (Model 4) tested is presented in Figure 9. Indirect effects

are presented in Table 9. In this model, exercise regulations are predicted by goal orientation via competence need satisfaction. All fit indices other than the chi-square value showed that the model exhibited acceptable fit ($\chi^2 = 3180.398$, df = 716, $p < .001$, CFI = .93, RMSEA = .053, SRMR = .077). All direct paths in the model were significant ($p < .05$). Direct paths from competence need satisfaction to intrinsic motivation, integrated regulation, and identified regulation were the largest (.621, .509, and .438, respectively). Direct paths from competence need satisfaction and external regulation and amotivation were negative. Task orientation was a better predictor of competence need satisfaction (.376) than ego orientation (.115). Indirect paths followed a similar patter to the direct paths. All indirect paths were significant except the path from ego orientation to integrated regulation. The largest indirect path occurred between task orientation and intrinsic motivation (.417). Indirect paths from both goal orientations and external regulation and amotivation were negative.

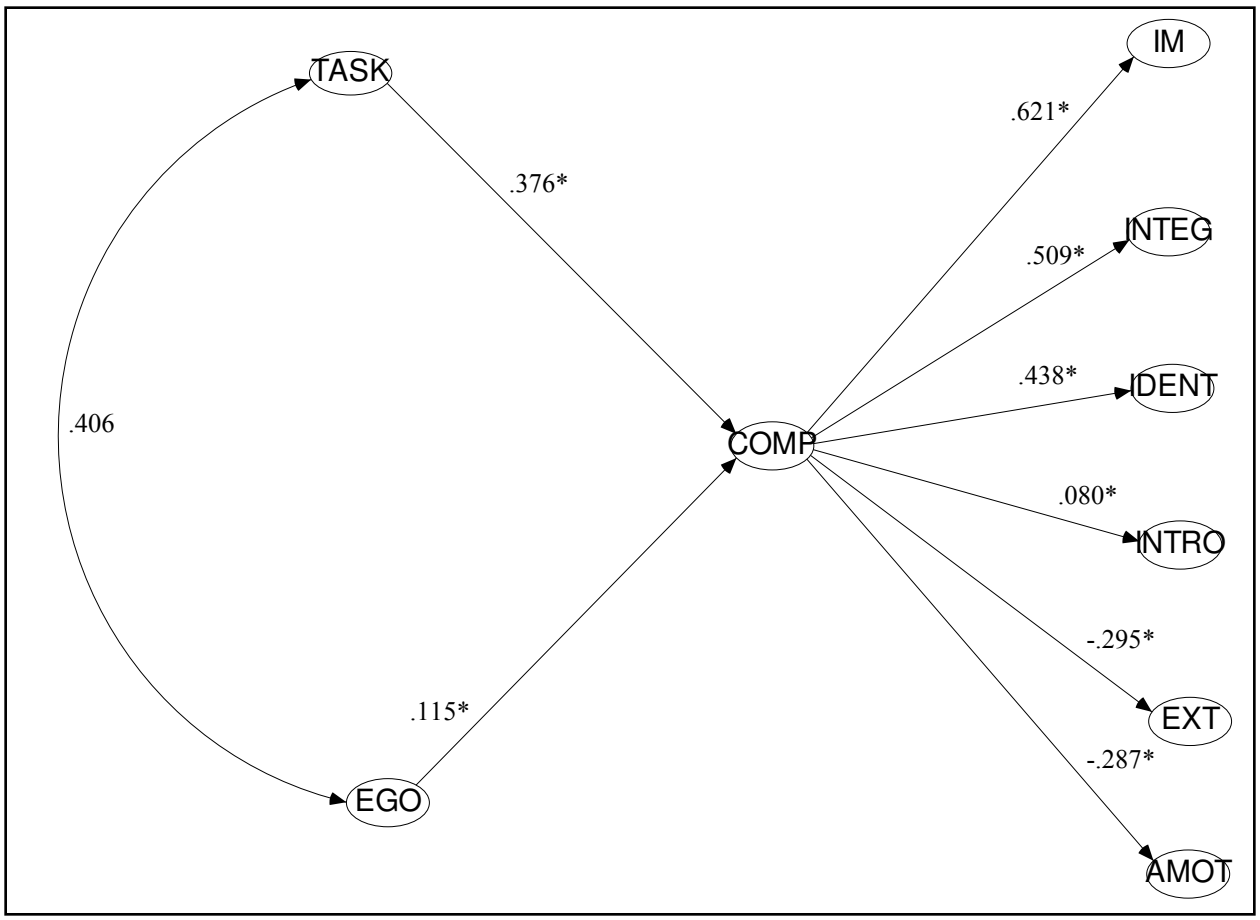

Figure 9: Structural model of indirect relationships through competence need satisfaction (Model 4).

Table 9: Indirect Relationships for Competence Need Satisfaction Only Structural Model (Model 4).

Predictor	Mediating Variable		Outcome Variable	Indirect Effect
TASK	COMP	→	IM	.417*
TASK	COMP	→	INTEG	.278*
TASK	COMP	→	IDENT	.190*
TASK	COMP	→	INTRO	.046*
TASK	COMP	→	EXT	-.161*
TASK	COMP	→	AMOT	-.145*
EGO	COMP	→	IM	.117*
EGO	COMP	→	INTEG	.078*
EGO	COMP	→	IDENT	.053*
EGO	COMP	→	INTRO	.013
EGO	COMP	→	EXT	-.045*
EGO	COMP	→	AMOT	-.041*

* Indicates Significance

Note: TASK=Task Orientation, EGO=Ego Orientation, COMP=Competence Need Satisfaction, AUT =Autonomy Need Satisfaction, REL=Relatedness Need Satisfaction, IM=Intrinsic Motivation, INTEG=Integrated Regulation, IDENT=Identified Regulation, INTRO=Introjected Regulation, EXT=External Regulation, AMOT=Amotivation.

