ACHIEVEMENT GOALS AMONG HIGH SCHOOL STUDENTS IN PHYSICAL EDUCATION

A Dissertation

by

JIANMIN GUAN

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2004

Major Subject: Kinesiology

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ABSTRACT

Achievement Goals among High School Students in Physical Education. (August 2004)

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Achievement goal research in physical education (PE) settings relies heavily on the traditional dichotomous achievement goal framework. Few studies use the trichotomous or 2*2 achievement goal model to explore and examine high school students' achievement goals and behaviors in PE settings. Additionally, few studies to date have examined social and achievement goals simultaneously for high school students in PE settings. The purposes of this study were to: (1) examine whether the trichotomous and 2*2 achievement goal models reported in university undergraduate classrooms are appropriate in high school PE classes and (2) examine achievement goals and social goals simultaneously to see how they impact students' persistence/effort toward physical education.

The results revealed that the 2*2 model is appropriate for high school students in PE settings and provides a better fit to the data than the trichotomous model. The results also revealed that social responsibility goals represent the greatest contributor to students' persistence/effort toward physical education. This is followed by mastery-

approach goals, mastery-avoidance goals, and performance-approach goals. Performance-avoidance goals and social relationship goals did not significantly affect students' persistence/effort toward physical education. Based on the findings, we advocate using both achievement and social goals when examining student motivation and achievement in high school physical education.

DEDICATION

I would like to dedicate this dissertation to my wife, Liping Cui and our daughter, Chuyang Guan. I would have never finished my graduate studies without their love, support, and encouragement.

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CHAPTER I

INTRODUCTION*

The central focus of this study was to examine whether the trichotomous achievement goal, 2*2 achievement goal, and social goal models are appropriate in high school physical education classes. Second, this study examined how achievement goals and social goals might affect students' persistence and effort toward physical activities. This chapter reviews the literature on achievement goal and social goal theory and includes: (a) achievement goal models and instrument development, (b) social goals, (c) model assessment and fit indexes, and (d) replicability theory of research outcomes.

Background

Achievement Goal Model and Instrument Development

In the late 1970s and early 1980s, several researchers introduced an achievement goal approach to study achievement motivation and behaviors (Dweck & Bempechat, 1983; Maehr & Nicholls, 1980; Nicholls, 1979, 1984). Achievement goals are conceptualized as the purpose (Ames, 1992a; Maehr, 1989) or cognitive-dynamic focus (Elliot, 1997) of competence-relevant activity. In other words, achievement goals concern how individuals engage in achievement activities as well as the reasons why

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This dissertation follows the style and format of *Research Quarterly for Exercise and Sport.*

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individuals want to achieve what they achieve. Initially, achievement goal theorists (Dweck & Elliott, 1983; Nicholls, 1984) incorporated the approach and avoidance motivation into their achievement goal framework and posited three types of achievement goals: a learning/task-oriented goal that focused on the development of competence and task mastery, an approach-oriented performance/ego goal that aimed to attaining favorable judgments of competence, and an avoidance-oriented performance/ego goal that tried to avoid unfavorable judgments of competence. Each of these goals is hypothesized to lead to different motivational patterns. For example, the pursuit of a learning/task-oriented goal is hypothesized to generate mastery motivational patterns (e.g., high intrinsic interest in activity, persistence in the face of failure, active engagement). The adoption of approach-oriented performance/ego goals is hypothesized to lead to some adaptive outcomes (e.g., persistence/effort while studying, active task engagement), whereas the pursuit of avoidance-oriented performance/ego goals is expected to result in maladaptive outcomes (e.g., decreased intrinsic motivation, inactive task engagement).

However, the concept of independent approach and avoidance goal orientations received little theoretical and empirical attention and was soon abandoned by achievement goal theorists. As a result, achievement goal researchers collapsed the approach and avoidance component of the performance goal together into a unitary orientation, and then proposed a dichotomous model, called performance-learning goal dichotomy (e.g., Dweck, 1986) or task-ego goal dichotomy (e.g., Nicholls, Patashnick, Cheung, Thorkildsen, & Lauer, 1989).

These two goals to date have been alternatively labeled task-involvement goals and ego-involvement goals (e.g., Maehr & Nicholls, 1980; Nicholls, 1989; Ryan, 1982), learning goals and performance goals (e.g., Dweck, 1986; Elliot & Dweck, 1988), and mastery goals and ability goals (e.g., Ames, 1984; Butler, 1992). In this study, the term mastery goals and performance goals will be used throughout the paper. Despite differences in terminology for these two goals, the frameworks have been considered similar enough to justify convergence in a mastery goal versus a performance goal dichotomy (Ames & Archer, 1987).

Because of the growing popularity of the achievement goal approach, a number of scales were developed to assess individual differences in goal orientations. Some are specific to the academic settings (e.g., Nichollos, Patashnick, & Nolen, 1985), sport settings (e.g., Duda, 1989; Duda & Whitehead, 1998), and work areas. Others (e.g., Button, Mathieu, Zajac, 1996) are general goal orientation scales that could apply across different domains. In this paper, the achievement goal scales associated with sport and physical education areas were reviewed.

Dichotomous achievement goal scale. Most achievement goal research in the context of physical education use the Task and Ego Orientation in Sport Questionnaire (TEOSQ) to examine individual differences in goal orientations. The TEOSQ was originally developed by Duda (1989) and Duda, Olson, and Templin (1991) and was designed to assess individual differences in the proneness for task and ego involvement in the athletic realm. Participants responded to 13 items on a 5-point Likert-type scale with 1 = strongly disagree and 5 = strongly agree. An example from task-oriented

subscale is “I feel successful in sport when I work really hard.” An example item for an ego-oriented subscale is “I feel successful in sport when I score the most points.”

Over 70 published studies in the sport domain to date have employed the TEOSQ to assess individual differences in goal orientations (Duda & Whitehead, 1998). These research studies drew from adolescents, college students and adults. Most provided evidence of validity and reliability for this dichotomous model. Chi and Duda (1995) employed confirmatory factor analysis (CFA) to examine the factorial validity of the TEOSQ using four diverse samples (college students enrolled in skill classes, intercollegiate athletes, high school athletes, and young adolescent youth sport participants). Their study found that a single CFA supported the dichotomous model, but the multiple CFAs did not support the two-dimension structure of the TEOSQ. The major reason might be associated with differences such as gender, age, level, and type of sport involvement between groups (Chi & Duda, 1995).

In the last decade, the TEOSQ has been adapted to the physical education domain by changing the stem “I feel successful in sport when…” to “I feel most successful in PE class when…”. Research based on U.S. (e.g., Dunn, 2000; Solmon & Boone, 1993; Walling & Duda, 1995; Xiang & Lee, 1998), Greek (Papaioannou, 1990; Papaioannou & Macdonald, 1993), British (Goudas, Biddle, & Fox, 1994; Hall & Earles, 1995; Spray & Biddle, 1997), and Chinese samples (Xiang, Lee, & Shen, 2001) all supported the dichotomous model in physical education domain.

Another dichotomous achievement goal questionnaire used to assess individual differences in the proneness for task and ego involvement in the context of sport is the

Perception of Success Questionnaire (POSQ). The POSQ was originally pulled from the work of Nicholls (1989) and used the same stem as that of the TEOSQ. For example, an item from the task-oriented subscale is "I feel successful in sport when I perform to the best of my ability." An item from the ego-oriented subscale is "I feel successful in sport when I outperform my opponents." Participants respond to the 12 items on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). The POSQ has been primarily used in the sport domain. Analysis of validity and internal consistency provides strong support for this scale (for more information, see Duda & Whitehead, 1998).

Recently, researchers (e.g., Standage & Treasure, 2002; Wang, Chatzisarantis, Spray, & Biddle, 2002) applied the POSQ to the context of physical education. Validity and reliability analysis from these studies also supported the two constructs of the POSQ (Treasure & Roberts, 1994). For example, with middle school students, Standage and Treasure (2002) investigated the relationship among achievement goal orientations and multidimensional situational motivation in physical education. They found that task orientation was positively related to more self-determined types of situational motivation. Ego orientation was associated with less autonomous types of situational motivation.

Trichotomous achievement goal model. In recent years, Elliot and his colleagues developed a trichotomous model that draws from the approach and avoidance motivation theory. They argued that the distinction between approach and avoidance motivation is critical and fundamental to the study of human behavior, affect, and cognition (Elliot &

Thrash, 2001). The difference between approach and avoidance motivation lies in a function of valence. In approach motivation, for example, behavior is directed or instigated by a desirable/positive event or possibility, whereas in avoidance motivation, behavior is directed or instigated by an undesirable/negative event or possibility (Elliot, 1999). This distinction has wide utility/value in the study of scientific psychology. As Elliot, Chirkov, Kim, and Sheldon (2001) stated:

> This approach-avoidance distinction is applicable to several different levels of conceptual analysis, from global motives to goals to rudimentary reflexes, and has been shown to have theoretical and empirical utility in numerous research domains throughout the history of scientific psychology. (p. 505)

The trichotomous model incorporates the approach-avoidance distinction into the traditional dichotomous achievement goal framework. The model posits three types of achievement goals: performance-approach goals (the attainment of favorable judgments of competence), performance-avoidance goals (the avoidance of unfavorable judgments of competence), and mastery goals (the development of competence and mastering tasks). Both mastery goals and performance-approach goals are considered approach orientations because they represent regulation according to positive potential outcome such as persistence/effort while studying, absorption during task engagement, and challenge construal (Elliot, 1999). The performance-avoidance goals are considered avoidance orientations because they represent regulation according to negative potential outcomes such as low absorption during task engagement, decreased intrinsic motivation, and poor performance (Elliot, 1999).

To test the trichotomous model in university settings, Elliot and Church (1997) developed an 18-item achievement goal questionnaire on a 7-point Likert scale ranging from 1 (not at all true of me) to 7 (very true of me). These items reflect three achievement goals: mastery goals (e.g., "I want to learn as much as possible from my university classes."), performance-approach goals (e.g., "it is important for me to do better than other students in my university classes."), and performance-avoidance goals (e.g., "I wish my university classes were not graded."). Each achievement goal includes six items. The results from a principle components factor analysis revealed that the three separate goal orientations were distinguishable in an academic setting. Additionally, Elliot and Church (1997) reported Cronbach alphas for the mastery, performance-approach, and performance-avoidance subscales of .89, .91, and .77, respectively.

The trichotomous achievement goal questionnaire was slightly modified in a recent study by Elliot (1999). One item ("I wish my university classes were not graded.") from performance-avoidance goals has been replaced by a new item ("My goal for this class is to avoid performing poorly."). The revised trichotomous achievement goal questionnaire demonstrated greater face value and better psychometrics of the measures than the original instrument. Analysis of test validity and internal consistency provides strong support for this modified trichotomous model. For greater detail, refer to Elliot (1999).

Midgley et al. (1998) independently developed a similar trichotomous instrument to assess performance-approach, performance-avoidance, and mastery goals. Participants responded to 16 items on a 5-point Likert scale ranging from 1 (not at all true) to 5 (very

true). Five items addressed mastery goals (e.g., "I like academic work that I will learn from, even if I make lots of mistakes."), five items focused on performance-approach goals (e.g., "I want to do better than the others in my university classes."), and six items addressed performance-avoidance goals (e.g., "The reason I work in my university classes is so the lecturers don't think I know less than others."). This instrument also demonstrated good psychometric properties. For a more in-depth review, see Smith, Duda, Allen, and Hall (2002).

To date, the trichotomous achievement goal model developed by Elliot (1999) has been widely used in the academic context. Research based on U.S. (e.g., Elliot, 1999; Elliot & Church, 1997), British (Smith, Duda, Allen, & Hall, 2002), Russian (Elliot, Chirkov, Kim, & Sheldon, 2001), and South Korean samples (Elliot, Chirkov, Kim, & Sheldon, 2001) all support the trichotomous model in academic and university settings.

Although the trichotomous model has been widely used in academic domains, there is little research applying it to the physical education domain. To date, only a few studies with the French high school samples were conducted using the trichotomous model in the context of sport and physical education. Based on the trichotomous framework, for example, Cury (1999) developed the approach and avoidance achievement in sport questionnaire to assess French high school students' three achievement goals. This instrument consists of 15 items adapted from Elliot (1997) and Elliot and Church (1997). Responses on a 5-point Likert scale range from 1 (don't agree at all) to 5 (completely agree). This instrument has been reported as valid and reliable in

sport and physical education settings in French high schools (Cury, 2000; Cury, Elliot, Sarrazin, Fonseca, & Rufo, 2002).

2*2 *achievement goal model.* Although the trichotomous achievement goal framework incorporated the distinction between approach and avoidance, it still portrays mastery goals as a unitary approach orientation. To fully incorporate the distinction between approach and avoidance into an achievement goal framework, Elliot and McGregor (2001) proposed a 2*2 achievement goal framework in which mastery goals, like performance goals, can be separated into mastery-approach goals and mastery-avoidance categories. The rationale under this model lies in how competence is defined and how it is valenced: a desirable and positive possibility (e.g., success) or an undesirable and negative possibility (e.g., failure). For example, mastery-approach goals are defined in absolute/intrapersonal terms and are positively valenced, whereas mastery-avoidance goals are defined in absolute/intrapersonal terms but negatively valenced. Meanwhile, performance-approach goals are defined in normative terms and are positively valenced, whereas performance-avoidance goals are defined in normative terms but are negatively valenced. A pictorial representation of the 2*2 achievement goal framework is seen in Figure 1 (Elliot, McGregor, 2001). As noted in Figure 1, the 2*2 achievement goal framework includes three achievement goals from the trichotomous framework. The remaining cell of the 2*2 framework represents mastery-avoidance goals.

The focus of mastery-avoidance goals is to avoid task-referential or self-referential incompetence such as trying not to lose one's skills and abilities, striving to

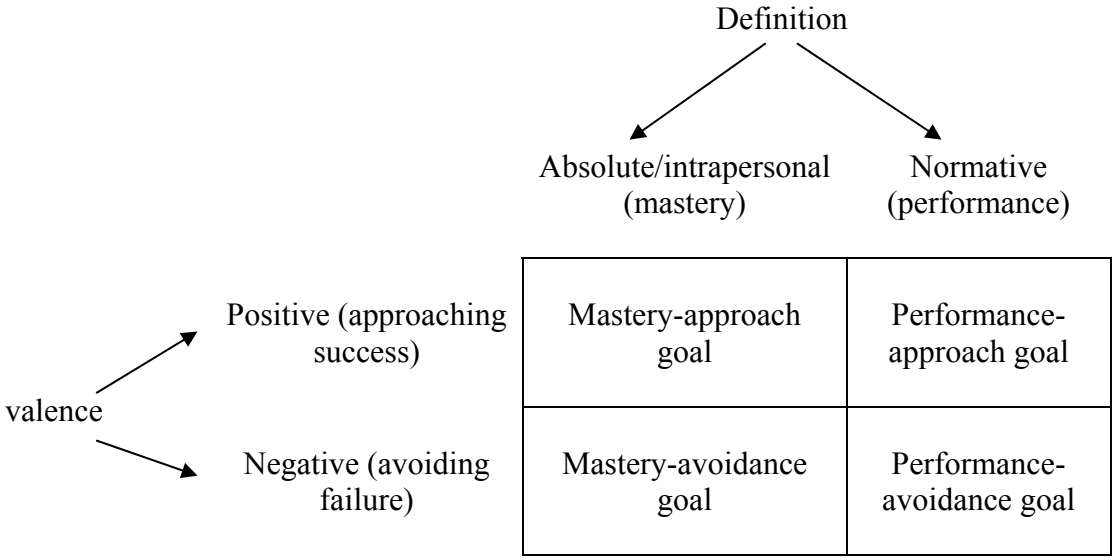

Figure 1. The 2*2 achievement goal framework modified from Elliot and McGregor (2001).