The final structural model (Model 5) tested is presented in Figure 10. This model is identical to the previous model (Figure 9), with the addition of direct paths from goal orientation to exercise regulations. Indirect effects are presented in Table 10. The model exhibited a slightly better fit than the previous model ($\chi^2 = 3069.829$, df = 710, $p < .001$, CFI = .93, RMSEA = .052, SRMR = .067). The newly added direct paths from both task and ego orientation to exercise regulations were positive and significant. However, all completely standardized regression weights were smaller than .200 with the exception of the direct path between ego orientation and

introjected regulation (.237). Chi-square difference tests revealed that the two competence-only models were not significantly different.

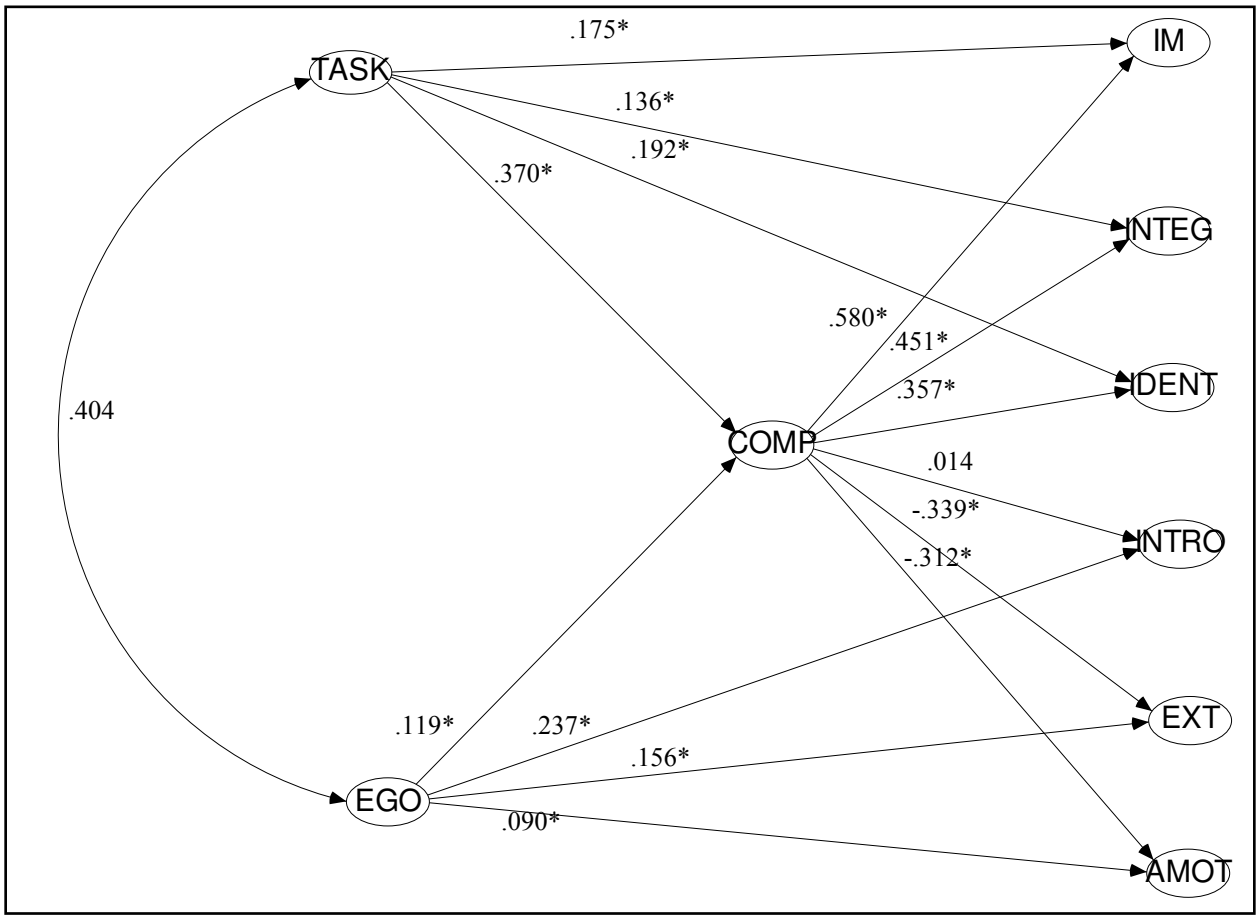

Figure 10: Structural model of indirect and direct relationships through competence need satisfaction (Model 5).

Table 10: Indirect Relationships through Competence Need Satisfaction (Model 5).

Predictor	Mediating Variable		Outcome Variable	Indirect Effects
TASK	COMP	→	IM	.381*
TASK	COMP	→	INTEG	.241*
TASK	COMP	→	IDENT	.150*
TASK	COMP	→	INTRO	.008
TASK	COMP	→	EXT	-.181*
TASK	COMP	→	AMOT	-.155*
EGO	COMP	→	IM	.112*
EGO	COMP	→	INTEG	.071*
EGO	COMP	→	IDENT	.044*
EGO	COMP	→	INTRO	.002
EGO	COMP	→	EXT	-.053*
EGO	COMP	→	AMOT	-.046*

* Indicates Significance

Note: TASK=Task Orientation, EGO=Ego Orientation, COMP=Competence Need Satisfaction, AUT =Autonomy Need Satisfaction, REL=Relatedness Need Satisfaction, IM=Intrinsic Motivation, INTEG=Integrated Regulation, IDENT=Identified Regulation, INTRO=Introjected Regulation, EXT=External Regulation, AMOT=Amotivation.

CHAPTER 5
DISCUSSION

The purpose of the present study was to test several structural models detailing the relationships among Achievement Goal Theory and Self-Determination Theory within the context of exercise. Specifically, each model examined the way in which goal orientation predicted behavioral regulations for exercise both directly and indirectly through psychological need satisfaction. Examination of the models provides better insight into the relationship among these constructs; specifically in the domain of exercise. Previous attempts to investigate the relationships among the theories have fallen short either through methodological flaws or incomplete use of the theories (Biddle et al., 1999; Edmunds et al., 2006; Ntoumanis, 2001; Standage et al., 2003; Wilson et al., 2003).