avoid misunderstanding materials, and striving not to forget what one has learned (Elliot, 1999; Elliot & McGregor, 2001). These goals "differ from mastery-approach goals in terms of how competence is valenced, they differ from performance-avoidance goals in terms of how competence is defined, and they differ from performance-approach goals in terms of how competence is both defined and valenced" (Elliot, 1999; p. 181). Given the somewhat hybrid regulatory structure, the mastery-avoidance goals are expected to produce a mixed motivational pattern regarding the antecedents and consequences of these goals. Like mastery-approach goals, for example, the mastery component of the goal may emerge from optimal antecedents and have positive consequences "when undergirded by incremental beliefs in which the negative possibilities being avoided merely represent obstacles or setbacks, rather than indicators of an immutable lack of ability" (Elliot, 1999; p.182). Like performance-avoidance goals, the avoidance component of the goal may emerge from nonoptimal antecedents and lead to negative consequences "when undergirded by fear of failure in which the negative possibilities being avoided represent shame-inducing experiences" (Elliot, 1999; p. 1982).

To assess the independence of the four achievement goal constructs, Elliot and McGregor (2001) developed a 2*2 achievement goal questionnaire comprising four achievement goals: mastery-approach goals (e.g., "I want to learn as much as possible."), mastery-avoidance goals (e.g., "I worry that I may not learn all that I possibly could."), performance-approach goals (e.g., "it is important for me to do better than other students."), and performance-avoidance goals (e.g., "I just want to avoid doing poorly."). Participants respond to the 12 items on a 7-point Likert scale ranging from 1(not at all

true of me) to 7 (very true of me). Each achievement goal includes three items. Among the 12 items, nine items were systematically selected from the trichotomous achievement goal questionnaire developed by Elliot (1999) and Elliot and Church (1997). The results from both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) strongly supported the 2*2 achievement goal framework. The CFA also showed that the 2*2 framework provided a better fit to the data than the trichotomous framework. Additionally, Elliot and McGregor (2001) reported Cronbach alphas of .89, .94, .83, and .88 for the mastery-approach, performance-approach, performance-avoidance, and mastery-avoidance subscales, respectively.

However, the 2*2 achievement goal model, like the trichotomous model developed by Elliot and Church (1997), was proposed and tested in the context of the college classroom. Little is known about generalizability of the 2*2 outside of this sample population. An examination of the motivation literature reveals that the 2*2 achievement goal model has not been applied to other settings, particularly in the sport and physical education domains. To examine generalizability of the trichotomous and 2*2 achievement goal models, therefore, there may need to apply them to a different setting. In this study, we examined the generalizability of the trichotomous and 2*2 achievement goal models in high school physical education setting.

Social Goals.

Over the last two decades, research on achievement goals has provided us a better understanding of students' motivation and has made specific recommendations for how instruction could or should be improved or reformed. In addition to achievement

goals, however, students may have social reasons for trying to succeed academically. For example, a student may believe that the purpose of academic success is to gain or keep peer approval. The literature review revealed that achievement goal researchers have largely relied on the dichotomous and trichotomous models and have ignored social goals in their studies of motivation (Urdan & Maehr, 1995).

There are a number of social goals found in the literature review, including social approval goals, solidarity, welfare goals (Urdan & Maehr, 1995), responsibility goals (Wentzel, 1989), status goals (Anderman & Anderman, 1999), and intimacy/relationship goals (Anderman & Anderman, 1999; Patrick, Hicks, & Ryan, 1997). It is necessary to define social goals within the achievement goal theory before reviewing the social goals. Because achievement goal theorists typically focus on students' perceptions about why they are trying to achieve in a given academic situation rather than what they are trying to achieve, social goals in this study are defined as "the perceived purposes for trying, or not trying, to achieve academically" (Urdan & Maehr, 1995, p. 214).

An examination of the motivation literature suggests that there are three types of social goals associated with students' achievement goals: (1) social responsibility goals that refer to an individual desire to form and maintain positive peer relationships in school (Hicks, 1996), (2) social relationship goals that represent a desire to adhere to social rules and role expectations (Wentzel, 1991), and (3) social status goals that refer to "the desire to belong to the popular crowd in school" (Hicks, 1997; p. 20). Research shows these social goals have a positive relationship with achievement goals in middle school settings. Anderman and Anderman (1999), for example, conducted a longitudinal

study between fifth and sixth grades to investigate the changes of relationship between these social goals and achievement goals. They reported that increases in mastery goal orientation were positively associated with endorsing responsibility goals, whereas increases in performance goal orientation were positively associated with relationship and status goals.

There are several instruments used for measuring social goals. Patrick, Hicks, and Ryan (1997) developed a social goal scale designed to measure fifth-grade students' social responsibility and intimacy goals. This scale consists of 11 items scored on a 5-point Likert scale ranging from 1 (not at all true) through 5 (very true). Five items addressed social responsibility goals adapted from Wentzel (1991). Six items focused on social intimacy goals. Examples of items include: "I'd like the teacher to think I'm a responsible student." (social responsibility goals) and "It's important to me to form one or two really close friendships at school." (social intimacy goals). Cronbach alphas for responsibility and intimacy goals were .77 and .60, respectively, indicating acceptable internal consistency. Principle factor analysis with varimax rotation supported the differentiation between responsibility and intimacy goals. However, Patrick, et al. (1997) did not report specific statistical indices (e.g., eigenvalues, factor loadings) to demonstrate how the social goal scale fitted the data. Additionally, no studies used confirmatory factor analysis to further confirm the validity of testing scores from this scale.

Based on Patrick et al. (1997), Anderman and Anderman (1999) developed another social goal scale. This scale comprised three subscales: responsibility,

relationship, and status goals. The participants responded to the 17 items on a 5-point Likert scale ranging from 1 (not at all true) through 7 (very true). Eight items addressed social relationship goals (e.g., "I want to be part of things that other kids are doing at school."), five items focused on social responsibility goals (e.g., "it's important to me that I follow class rules."), and four items addressed social status goals (e.g., "I don't want to hang out with unpopular students at school."). Anderman and Anderman (1999) reported Cronbach alphas of .75, .82, and .70 for the relationship, responsibility, and status subscales, respectively. Principle factor analysis with varimax rotation supported the differentiation among relationship, responsibility, and status goals. Again, no specific statistical indices (e.g., eigenvalues, factor loadings) were reported on how the social goal scale fits the data, and no studies using the CFA confirmed the independence of the three social goals.

Model Assessment and Fit Indexes

Reliability and validity are two essential characteristics of any test or measuring instrument. Reliability refers to consistency of measurement. Reliability concerns random error and may be assessed in a variety of ways. In general, there are four types of reliability: test-retest, alternate-form, interrater, and split-half and internal consistency reliability (Kline, 1998). Each of four types of reliability estimates random measurement error of the type indicated by that kind of reliability analysis. Test-retest reliability reflects time-related sources of random error and can be assessed by administrating the same instrument to the same group of subjects at two points in time. If the correlation between the two sets of scores are high, then random error due to events occurred in a

single test session may be minimal and the test-retest reliability is high. One problem with the test-retest reliability procedure is that the researchers and participants may not have time to perform two tests on the same instrument.

Alternate-form reliability reflects content-related sources of random error and can be assessed by administering different versions of a test to the same sample of subjects either within the same session or within a short time interval. Theoretically, alternate forms should cover the same content but with different sets of items. The higher the correlation across the forms, the higher the alternate-form reliability. When there is only a single version of the test, however, alternate-form reliability is not applicable. Interrater reliability reflects examiner-related sources of random error. If independent raters consistently agree in their scoring, the interrater reliability of test scores is high.

Both split-half and internal consistency reliability concern the consistency of scores within a single test. The former concerns the stability of test scores across divided halves of the test, usually by making the odd and even items. The Spearman-Brown prophecy formula can be used to estimate the split-half reliability of test scores (For greater details, see Thomas & Nelson, 2001). Internal consistency reliability reflects content heterogeneity-related sources of random error and concerns the item to item consistency of individual responses within a single test. Because the indices of internal consistency reliability can be obtained with only one administration. In the social sciences, coefficient alpha (Cronbach, 1951) is one of the most widely-used indices of internal consistency reliability.

The results of a reliability study can be presented by reliability coefficients ranging from 0 (no reliability) to 1 (perfect reliability). To date, there is no clear-cut guideline about how a high coefficient is high for an "excellent" or "good" reliability. However, there are some rough guidelines for the assessment of reliability. For example, coefficients around .90 are considered to be "excellent", around .80 "very good", around .70 "adequate", and below .50 "unreliable" because it indicates that at least 50% of the observed variance is associated with random error (Kline, 1998).

Validity refers to the degree to which an instrument measures what it is intended to measure. Like reliability, the concept of validity is also multifaceted. An examination of the psychometric literature review reveals four basic types of validity: content validity, criterion-related validity, convergent and discriminant validity, and construct validity. Content validity concerns whether an indicator's items are representative of the domain it is intended to measure. The assessment of content validity relies on the domain experts whose opinions about representativeness of the items provide the basis for evaluating content validity. A high level of agreement from the experts indicates that the content may be valid.

Criterion-related validity concerns a relationship between test scores and scores from one or more criterion tests considered to be a more accurate measure of the characteristic of interest. There are two major types of criterion-related validity: concurrent validity (focus on the comparison of a test with a criteria test) and predictive validity (focus on prediction of a behavior on a criteria test). Criterion-related validity can be assessed by computing validity coefficients. This coefficient represents the

correlation (r_{xy}) between X (stands for the predictor) and Y (stands for the external criterion). The higher the validity coefficient, the stronger the relationship between the predictor and the external criterion.

Convergent validity and discriminant validity focus on the evaluation of measures against one another rather than against an external criterion. Convergent validity is demonstrated when using different instruments to measure the same construct and scores from these different instruments are strongly correlated. In other words, the correlation reveals if different instruments measure the same construct. Discriminant validity, on the other hand, is demonstrated when using a variety of instruments to measure different constructs and scores from these different instruments are weakly correlated. For example, a test displays discriminant validity when the test does not measure a construct that it was not intended to measure.

Lastly, construct validity concerns whether an indicator actually measures the construct the researcher intends to measure. Construct validity is the most general kind of validity because it includes the above three types of validity which are relevant to the evaluation of construct validity (Kline, 1998). Construct validity can be performed by fitting common factor models to the data set.

There are two basic kinds of approaches to the investigation of construct validity for the underlying factors: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Both EFA and CFA attempt to reproduce a set of either correlations or covariances presented in the original data by clustering subsets of the observed variables with a relatively small set of underlying factors. Generally, EFA is more appropriate

when little is known about the structure of underlying constructs. The major goal of the EFA is to decide how many factors exist in a set of theoretical relations. It should be noted, however, that although "the EFA is useful in determining the adequate number of factors in a theoretic model, it does not provide a statistical test of how well the individual items fit with each particular factor." (Heck, 1998; p. 201)

Three major approaches assess the model fit in an exploratory factor analysis. The first approach is the proportion of variance contributed by both each factor and the set of factors as a group. Generally, if the factors account for 50%-80% of the variance, the model fits the data. Second, one can examine the Kaiser-Eigenvalues that refers to the sum of the squared loadings of the indicators on the factor with which the eigenvalue is associated. When a factor's eigenvalue is above 1.0, one should retain the factor. Conversely, when a factor's eigenvalue falls below 1.0, one should eliminate the factor.

The third approach is Cattell's Scree Test (1966) that "is a visual representation of descending eigenvalues (or variance accounted for) associated with each factor" (Heck, 1998; p.188). According to the Kaiser-Eigenvalue criterion, the eigenvalues will level off at 1.0. When the descending eigenvalue falls below 1.0 or reaches a horizontal line, those factors will not account for further meaningful variance.

In contrast to exploratory factor analysis in which the researcher has no prior knowledge that the items measure the intended factors, confirmatory factor analysis requires a proposed theoretical model in which the researcher must specify a set of relationships in the model before being actually tested with data. These relationships are postulated on the basis of previous research in the area of study, knowledge of the

related theory, or some combinations of both. Therefore, the CFA is a useful means of investigating and establishing the construct validity of a proposed model.

Confirmatory factor analysis has been used in this study to measure the construct validity for the 2*2 achievement goal model, the trichotomous model, and social goal model. Interpretation and evaluation of CFA results requires knowledge of the method used to obtain parameter estimates and the criteria. However, different estimation and fit indexes would lead to the different inferential outcomes. To date there are several methods of estimation such as maximum likelihood (ML), generalized least squares (GLS), ordinary least squares (OLS) and asymptotic distribution-free (ADF). Among these methods of estimation, the ML is the most widely employed because many studies reveal that the ML performs well under different less-than-optional analytic conditions such as excessive kurtosis and small sample size (Hoyle & Panter, 1995). Because of this, Hoyle and Panter (1995) suggest that researchers should routinely report outcomes from ML estimation. In fact, ML estimation represents the default method in many model-fitting statistical software programs.

There are a number of fit indices used to evaluate the fit of a model to the data. The major fit indices include the Chi-square (χ^2), the ratio of Chi-square to degrees of freedom (χ^2/df), the Bentler-Bonett Non-Normed Fit Index (NNFI), the Bentler-Bonett Normed Fit Index (NFI), the Bentler Comparative Fit Index (CFI), the Goodness of Fit Index (GFI), the Adjusted Goodness of Fit Index (AGFI), and the Root Mean Square Error of Approximation (RMSEA). Each index is described below.

Chi-square(χ^2). The χ^2 test is the most common measure of a model fit, which assesses the magnitude of the discrepancy between the fitted covariance matrices and the sample. However, there is a major problem with the χ^2 as a fit index. The χ^2 is very sensitive to sample size. If the sample size is large, theχ^2 statistic would frequently be significant even if the model provides a good fit (James, Mulaik, & Brett, 1982). Because of this, it is frequently concluded that the CFA model is a good fit with the data even if the χ^2 is significant (Hatcher, 1994).

Ratio of chi-square to degrees of freedom (χ^2/df). Alternatively, some researchers use the χ^2/df to reduce the sensitivity of the χ^2 statistic to the sample size. However, it should be noted that there are still two major weaknesses with this index. First, the χ^2/df ratio is still affected by sample size. The same model may have significantly different ratios with a small sample than with a large sample (Marsh, Balla, & McDonald, 1988). Second, to date there is no standard about what value of the χ^2/df is minimally acceptable. Although a frequent suggestion is that the χ^2/df should be less than 3.0 for adequate fit (Kline, 1998; McIver & Carmines 1981), this requirement is somewhat arbitrary. For these reasons, the χ^2/df as a fit index should be used only with caution. As Hatcher (1994) stated, "we advise that this criteria be used only as a very rough rule of thumb, if at all, and be supplemented with other criteria that are not affected by sample size." (p. 290)

Bentler-Bonett Normed Fit Index (NFI). This index is viewed as the proportion in the improvement of the overall fit of the researcher's model compared with a null model. The typical null model is an independent model in which the observed variables are

assumed to be uncorrected. The value of the NFI may range from 0 to 1, with values over .90 indicative of an acceptable fit of the model to the data. The NFI is easily interpreted, but substantially underestimates goodness of fit in small samples (Hatcher, 1994).