There has been a substantial amount of research and theoretical discussion on the integrative nature of the constructs of AGT and SDT. Within the framework of SDT, it is suggested that competence, autonomy, and relatedness need satisfaction should facilitate highly self-determined forms of behavioral regulations (Deci & Ryan, 2002). While research has demonstrated the relationship between competence need satisfaction and self-determined behavioral regulations (Goudas & Biddle, 1994), there has been little to no research directly examining the influence of autonomy and relatedness need satisfaction on behavioral regulations. Theoretically, task orientation is more likely to be related to satisfaction of the three psychological needs than ego orientation (Ntoumanis, 2001), but there has yet to be a study that has investigated the existence of a direct association between goal orientation and need satisfaction. Finally, since task orientation is more likely to be related to satisfaction of the three psychological needs, and satisfaction of those needs is suggested to facilitate self-determined forms of behavioral regulations, it logically follows that task orientation should be related to more self-determined forms of behavioral regulations. Several studies have demonstrated the link between task orientation and intrinsic motivation (Dorobantu & Biddle, 1997; Ferrer-Caja & Weiss, 2000; Rawsthorne & Elliot, 1999; Vlachopoulos et al., 1996).

Based on previous research and theoretically postulations, the initial hypothesized model (see Figure 6) tested the direct effects of goal orientation on behavioral regulations for exercise, as well as the indirect effect of task orientation on highly self-determined forms of behavioral regulation (intrinsic motivation, integrated regulation, identified regulation) through competence,

autonomy, and relatedness need satisfaction. Overall the model fit the data well and supports the theoretical explanations for the ways in which the theories are related in the context of exercise. Specifically, support was provided for the influence of competence, autonomy, and relatedness need satisfaction on the relationship between task orientation and highly internalized forms of behavioral regulations for exercise. When individuals based their success on task mastery and learning they felt that their psychological needs were being satisfied and, in turn, also had internalized reasons for engaging in the exercise behavior. In addition, support was provided for the direct relationship between goal orientations and behavioral regulations for exercise. Individuals had more internalized reasons for participating in exercise when they were task-oriented and had less internalized reasons for participating in exercise when they were ego oriented. In the following sections I will detail the direct relationships between each pair theories (i.e., AGT and CET) and then the indirect relationships among the three theories.

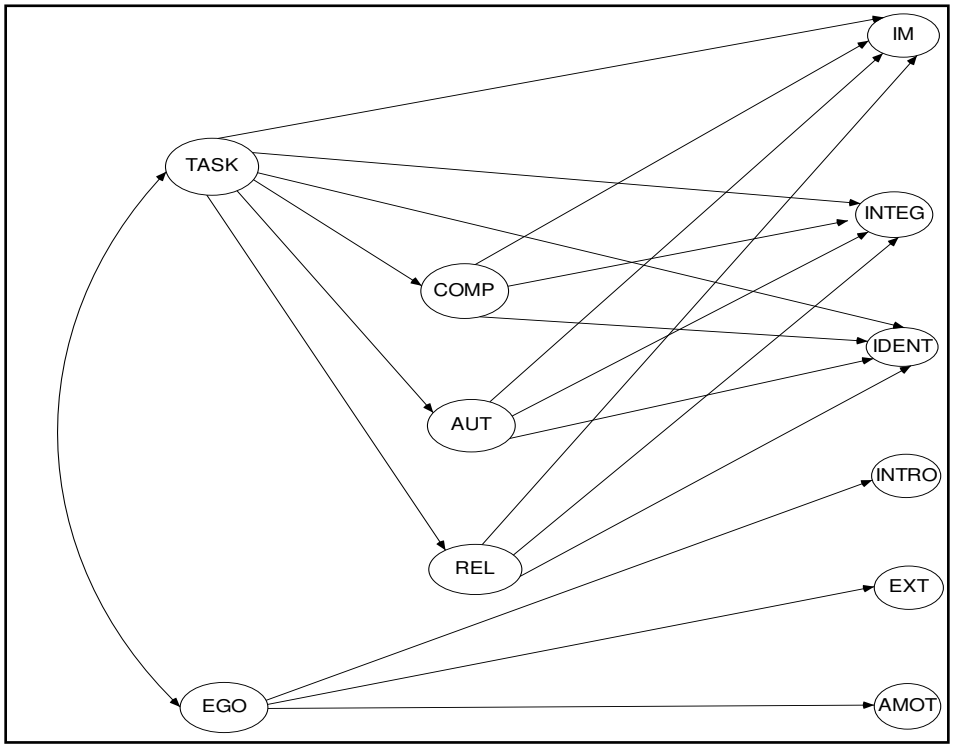

Figure 6: Structural model of indirect relationships for task orientation through competence, autonomy, relatedness need satisfaction.

AGT and CET

Results based on the model presented in Figure 6 indicated that task orientation positively predicted all types of need satisfaction. The largest association was between task orientation and competence need satisfaction. Therefore, individuals felt that their psychological needs were being satisfied when their judgments about success are based on task mastery and learning. Standage et al. (2003) found similar results with mastery climate and need satisfaction. Specifically, creation of a mastery climate (a climate that supports task mastery) influenced perceptions of competence, autonomy, and relatedness in students in physical education clases. These findings support the claim by Ntoumanis (2001) that having a task orientation facilitates satisfaction of the three psychological needs. When one has a task orientation, learning is an important aspect of success. Since the individual does not need to count of others in order to learn and therefore, feel successful, feelings of competence are under the individual's personal control (Nicholls, 1989). The task-oriented individual is almost entirely responsible for the aspects that result in perceptions of success. Hence, the task oriented individual is likely to perceive him or herself as being in control, or autonomous, in regards to an activity. Finally, since a task-orientated individual is focused on learning and improvement, it could possibly follow that task oriented individuals interact with others in their environments with the intention of gaining information about a task and therefore, feel more fulfilled and connected (i.e., related) through those interactions. The relationship between task orientation and need satisfaction has been supported; in the next section I will examine the relationship between both task and ego orientation and behavioral regulations.

AGT and OIT

Findings of the present study indicated that both task and ego orientations had a significant link to behavioral regulations for exercise. Specifically, task orientation predicted more self-determined forms of behavioral regulations for exercise (intrinsic motivation, integrated regulation, and identified regulation). Further, ego orientation predicted less self-determined forms of behavioral regulations for exercise (introjected regulation and external regulation), but not amotivation. Therefore, individuals had more internalized reasons for participating in exercise when improvement and learning were indicators of success, and had less internalized reasons for participating in exercise when their judgments of success were based on out-performing others. These findings support research in the exercise domain (Biddle & Wang,

2003; Standage et al., 2003; Wang & Biddle, 2001). Specifically, Biddle and Wang (2003) found that scores on task orientation clustered with high scores on self-determination, and suggest that they are both "motivationally adaptive." This argument follows in line with theory since, according to the tenets of SDT, self-determined individuals engage in more adaptive behaviors (Deci & Ryan, 2002). A possible explanation could be that since task oriented individuals are focused on aspects inherent to the task, such as mastery, they are more engaged in the activity and therefore, develop more meaningful knowledge about the task. As a result, greater knowledge about a task may promote more interest in the task and in turn, a more internalized motivation for engaging in the task. This proposed relationship between knowledge and internalization is reflected in the assumptions of SDT. SDT posits that interest plays a large role in internalization of behaviors (Deci & Ryan, 2002). The ego-oriented individuals' attention is on aspects external to the task itself, which may undermine the individual's ability to gain a deeper understanding of the task and hinder internalization of motivation. The lack of a predictive relationship between ego orientation and amotivation is not surprising since amotivation reflects a lack of intention to engage in a behavior. While ego-oriented individuals may be driven by factors such as peer comparison and exhibiting greater relative ability, they are still motivated to engage in a behavior as long a perceptions of ability are sufficient (Nicholls, 1989). The relationship between goal orientations and behavioral regulations has been supported; the next section will examine the relationship between need satisfaction and behavioral regulations.

CET and OIT

In line with previous research (Standage et al., 2003), competence need satisfaction and relatedness need satisfaction both predicted highly self-determined forms of behavioral regulations for exercise. Therefore, when the needs for competence and relatedness are being fulfilled in the context of exercise, individuals have more internalized reasons for participating in exercise. These findings correspond to the assumptions of SDT. According to SDT, when an individual's environment supports one's needs for competence, autonomy, and relatedness, that individual will feel more self-determined (Deci & Ryan, 2002). The results on autonomy need satisfaction and behavioral regulations for exercise were less consistent. Autonomy need satisfaction weakly predicted identified regulations, and did not significantly predict intrinsic motivation or integrated regulations. Similar results were reported by Edmunds et al. (2006) in

which autonomy need satisfaction did not significantly predict intrinsic motivation. These results do not follow the theoretical notion that feeling as though one is the origin of his or her actions (or in attributional terms, having an internal perceived locus of control) should allow the individual to feel more in control, and therefore more self-determined in his/her regulations. In the present study, lack of a predictive relationship between autonomy need satisfaction and highly self-determined forms of behavioral regulations for exercise could have been due to the distribution of the scores on the autonomy need satisfaction subscale items of the PNSE. The highest score for each item was 6.00, and all of the items on the autonomy need satisfaction subscale had means above 5.00, therefore, producing a ceiling effect. While none of the skewness values of the items reached the critical value, all of the values were approaching 2.0; ranging between -1.42 and -1.98. The high item means of the autonomy need satisfaction subscale was supported by Wilson et al. (2006) during the development and validation of the PNSE. Based on this psychometric finding, it cannot be concluded from the present study that autonomy need satisfaction is a strong predictor of behavioral regulations for exercise.

Indirect Relationships

Results also indicated that task orientation influenced highly self-determined forms of behavioral regulations for exercise through competence and relatedness need satisfaction. Similar to the direct effect of autonomy need satisfaction on behavioral regulations, the only significant indirect effect of autonomy need satisfaction was on the relationship between task orientation and identified regulations. However, a ceiling effect of the autonomy need satisfaction subscale items of the PNSE is a feasible explanation for the lack of a predictive relationship. According to SDT, satisfaction of the three psychological needs facilitates self-determined motivation (Deci & Ryan, 2002). Further, having a task orientation has been linked to satisfaction of the three psychological needs (Nicholls, 1989; Ntoumanis, 2001). These findings provide support for the mediation nature of psychological need satisfaction in the relationship between task orientation and internalized reasons for engaging in exercise behavior. Similar results were reported by Standage et al. (2003) where competence, autonomy, and relatedness need satisfaction influenced the effect of motivational climate on self-determined motivation.

Exploratory Models

Several other exploratory structural models were tested in order to gain further understanding of the nature of the relationships among the constructs of AGT and SDT. The first model (see Figure 7) examined the effects of both task and ego orientation on behavioral regulations for exercise through competence, autonomy, and relatedness need satisfaction. This model differs from the original hypothesized model in two ways. First, Biddle et al. (1999) argued that perceived competence would have an effect on the ego orientation/behavioral regulation relationship. Therefore, direct paths were added between ego orientation and need satisfaction as well as indirect paths from ego orientation to behavioral regulations through need satisfaction. Second, there is empirical evidence to suggest a negative relationship between less self-determined forms of behavioral regulations and need satisfaction (Standage et al., 2003; Wilson et al., 2003), hence there was an addition of direct paths between the competence, autonomy, and relatedness need satisfaction and introjected regulation, external regulation, and amotivation.