Bentler-Bonett Non-Normed Fit Index (NNFI). This index is a variation on the NFI. An older name for the NNFI is the Tucker-Lewis Index (TLI). The NNFI/TLI performs well and better reflects model fit at all sample sizes when the maximum likelihood estimate (the standard method of estimating free parameters in structural equation models) is used (Hu & Bentler, 1995). The value of the NNFI/TLI may assume below 0 and above 1, with values over .90 indicating a relatively good fit.

Bentler Comparative Fit Index (*CFI).* This index is another variation on the NFI. Like the NFI, values of the CFI range from 0 to 1, with values over .90 indicative of an acceptable fit of the model to the data. Additionally, the CFI is similar to the NNFI because it is less influenced by sample size. However, the CFI tends to be more accurate than the NNFI in describing comparative model fit (Bentler, 1989).

Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI). These two fit indexes are less sensitive to sample size and more standardized than the χ^2 statistic. The GFI and AGFI were originally used in the LISREL program but are now calculated by other programs (e.g., CALIS and AMOS). Theoretically, values of both the GFI and AGFI indexes range from 0 to 1 with values close to 1 being indicative of good fit, but it is possible for them to be below 0 (e.g., when sample size is small) or above 1 (e.g., with just-identified models). Because the GFI and AGFI basically compare the

hypothesized model with no model at all, they can be classified as absolute fit indexes (Hu & Bentler, 1995). It should be noted, however, that both the GFI and AGFI values are still overly affected by sample size. According to Hoyle (1995), for example, Hu and Bentler reported that the GFI tends to underestimate its asymptotic value at small sizes (e.g., $N < 250$). For more information about how sample sizes affect the GFI and AGFI values, see Fan, Thompson, and Wang (1999).

Root Mean Square Error of Approximation (RMSEA). The RMSEA is another widely used index proposed by Steger and Lind (1980) and takes into account the error of approximation in the population. This statistic provides a greater room for acceptance of a model than does the χ^2 statistic because it allows for a difference of fit per degree of freedom. RMSEA are measures of the average unexplained variance and covariances in the model, the values of index should be close to zero for a good fit. Unlike indexes of the NFI, NNFI, CFI, GFI, and AGFI, which there is a consistent/agreeable criteria (value above .90) for a good-fitness model, there is no agreement for the values of RMSEA index. Some researchers consider the RMSEA with values less than .01 being indicative of good fit. The others consider a value of less than .05 indicative of an acceptable fit of the model to the data.

In sum, it should be noted that to date there is no agreement on the best index of overall fit for evaluating structural equation models. Most researchers recommend reporting multiple indexes of overall fit (e.g., Hatcher, 1994; Hu & Bentler, 1995).

Replicability Theory of Research Results

Result replicability is a critical issue in research and is endorsed by more and more scholars because results that can not be replicated are dubious. Result replicability focuses on how stable statistical results are across different samples from the same population. It is necessary to address the differences between replicability and reliability in order to better understand result replicability procedures. Result replicability helps determine whether the same results will be found if other researchers select a different sample from the same population. In other words, whether or not the results from one study can be generalized to its population. Given that a core research endeavor using samples is to understand the population, it is important to ensure whether research results with a sample are replicable in the same population with different samples. Reliability, on the other hand, is an important characteristic of test scores. It focuses on measurement consistency. In other words, reliability determines whether the same results (e.g., scores on a test) will be found if the same sample instead of a different sample from the same population is to be tested again. At present, there are three commonly used methods for establishing reliability: test-retest (stability), alternate-form, and internal consistency reliability (Thomas & Nelson, 2001). They all use one sample with different techniques to obtain reliability.

There are two kinds of methods for evaluating replicability: external and internal. External analysis involves true replication because it generates new data when re-conducting the study. In reality, however, it is not practical for researchers to draw many repeated samples from a population. Alternatively, internal replicability analyses are

more appealing to researchers as no new data sets are required. It is important to point out, however, that internal analyses tend to yield inflated internal empirical replicability evaluations (Thompson, 1993, 1994). Despite this limitation, internal analyses are still better than the mere presumption of replicability, especially if such analyses are carefully interpreted (Thompson, 1993, 1994).

An examination of the literature on this topic revealed three commonly used methods to internally test result replicability: jackknife, bootstrap, and cross-validation analyses (Ang, 1998; Gillaspy, 1996; Thompson, 1989, 1993). Each method has its own advantages and disadvantages. These procedures are illustrated in Figure 2.

Jackknife methods, developed by Tukey (1958), involve repetitively dropping different observations or subsets of observations from an analysis to determine how stable the results are across different configurations of observations. For example, assume there are 51 observations in a sample. To produce the first jackknife sample statistic (e.g., the R^2), omit the first observation from the sample and compute R^2 based on the remaining 50 observations; to generate the second jackknife R^2, omit the second observation, but bring back the first. This process is repeated until a total of 51 jackknife R^2 are computed, each with a sample size of 50 observations. Based on these R^2 values, jackknife estimations then can be determined. Gillaspy (1996) provides detailed information regarding jackknife methods and computer commands for social science analyses.

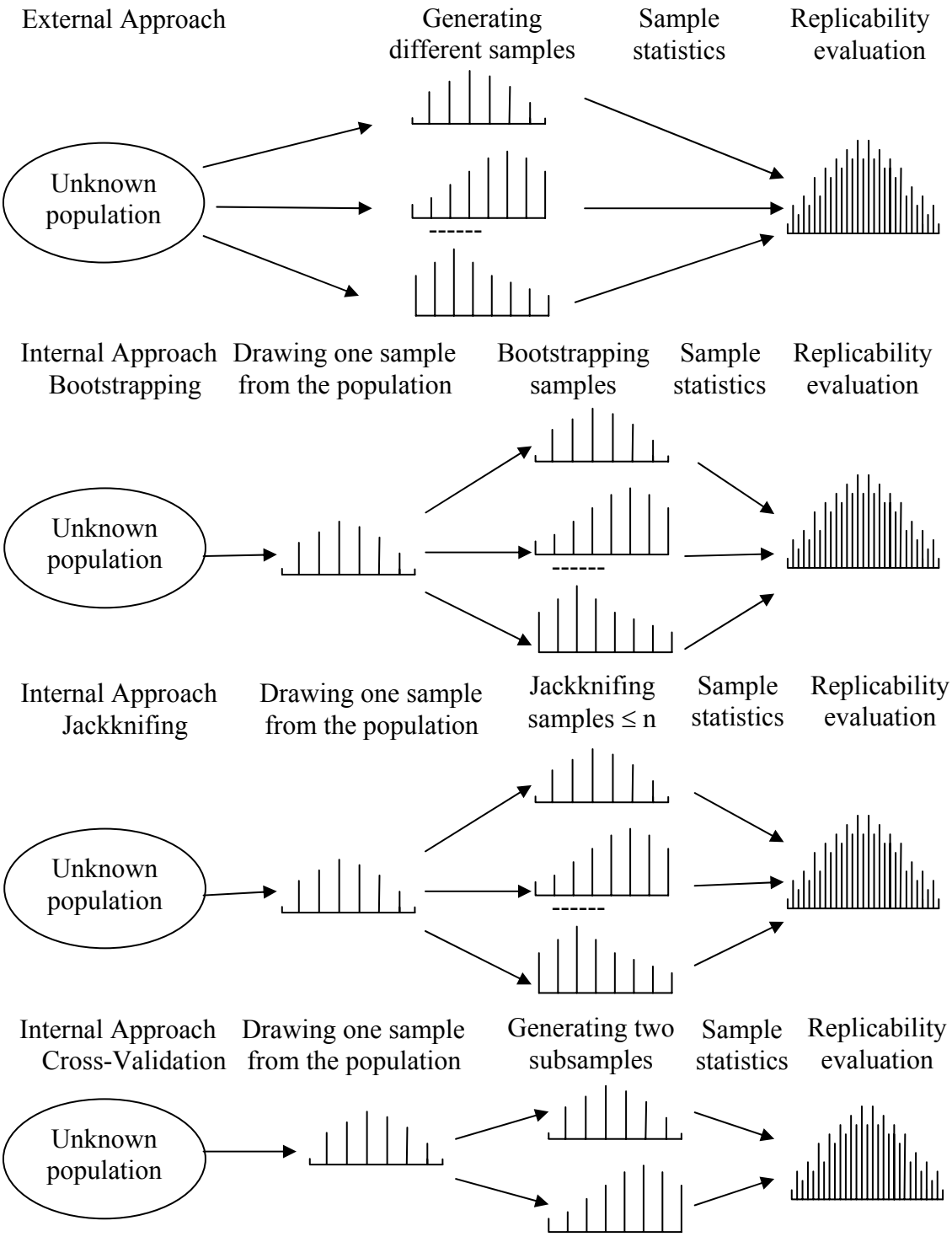

Figure 2. Differences between external and internal approach in evaluating result replicability.