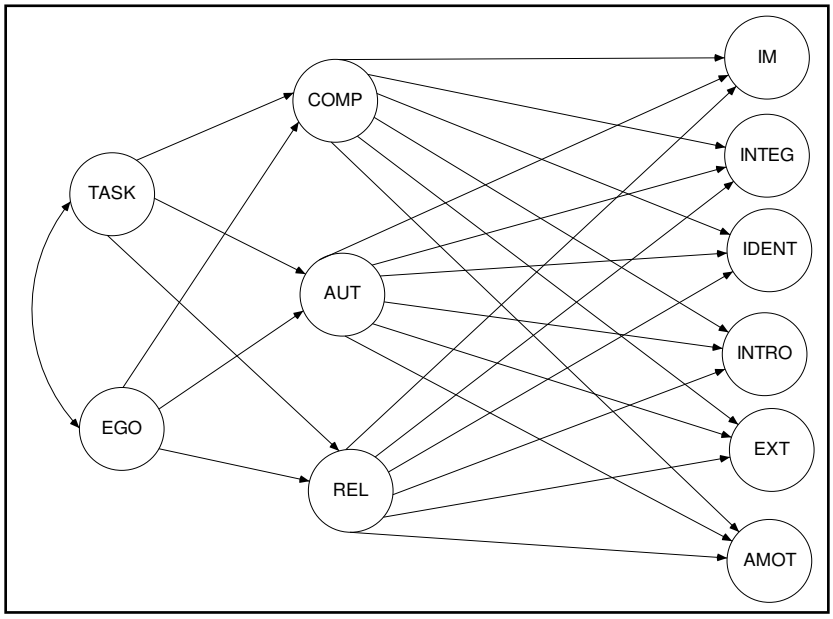

Figure 7: Structural model of indirect relationships through competence, autonomy, and relatedness need satisfaction.

As with the previous model, there was a good fit to the data. Task orientation was a stronger predictor of need satisfaction than ego orientation. This finding is consistent with Duda's (1992) findings suggesting that task-oriented individuals were more likely to have a stronger need for competence satisfied than ego oriented individuals, who possess less control over their perceptions of competence; often relying on the relative incompetence of others. The lack of control of the ego-oriented individual is also supported by findings from the present study indicating a significant relationship between ego orientation and autonomy need satisfaction. Individuals that did not perceive themselves to be in control of choosing their exercise activities based success on comparisons with others. Both task and ego orientation positively predicted relatedness need satisfaction; however, task orientation was a stronger predictor. Ntoumanis (2001) argued that constant comparison and rivalry of the ego oriented individual could undermine the feelings of connectedness that accompany relatedness need satisfaction. Findings of the present study provide support for Ntoumanis's argument.

Both competence need satisfaction and autonomy need satisfaction were found to be negatively related to amotivation. Therefore, deficient feelings of competence and control have a negative association with participation in exercise. However, lacking feelings of connectedness was not significantly related to amotivated for exercise. Similar results between competence need satisfaction and amotivation were found by Standage et al. (2003). Competence and autonomy need satisfaction had significant negative relationships with external regulation; relatedness need satisfaction had a weak positive relationship with external regulation. Edmunds et al. (2006) also found significant negative relationships between need satisfaction and external regulation. Contradictory to Edumund's results, a positive relationship between relatedness need satisfaction and external regulation was observed in the present study. However, the associations between the variables of both studies were weak. Therefore, it is difficult to make conclusions on the nature of the relationship between relatedness need satisfaction and external regulation until further investigations are carried out. Finally, results showed a significant positive relationship between introjected regulation and relatedness need satisfaction, but not competence or autonomy need satisfaction. These findings are in line with SDT in that introjection is suggested to be an outcome of relatedness need satisfaction (Deci & Ryan, 2002). Further, since satisfaction of the three psychological needs is suggested to be related to more self-determined

forms of behavioral regulations, it is not surprising that, in the present study, satisfaction of the needs was negatively, or weakly, related to less self-determined forms of behavioral regulation.

Competence need satisfaction and relatedness need satisfaction played a similar role in the goal orientation/behavioral regulation for exercise relationship for ego orientation as it did for task orientation (described in the previous model). However, task and ego orientation had differing associations with behavioral regulations through autonomy need satisfaction. Task-oriented individuals who felt in control of their exercise had more internalized reasons for participating in exercise; although the effect was weak. On the other hand, ego-oriented individuals who felt in control of their exercise had no discernable pattern of reasons for participating in exercise. It is important to mention again, however, the ceiling effect of the autonomy need satisfaction items. In addition, need satisfaction played a larger role in the relationship between task orientation and behavioral regulations than in the relationship between ego orientation and behavioral regulations. Thus, a second exploratory model added in the direct paths from goal orientation to behavioral regulations. This model fit the data slightly better than the previous exploratory model without the direct paths. The strongest path was between ego orientation and introjected regulation. Theoretically the relationship makes sense. According to Ryan (1982), ego-involvement is a form of introjected regulation.

Both models adequately accounted for the relationship among the theories and provided support for the mediation influence of need satisfaction in the goal orientation/behavioral regulation relationship. There is empirical support to suggest that a model including ego orientation, as a predictor of need satisfaction would also fit well. The effects from ego orientation on behavioral regulations through need satisfaction are partially supported by finding from Biddle et al. (1999). Although perceived autonomy and relatedness were not included in the model, results of the study showed that competence need satisfaction significantly influenced the relationship between ego orientation and self-determined regulations. Biddle et al. argued that perceived competence would strongly influence the ego orientation individual since people are motivated by success over others, and therefore, low perceived competence could undermine internalization of reasons for engaging in an exercise behavior.

Competence-only

Since competence need satisfaction had the strongest relationship with goal orientation and behavioral regulation in previous models, a subsequent exploratory model was tested in

which competence need satisfaction was the only psychological need through which goal orientation predicted behavioral regulations for exercise. The competence-only models followed the same theoretical logic as the previous models; however, competence need satisfaction acts as the only mediational construct through which goal orientations predict behavioral regulations for exercise. The first competence-only model (see Figure 9) tested the indirect effects of goal orientation on behavioral regulations for exercise through competence need satisfaction. Results revealed that the model was a good fit to the data. However, the fit was not drastically improved over the models that included all three psychological needs. The last model that was tested included the addition of direct paths from goal orientation to behavioral regulations. Again, while the model adequately fit the data, and fit slightly better than the previous competence-only model, it was not a considerable improvement over any of the previous models. The pattern of indirect and direct effects of the models followed the same pattern as those of the models that included all three psychological needs. Task orientation was a stronger predictor of competence needs satisfaction than goal orientation. Task oriented individuals felt that their need for competence was satisfied and exercised for more self-determined reasons. As suggested by Nicholls (1989), task oriented individual is much more likely to have the need for competence satisfied due to their self-referenced judgments of success. Since the task oriented individual is concerned with aspects of the task that are generally under his or her influence, such as task improvement, there is more control over perceptions of competence. Ego oriented individuals, however, are other-referenced, and must count on the lower relative ability of the comparison individual in order to have high perceptions of competence (Nicholls, 1989).