Bootstrap methods were derived from the jackknife technique (Efron, 1979). These methods involve first drawing a sample randomly from a population and then redrawing randomly many subsamples with replacement from the sample. Based on these subsamples (called bootstrap samples), sample statistics (e.g., mean or median) can be generated for each bootstrap sample. Because the bootstrap method allows for the consideration of many configurations of observations and examines the extent to which results generalize across different types of observations, it is more powerful than the jackknife procedure (Thompson, 1994). For greater detail and application of bootstrap methods, refer to Ang (1998) and Zhu (1997).

Although Jackknifing and bootstrapping can be used to evaluate result replicability, both procedures are complicated and labor intensive (Thompson, 1994; White, 2000). Jackknife methods are especially labor intensive when the sample size is large because one usually needs to regress many subsets from the data and compute pseudovalues and confidence intervals. Because of this, some researchers use simpler double cross-validation methods to evaluate the replicability of results. A double cross-validation procedure is an empirical invariance procedure used in multiple regression. The double cross-validation procedure essentially involves the use of two samples/ subsamples to produce two pairs of regression equations from which respective shrinkages can be determined. The first sample results can be confirmed using the second sample data and the second sample results, in turn, can be confirmed using the first sample data. This approach requires little additional work, compared to a simple cross-validation procedure. It can produce more confidence in a study's conclusions

regarding generalizability if the results can be confirmed on two "crosses" rather than one (Thompson, 1994). The following four standardized regression equations illustrate the logic of double cross-validation procedures:

$$Z_{\hat{Y}11} = \beta_{11}Z_{11} + \beta_{12}Z_{12} + \beta_{13}Z_{13} + \ldots + \beta_{1j}Z_{1j}$$

$$Z_{\hat{Y}12} = \beta_{21}Z_{11} + \beta_{22}Z_{12} + \beta_{23}Z_{13} + \ldots + \beta_{2j}Z_{1j}$$

$$Z_{\hat{Y}21} = \beta_{11}Z_{21} + \beta_{12}Z_{22} + \beta_{13}Z_{23} + \ldots + \beta_{1j}Z_{2j}$$

$$Z_{\hat{Y}22} = \beta_{21}Z_{21} + \beta_{22}Z_{22} + \beta_{23}Z_{23} + \ldots + \beta_{2j}Z_{2j}$$

Where $Z_{\hat{Y}}$ = predicted standard score of $\hat{Y}$ (predicted score for the criterion variable). β = standardized regression coefficient or beta coefficient. Z = standard score of predictor variable. The first subscript number for the $Z_{\hat{Y}}$ indicates which subsample's Z-scores are employed to compute the $Z_{\hat{Y}}$, while the second subscript number for the $Z_{\hat{Y}}$ represents which subsample's beta cpefficients are used to calculate the $Z_{\hat{Y}}$. The first subscript for the β and Z indicates which subsample produces the beta coefficients and Z-scores of predictor variables. The second subscript represents the sequence number of the predictor variables (from the first to the j^{th}).

Therefore, for subsample 1, $Z_{\hat{Y}11}$ can be computed using subsample 1's Z-scores and beta coefficients, whereas $Z_{\hat{Y}12}$ is completed by using subsample 1's Z-scores and subsample 2's beta coefficients. Similarly, for subsample 2, $Z_{\hat{Y}21}$ can be computed using subsample 2's Z-scores and subsample1' beta coefficients, while $Z_{\hat{Y}22}$ is completed by using subsample 2's Z-scores and beta coefficients.

It is important to note that the double cross-validation procedure could be used to test result replicability either externally (when two independent samples are available) or

internally (when only one single sample is available). In this study, two independent samples were used to evaluate the result replicability.

In addition, the concept of shrinkage of the multiple correlation needs to be addressed in order to better understand the replicability analysis of cross-validation methods. In multiple regression analysis, the multiple correlation *R* is a Pearson product-moment correlation between scores on the observed criterion variables (Y) and predicted scores for the criterion variable ($\hat{Y}$). R^2 represents the proportion of criterion variable variance that can be accounted for by the combined predictor variables. Because the choice of a set of weights in a regression analysis is designed to yield the highest possible correlation between the criterion variable and the predictor variables, the resulting R^2 is the maximum mathematical value for a given sample. In other words, if a set of weights derived in one sample is applied to the predictor scores of another sample and the observed criterion scores are then correlated with the predicted scores, the resulting *R* would generally be smaller than the original *R* (Pedhazur, 1997). This phenomenon is called the shrinkage of the multiple correlation.

There are two ways for estimating the degree of shrinkage: a formula estimation and a cross-validation procedure. At present, a number of formulas can be used to estimate the amount of shrinkage (Catting, 1980; Cotter, 1982) for more information regarding the formulas. Wherry's (1931) formula has been most the commonly used and can be calculated by most computer statistical packages (e.g., SPSS, SAS).

$$\hat{R}^2 = 1 - (1 - \hat{R}^2) \frac{N-1}{N-k-1}$$

where $\hat{R}^2$ = adjusted squared multiple correlation; R^2 = obtained squared multiple correlation; N = size of sample; k = number of predictors.

The major disadvantage of the Wherry formula estimation, however, is its insensitivity to violation of random sampling assumptions. For example, for any given N, k, and R, the estimated shrinkage of R^2 is the same regardless of the nature of sample from which the regression equation was obtained. Additionally, the Wherry formula cannot be used to estimate if the derived equation predict well on other samples, which are also drawn from the same sample population (Stevens, 2002).

Alternatively, some researchers (e.g., Herzberg, 1969; Lord & Novick, 1968; Moiser, 1951; Pedhazur, 1982) suggest that the best methods for estimating the degree of shrinkage are double cross-validation procedures that can be done by using two random samples. For the first sample a regular regression analysis is performed, and a set of weights and R^2 are obtained. These weights are then applied to the predictor variables of the second sample, thus yielding a $\hat{Y}$ for each observation. A Pearson r between the observed criterion scores (Y) in the second sample and the predicted criterion scores ($\hat{Y}$) can be calculated. This r is analogous to the multiple correlation R obtained in the first sample. The difference between R^2 in the first sample and R^2 in the second sample is an estimate of the degree of shrinkage. This provides a theoretical basis for using cross-validation to evaluate the replicability of results.

The process of empirical double cross-validation is based on applying the above procedures twice. Because of the shrinkage, it is highly possible that statistically significant predictor variables in the derivation sample may not be statistically

significant in the second sample or vice versa. Therefore, the degree of shrinkage of R^2 can be considered an index that represents stability or invariance across the samples. The more closely the shrinkage estimates approach zero, the greater the degree of stability across the samples and the more confidence the researcher can vest in the replicability of the results.