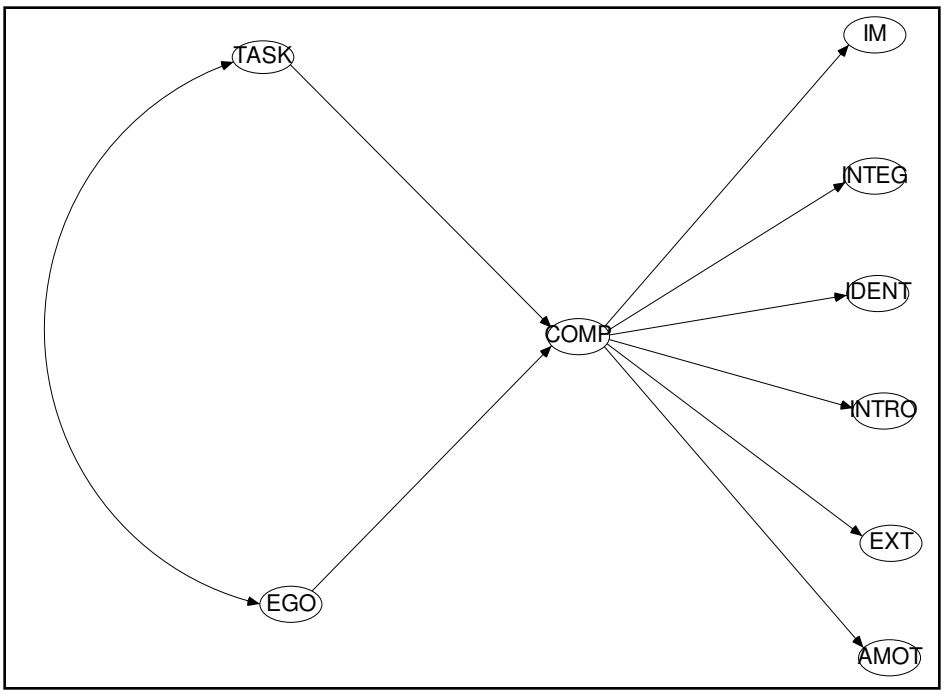

Figure 9: Structural model of indirect relationships through competence need satisfaction.

In conclusion, the present study provided support for the theoretical explanations of how the constructs of Achievement Goal Theory and Self-Determination Theory related to one another. Findings suggest that goal orientations predict one's behavioral regulations both directly and indirectly though competence, autonomy, and relatedness need satisfaction. The present study is innovative and sheds more light on exercise behaviors and their antecedents. Previous attempts to examine the relationships among motivational components, which stem from these two different, but somewhat related theories, had several limitations that needed to be addressed. First, many of the studies investigating behavioral regulations did not include an integrated regulation subscale and therefore, did not fully represent the continuum of behavioral regulations proposed by Deci and Ryan (1985). To resolve this shortcoming, the present study used the EMS (Li, 1999); a measure developed for use in the exercise setting that included an integration subscale. Further, the EMS subscales followed the simplex-like pattern reflecting the theoretical continuum on which the subscales are proposed to exist. The lack of this simplex-like pattern is another limitation of previous studies (Standage et al., 2003).

Previous research examining the role of psychological need satisfaction contains methodological weaknesses. Specifically, subscale reliabilities have been low and the measures that have been used were developed for use in contexts other than exercise. In response to those limitations, the PNSE (Wilson et al., 2006) was used to assess psychological need satisfaction in the present study. The PNSE was not only developed for use in the exercise setting, but the subscales also have strong reliability coefficients.

A theoretical gap in the literature that was satisfied by the present study is the lack of an examination of the role autonomy and relatedness need satisfaction in the integration of the two theories; specifically in regards to goal orientation (Ntoumanis, 2001). While competence need satisfaction did have the strongest relationship with goal orientation, results indicated that autonomy and relatedness need satisfaction were also significantly predicted by goal orientation and influenced behavioral regulations for exercise.

The final and most substantial way in which the present study contributes to the literature is by answering the call for a complete examination of the integrative nature of the constructs of AGT and SDT. Over the last decade, several researchers have stressed the importance of research that furthers our understanding of the nature of the relationships among the theories in the context of exercise (Biddle et al., 1999; Ntoumanis, 2001; Wang & Biddle, 2007). While theoretical explanations of how pairings of the theories should be related have been proposed and tested, a study has yet to link all of the constructs together in a mediation approach. The present study however, has provided a more complete picture of this mediation nature of the relationships among these theories. Based on the findings from the present study, there is more evidence that goal orientations not only influence behavioral regulations for exercise directly, but also indirectly through satisfaction of the needs for competence, autonomy, and relatedness. Therefore, whether or not one's judgments of success in exercise are self-referenced (task orientation) or other-referenced (ego orientation) will determine how likely it is that the individual will perceive that his or her needs for competence, autonomy, and relatedness are being satisfied in the exercise environment. More specifically, an individual that is self-referenced and feels successful in exercise when learning and improvement occur is likely to feel competent, autonomous, and related in the exercise environment. On the other hand, an individual that is other-referenced and feels successful in exercise when outperforming others, he or she is less likely to feel competent, autonomous, and related in the exercise environment.

Consequently, whether or not an individual's perceives those needs to be satisfied in the exercise environment will influence how self-determined his or her reasons are for participating in exercise. If one feels competent, autonomous, and related in the exercise environment, then he or she is likely to engage in exercise for internalized reasons. However, if the exercise environment does not facilitate perceptions of competence, autonomy, and relatedness, then the individual is likely to engage in exercise behavior for more external reasons.

Limitations and Future Research

While the present study has addressed a number of weaknesses and gaps in the extant literature, it is not without its own limitations. For example, there was a ceiling effect of the items on the autonomy need satisfaction subscale of the PNSE. High items' means were also reported by Wilson et al. (2006). The restricted range of the scores of the items limited the information the subscale could provide to the models. Therefore, future studies could gain more insight into the role of autonomy need satisfaction in the goal orientation/behavioral regulations relationships by using items that are more difficult to endorse. Further, there were also psychometric weaknesses of the EMS. Some subscales' reliability coefficient ranges were less than ideal (≈ .70) and the pattern of factor loadings suggested item cross-loadings. While neither issue is a substantial problem, development of a stronger measure would be more beneficial. In order to extend the current study, future research must test directly the mediation relationship of the motivational constructs of AGT and SDT. The present study provides evidence for such a relationship in that results indicated that goal orientations predict psychological need satisfaction, which, in turn, predicted behavioral regulations for exercise. However, since the study was cross-sectional, a true examination of the meditation relationship of the motivational constructs could not be examined. Thus, a longitudinal study could provide stronger evidence for the theoretical causal chain.

According to Standage at al. (2003) and Wang and Biddle (2007), gaining greater insight into the integrative nature of SDT and AGT has implications to the success of exercise interventions. Research has shown that exercise adherence is linked to more self-determined forms of behavioral regulations (Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002; Oman & McAuley, 1993; Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). In other words, the more internalized one's reasons are for engaging in exercise behaviors, the more likely it is that that person will continue to exercise. Therefore, it is essential for researchers to have a greater

understanding of what factors contribute to internalization in order to promote adherence. The present study provides more insight into the ways in which goal orientations and need satisfaction are related to internalized reasons for exercise. Specifically, results showed that while task orientation was more strongly related to internalized reasons for exercise when compared with ego orientation, need satisfaction also facilitated motivational internalization. Consequently, these findings could have implications in the research on the promotion of exercise behavior. For example, future research could examine ways to facilitate feelings of competence, autonomy, and relatedness in one's exercise environment. Additional research could investigate the role of goal involvement states in need satisfaction and behavioral regulations for exercise. While goal orientation is considered to be dispositional, and therefore relatively stable and unchanging, goal involvement is considered to be a motivational state (Roberts, 2001). Similar to goal orientations, goal involvement states are either task or ego. The present study could be extended by determining whether or not goal involvement states have the same influence on need satisfaction and behavioral regulations as goal orientations. If so, this could have important implications for research on exercise behavior promotion as situational goal involvement states would be more easily manipulated when compared with dispositional goal orientations.

APPENDIX A

RECRUITMENT EMAIL TO PROFESSORS

Dear Instructor,

I am a doctoral student at FSU working on my dissertation under Dr. Gershon Tenenbaum. I am in need of 1200 participants for my study on exercise motivation. Participants will be asked to complete an online survey on exercise motivation lasting approximately 5-10 minutes. Participants will be asked to give their informed consent before beginning the survey. Participants do not have to be regular exercisers to participate. I would greatly appreciate if you would forward the survey link (survey link) to your students and ask them to participate. If you feel it is necessary for me to come speak to your class about the research project I will be happy to do so.

Sincerely,
Allison Dyrlund, M.A.
Doctoral Candidate
Florida State University

APPENDIX B

PERCEPTIONS OF SUCCESS QUESTIONNAIRE-EXERCISE

When exercising, I feel most successful when . . .	Strongly Disagree		Neutral		Strongly Agree
1. I exercise longer than other people	A	B	C	D	E
2. I am clearly superior	A	B	C	D	E
3. I am the best	A	B	C	D	E
4. I work hard	A	B	C	D	E
5. I show clear personal improvement	A	B	C	D	E
6. I accomplish something others cannot do	A	B	C	D	E
7. I reach a goal	A	B	C	D	E
8. I overcome difficulties	A	B	C	D	E
9. I master something I couldn't do before	A	B	C	D	E
10. I show other people I am the best	A	B	C	D	E
11. I perform to the best of my ability	A	B	C	D	E

APPENDIX C

BEHAVIORAL REGULATION IN EXERCISE QUESTIONNAIRE

(Intrinsic Motivation Subscale)

Directions: *Please indicate the degree of truth that each of the following statements is a reason that you exercise*.

		Not true for me	Somewhat not true for me	Moderately true for me	Somewhat true for me	Very true for me
1.	I exercise because it's fun	0	1	2	3	4
2.	I enjoy my exercise sessions	0	1	2	3	4
3.	I find exercise a pleasurable activity	0	1	2	3	4
4.	I get pleasure and satisfaction from participating in exercise	0	1	2	3	4

APPENDIX D

EXERICISE MOTIVATION SCALE

WHY ARE YOU CURRENTLY PARTICIPATING IN THIS ACTIVITY?

Directions: *Please read each of the statements listed below and indicate how strongly you agree or disagree with each statement by circling the appropriate response to the right of the statement. Use the following response categories:*

Strongly disagree	**Disagree**	**Moderately disagree**	**Moderately agree**	**Agree**	**Strongly agree**
(SD)	**(D)**	**(MD)**	**(MA)**	**(A)**	**(SA)**
1	**2**	**3**	**4**	**5**	**6**

	SD	**D**	**MD**	**MA**	**A**	**SA**
1. Because other people believe that it's a good idea for me to exercise.	1	2	3	4	5	6
2. Because I must exercise to feel good about myself.	1	2	3	4	5	6
3. Because I believe that regular exercise is a good way to enhance my overall development.	1	2	3	4	5	6
4. Because it is consistent with what I value.	1	2	3	4	5	6
5. I can't understand why I am doing this.	1	2	3	4	5	6
6. Because I feel pressure from others to participate.	1	2	3	4	5	6
7. Because I think that exercise allows me to feel better about myself.	1	2	3	4	5	6
8. Because I feel I have to do it.	1	2	3	4	5	6
9. To satisfy people who want me to exercise.	1	2	3	4	5	6
10. Because exercising is an important aspect of how I perceive myself.	1	2	3	4	5	6