The major problem with using this method to evaluate shrinkage, however, is that the result has no set metric (Rowell, 1991). For example, the degree of shrinkage from an R^2 of .90 to one of .80 is not the same as shrinkage from an R^2 of .20 to .10, because the former shrinkage is more noteworthy than the latter. Due to this inconsistency, researchers use invariance coefficients to estimate the replicability of the results (Ang, 1998; Rowell, 1991; Thompson, 1989). The invariance coefficient can be derived by correlating (a) $Z_{\hat{Y}12}$ scores produced by subsample 1's data and subsample 2's beta coefficients with $Z_{\hat{Y}11}$ scores derived in subsample 1's data and beta coefficients, and (b) $Z_{\hat{Y}21}$ scores produced by subsample 2's data and subsample 1's beta coefficients with $Z_{\hat{Y}22}$ scores derived in subsample 2's data and beta coefficients. As these two invariance coefficients approach one, more confidence can be obtained in the generalizability of the results.

In summary, this chapter reviewed achievement goal theory, social goal theory, and instrument development. We highlighted the development of achievement goal models and reviewed several fit indexes used for model assessments. The results from the literature review revealed that the trichtomous and 2*2 achievement goal models were proposed and tested in the context of the college classroom. Little is known about

the generalizability of these two models of this sample population, particularly in the sport and physical education domains. Additionally, we reviewed replicability theory of research outcomes. The results from the literature review revealed that result replicability is a critical issue in research and is endorsed by more and more scholars. Finally, the last section presents the limitations and delimitations of this study.

Limitations

The present study involved the following limitations:

1. The results of the study may be specific to the subject population used.

Delimitations

This study was delimited to:

1. High school participants only.
2. All participants were delimited to two high schools located in the southwest region of the United States.

CHAPTER II

THE STUDY

Introduction

Over the past 20 years, achievement goal theory has been recognized as an important theoretical approach to understanding student motivation and behavior in both classroom and physical education settings. Achievement goals are conceptualized as the purpose (Ames, 1992a; Maehr, 1989) or cognitive-dynamic focus (Elliot, 1997) of competence-relevant activity. Most achievement goal research reveals that individuals adopt two different goal perspectives: mastery goals and performance goals (Ames & Archers, 1987, 1988; Ames, 1992a) and each is associated with a different conception of ability and definition of success. These two goals have been alternatively labeled task-involvement goals and ego-involvement goals (e.g., Maehr & Nicholls, 1980; Nicholls, 1989; Ryan, 1982), learning goals and performance goals (e.g., Dweck, 1986; Elliot & Dweck, 1988), and mastery goals and ability goals (e.g., Ames, 1984; Butler, 1992). In this project, mastery goals and performance goals will be used throughout.

Despite differences in terminology for these two goals, the frameworks have been considered similar enough to justify convergence into a mastery goal versus a performance goal dichotomy (Ames & Archer, 1987). Individuals with a mastery goal orientation focus on the goals of learning, personal improvement, understanding of their work, or mastery based on self-reference standards (Ames, 1992a, 1992b; Meece, Blumenfeld, & Hoyle, 1988; Nicholls, 1989). Individuals with a performance goal

orientation focus on demonstrating superior ability relative to others, surpassing normative-based standards, or achieving success with little effort (Ames, 1984, 1992b; Covington, 1984).

Nicholls, Patashnick, Cheung, Thorkildsen, and Lauer (1989) stated that mastery and performance goals represent two types of "approach tendencies" that lead to different motivational patterns. For example, the adoption of a mastery goal is hypothesized to lead to mastery motivational patterns such as high intrinsic interest in activity, attribution to effort, and active engagement, whereas the adoption of a performance goal is presumed to generate failure-avoiding patterns of motivation such as an avoidance of challenge, withdrawal of effort in the face of failure, and use of superficial or short-term learning strategies (Ames, 1992b, 1992c).

In recent years the traditional dichotomous achievement goal framework has been challenged by researchers (e.g., Elliot, 1999; Elliot & Church, 1997; Elliot & Harachiewicz, 1996; Middleton & Midgley, 1997; Skaalvik, 1997). One of the major reasons is that the extant literature does not provide strong and clear support for the proposition that performance goals generate negative or maladaptive processes and outcomes (e.g., striving not to do worse than others). There is a mixed pattern of results for performance goals. Some studies (Butler, 1992; Elliot & Church, 1997; Elliott & Dweck, 1988) revealed that performance goals elicited negative or maladaptive processes and outcomes, whereas others (Elliot & Harachiewicz, 1996; Harackiewicz & Elliot, 1993) indicated that performance goals generated adaptive achievement behavior (e.g., striving to do better than others). Given that performance goals are not able to fully

account for the mixed pattern of results from these studies, there may be a need to further differentiate performance goals.

Elliot and Harachiewicz (1996) proposed a trichotomous achievement goal framework in which the mastery goal construct remained the same but the performance goal construct was partitioned into performance-approach and performance-avoidance goals. A performance-approach goal focuses on the attainment of favorable judgments of competence, whereas a performance-avoidance goal focuses on the avoidance of unfavorable judgments of competence (Elliot & Church, 1997). Each of these goals is hypothesized to lead to a unique motivational pattern. For example, performance-approach goals would lead to some adaptive outcomes, whereas performance-avoidance goals would result in maladaptive outcomes (Elliot, 1999; Elliot & Church, 1997; Elliot & Thrash, 2001). Analysis of validity and internal consistency provides strong support for this trichotomous framework (see Elliot & Church, 1997; Middleton & Midgley, 1997; Skaalvik, 1997).

Based on the trichotomous framework, Elliot and McGregor (2001) proposed a 2*2 achievement goal framework in which the mastery goal construct, like the performance goal construct, was also partitioned into mastery-approach and mastery-avoidance categories. Individuals with a mastery-approach goal orientation try to focus on mastering tasks, learning, and understanding. In contrast, individuals with a mastery-avoidance goal orientation try to avoid misunderstanding, avoid not learning or not mastering a task. To verify each of the four goals in the 2*2 framework, Elliot and McGregor (2001) developed a 2*2 Achievement Goal Questionnaire. The results of both

Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) strongly supported the existence of the four achievement goal constructs for this instrument. Additionally, the CFA analysis showed that the 2*2 framework provided a better fit to the data than the trichotomous framework. For an in-depth review of the 2*2 framework, see Elliot and McGregor (2001).

Although empirical research provides strong support for the 2*2 and trichotomous frameworks, both models were proposed and tested in the context of the college classroom. Little is known about generalizability of the 2*2 or trichotomous framework outside of this sample population. To further explore and develop the 2*2 and trichotomous achievement goal frameworks with other populations, there is a need to replicate and extend Elliot and his collegues' studies in other settings. As Harackiewicz, Barron, Pintrich, Elliot, and Thrash (2002) noted, "We need more research on younger and more diverse populations to understand the role of multiple goals in facilitating or constraining student motivation, cognition, and learning." (p. 643)

Research on Achievement Goals in Physical Education

In the last decade, research on achievement goals has extended to the physical education domain. Researchers primarily focused on individual differences in goal perspectives or dispositional goal orientations. Walling and Duda (1995), for example, found that students with high mastery goals were significantly more likely to express the belief that success in physical education is achieved through intrinsic interest, high effort, and cooperation than those with low mastery goals. In contrast, high performance goal-oriented students were more likely to believe that success is achieved when they

possess high ability more than low performance goal-oriented students. Walling and Duda (1995) also reported that students with high mastery or low performance goals were more likely to reject the notion that success in physical education stemmed from learning to skillfully deceive the teacher. Additionally, researchers in the physical education domain found that students in upper elementary grades (Spray & Biddle, 1997; Xiang & Lee, 1998) or beyond (Walling & Duda, 1995, Spray, Biddle, & Fox, 1999) could be identified as mastery goal- and performance goal-oriented.

Achievement goal research in physical education settings relies heavily on the traditional dichotomous achievement goal frameworks (Chen, 2001). There are few studies using the 2*2 or trichotomous achievement goal framework to explore and explain students' achievement goals and behaviors in physical education settings, particularly in high school settings. Applying the 2*2 achievement and trichotomous frameworks to explore and summarize high school students' goal profiles in physical education settings may help to further understand older students' achievement goals.