11. I have no idea.	1	2	3	4	5	6
12. Because I think it is a good thing for my personal growth.	1	2	3	4	5	6
13. Because I would feel guilty if I did not take the time to do it.	1	2	3	4	5	6
14. Because I value the way exercise allows me to make changes in my life.	1	2	3	4	5	6
15. It is not clear to me anymore.	1	2	3	4	5	6
16. Because I think exercise contributes to my health.	1	2	3	4	5	6
17. To comply with expectations of others (e.g., friends).	1	2	3	4	5	6
18. Because I feel that changes that are taking place through exercise are becoming part of me.	1	2	3	4	5	6
19. Because I would feel ashamed if I was not doing anything to improve my current situation.	1	2	3	4	5	6

APPENDIX E

PSYCHOLOGICAL NEED SATISFACTION IN EXERCISE SCALE

The following statements represent different experiences people have when they exercise. Please answer the following questions by considering how YOU TYPICALLY feel while you are exercising.

	False	Mostly False	More false than true	More true than false	Mostly True	True
1. I feel that I am able to complete exercises that are personally challenging	1	2	3	4	5	6
2. I feel attached to my exercise companions because they accept me for who I am	1	2	3	4	5	6
3. I feel like I share a common bond with people who are important to me when we exercise together	1	2	3	4	5	6
4. I feel confident I can do even the most challenging exercises	1	2	3	4	5	6
5. I feel a sense of camaraderie with my exercise companions because we exercise for the same reasons	1	2	3	4	5	6
6. I feel confident in my ability to perform exercises that personally challenge me	1	2	3	4	5	6
7. I feel close to my exercise companions who appreciate how difficult exercise can be	1	2	3	4	5	6
8. I feel free to exercise in my own way	1	2	3	4	5	6
9. I feel free to make my own exercise program decisions	1	2	3	4	5	6
10. I feel capable of completing exercises that are challenging to me	1	2	3	4	5	6
11. I feel like I am in charge of my exercise program decisions	1	2	3	4	5	6
12. I feel like I am capable of doing even the most challenging exercises	1	2	3	4	5	6
13. I feel like I have a say in choosing the exercises that I do	1	2	3	4	5	6
14. I feel connected to the people who I interact with while we exercise together	1	2	3	4	5	6
15. I feel good about the way I am able to complete challenging exercises	1	2	3	4	5	6
16. I feel like I get along well with other people who I interact with while we exercise together	1	2	3	4	5	6
17. I feel free to choose which exercises I participate in	1	2	3	4	5	6
18. I feel like I am the one who decides what exercises I do	1	2	3	4	5	6

APPENDIX F

DEMOGRAPHIC QUESTIONNAIRE

1. Gender: Female or Male
2. Age: _____

3. Which of the following statements best describes you? Please read all 5 statements and then select your response.

a. I currently do **not** exercise and do not intend to start exercising in the next 6 months.
b. I currently do **not** exercise, but I am thinking about starting to exercise in the next 6 months.
c. I currently exercise some, but not **regularly** (*regularly* is defined as exercising 3 or more times per week for at least 30 minutes per session).
d. I currently exercise **regularly.**
e. I have been exercising **regularly** for the past six months or longer.

APPENDIX G

INFORMED CONSENT

FSU Human Subjects Committee approved 7/16/2007. Void after 7/14/2008. HSC#2007.579.

Informed Consent Form
Project Title: Measurement in Exercise Motivation

I HAVE BEEN INFORMED THAT:
1. Allison Dyrlund, who is doctoral student in the department of Educational Psychology and Learning Systems, Sport Psychology program at Florida State University, has requested my participation in a research project entitled "Measurement in Exercise Motivation.'

2. The purpose of the research is to examine the reliability of existing measures in exercise motivation.

3. My participation will involve the completion of an online survey lasting approximately 10-15 minutes.

4. There are no foreseeable risks or discomforts if I agree to participate in this study.

5. Although there may be no direct benefits to me, the possible benefits of my participation in the research are to help advance the quality of measures assessing exercise motivation in order to improve exercise interventions.

6. The results of this research study may be published but my name or identity will not be revealed to the extent allowed by law. Data and consent forms will be kept electronically on a password protected computer in the home of Allison Dyrlund, and will be destroyed by August 31, 2012.

7. I will not be paid for my participation.

8. Any questions I have concerning the research study or my participation in it, before or after my consent, will be answered by Allison Dyrlund, (270) 535-2277, Dr Gershon Tenenbaum, 644-8791, or the Chair of the Human Subjects Committee, Institutional Review Board, through the Office of the Vice President for Research, at (850) 644-8633.

9. If I have questions about my rights as a subject/participant in this research, or if I feel I have been placed at risk, I can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Office of the Vice President for Research, at (850) 644-8633.

10. I must be at least 18 years of age in order to participate in the study.

I have read the above informed consent form. I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefits to which I may otherwise

be entitled. In signing this consent form, I am not waiving any legal claims, rights or remedies. A copy of this consent form will be offered to me.
Subject's Signature _____ (Date) _____

APPENDIX H

IRB APPROVAL

APPROVAL MEMORANDUM

Date: 7/18/2007

To: Allison Dyrlund

Address: 1000 High Road, Apt. 401
Dept.: EDUCATIONAL PSYCHOLOGY AND LEARNING SYSTEMS

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Measurement in Exercise Motivation

The application that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Expedited per 45 CFR § 46.110(7) and has been approved by an expedited review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 7/14/2008 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects

involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Gershon Tenenbaum, Advisor
HSC No. 2007.579

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BIOGRAPHICAL SKETCH

My professional career begun at Winthrop University where I majored in Psychology. I continued my studies at Western Kentucky University. At WKU I received a Masters in Applied Experimental Psychology under Dr. Steven Wininger. I began conducting research in the area of exercise psychology; specifically in exercise adherence. I continued my work in exercise psychology at Florida State University where I received my Ph.D in Sport and Exercise Psychology. As of September 2008, I work as a Research Psychologist for the Center for Army Leadership for the Department of the Army.