Social Goals

Although achievement goal research provided a clearer understanding of student achievement motivation, students may have social reasons for trying to succeed academically. For example, a student may believe that the purpose of academic success is to gain peer approval. Urdan and Maehr (1995) defined social goals in the achievement situation as "the perceived purposes for trying, or not trying, to achieve academically" (p. 214).

Researchers examining student social goals in classrooms reported at least two different types of social goals associated with students' academic success (Hicks, 1996; Hicks, Murphy, & Patrick, 1995; Patrick, Hicks, & Ryan, 1997). The first social goal is called relationship and refers to an individual desire to form and maintain positive peer relationships in school (Hicks, 1996). Parker and Asher (1987) found that individuals with unsatisfactory peer relationships were more likely to be at risk of academic and adjustment problems in one's later schooling and beyond. Additionally, Hicks et al. (1995) found that social relationship goals were positively associated with both mastery goals and performance goals. Their findings also indicated that students who emphasized peer relationships were more likely to engage in academic work out of a desire to develop understanding and mastery or to demonstrate their ability in comparison to others.

The second social goal has been referred to as responsibility and represents a desire to adhere to social rules and role expectations (Wentzel, 1991). Individuals aimed to be socially responsible report that they want to follow rules and treat people with respect. Hick et al. (1995) found that social responsibility goals were positively associated with mastery goals and negatively associated with extrinsic goals. Their findings indicated that students who wanted to be socially responsible were likely to engage in academic work in order to obtain a personal sense of mastery or to demonstrate their ability in comparison to others rather than out of a desire for extrinsic rewards (e.g., grades).

Because of the relationship between social goals and student academic success, there has been a growing call for social goals to be considered in the study of achievement goals (e.g., Blumenfeld, 1992; Ford, 1992; Maehr & Nicholls, 1980; Urdan & Maehr, 1995). Few studies to date, however, examine social and achievement goals simultaneously with high school students in general, and physical education students in particular.

Persistence and Effort

Many researchers (e.g., Dweck, 1986; Elliot, McGregor, & Gable, 1999; Heckhausen, 1991) consider persistence and effort to be important predictors of achievement outcomes. Persistence is defined as a continued investment in learning when obstacles are encountered and effort refers to the overall amount of energy expended in the process of learning (Zimmerman & Risemberg, 1997). Classroom research establishes a link between student achievement goals and their persistence and effort. Researchers found that mastery goals were positively associated with persistence and effort, whereas performance goals had a mixed pattern.

Elliot, McGregor, and Gable (1999), for example, found that undergraduate students' mastery goals and performance-approach goals were positive predictors of persistence, effort, and exam performance, whereas performance-avoidance goals were negative predictors of exam performance. Additionally, Elliot et al. (1999) revealed that both persistence and effort were positive predictors of exam performance. However, these research findings have been based on either the traditional dichotomous achievement goal model or trichotomous framework in the traditional classroom setting.

With the appearance of the 2*2 frameworks and an emphasis of social goals on influence in student academic success, more research effort should be done to further examine the relationships among achievement goals, social goals, and behaviors in physical education settings.

Result Replicability

Rresult replicability is an important issue in scientific research (Thomas & Nelson, 2001; Thompson, 1989). Result replicability focuses on how stable statistical results are across different samples from the same population. However, few researchers in kinesiology address result replicability. A number of factors may account for this neglect. First, researchers may not be aware of the importance of result replicability and believe that statistical significance and effect size are sufficient research outcomes. To support this assertion, result replicability has not been included in the most often used kinesiology research methods textbooks (see Thomas & Nelson, 2001). Moreover, research methods instructors often do not focus on the topic of result replicability in research methods classes (Silverman & Keating, 2002). A sizeable fraction of kinesiology researchers, therefore, may be uninformed about this topic. Second, researchers unaware of the importance of replicability may incorrectly assume that the *p* values calculated in statistical significance tests evaluate the probability that results will replicate (Carver, 1993; Cohen, 1994; Thompson, 1994, 2002). Finally, most of the published studies regarding result replicability procedures have been so mathematically oriented that those researchers lacking mathematical backgrounds may not be able to use

these methods in their research (Schmitt, 1989). No matter the reasons, researchers should recognize the importance of evaluating result replicability in their research.

Result replicability can be evaluated by either external or internal methods. External methods involve true replication because they generate new data when re-conducting the study. In reality, however, it is not practical for researchers to draw many repeated samples from a population. Alternatively, internal replicability analyses are more appealing to researchers as no new data sets are required. An examination of the literature on this topic suggests that there are three commonly used methods to internally test result replicability: jackknife, bootstrap, and cross-validation analyses (Ang, 1998; Gillaspy, 1996; Thompson, 1989, 1993). Each method has its own advantages and disadvantages. For greater details, see previous chapter.

Purpose

The purposes of this study were threefold: (1) to examine whether the 2*2 and trichotomous achievement goal models revealed in university undergraduate classrooms exist in high school physical education classes and which model represents a better fit to the data in high school settings, (2) to examine the social and achievement goals simultaneously and explore relationships between two social goals (responsibility and relationship goals) and four achievement goals (mastery-approach goals, mastery-avoidance goals, performance-approach goals, and performance-avoidance goals) in high school PE classrooms, and (3) to examine how the achievement goals and the social goals might affect students' persistence and effort toward physical education.

Research Questions

1. Are the 2*2 and trichotomous achievement goal frameworks appropriate for high school physical education students?
2. Does the 2*2 model represent a better fit to the data than the trichotomous model in high school physical education settings?
3. Do achievement goals and social goals simultaneously affect high school students' persistence and effort toward their physical education?
4. Can results from this study be replicated?

Predictions

1. The 2*2 achievement goal model is appropriate for high school physical education students,
2. The 2*2 achievement goal model represents a better fit to the data than the trichotomous model in high school physical education settings.
3. Achievement goals and social goals simultaneously contribute to students' persistence and effort toward their physical education.
4. Statistical results from this study can be replicated.

Methods: Study One

This paper was completed in two studies. Study one is a pilot study. The aim of the pilot work is to modify the 2*2 achievement goal scale, trichotomous scale, social goal scale, and persistence and effort scale for high school students in the physical education settings and examine their validity and reliability. The aims of the study two were to (1) evaluate the replicability of the scales with another sample from a different

school district, (2) examine how achievement goals and social goals affect students' persistence and effort toward physical education, (3) evaluate the result replicability of two regression models in the prediction of students' persistence and effort toward physical education, and (4) interview selected students to gain in-depth information about their achievement goals in physical education settings.

Participants

Participants in study one were 180 high school students (84 boys, 95 girls, and one did not report his/her gender) from a local school in the southern region of the United States. Students consisted of ninth (48%), tenth (28.7%), eleventh (17.5%), and twelfth (5.8%) grades and their age ranges from 15-18 years. The majority, 55.0%, were Caucasian, with 12.8% Asian-American, 11.1% Hispanic American, 8.3% African American, and 12.2% others; the remaining .6% did not report their ethnicity.

Instrumentation

Participants completed the 41-item Achievement Goal Questionnaire-Physical Education (AGQ-PE). The AGQ-PE, adapted from the achievement goal literature for use in the physical education setting, consists of two sections. Section one requests demographic information including name, age, gender, race, school, and grade level. Section two includes the achievement goal scale, the social goal scale, and the persistence and effort scale. The format for all items is a 7-point Likert-type scale, ranging from 1 (not at all true for me) through 7 (very true for me). The stem for all items in the AGQ-PE is "In my PE class…".

Achievement goal scale. The achievement goal scale includes items gleaned from two models. The first is the 2*2 achievement goal model and consists of 12 items adapted from Elliot and McGregor (2001). These items reflect four achievement goals: mastery-approach goals (e.g., "I want to learn as much as possible."), performance-approach goals (e.g., "it is important for me to do better than other students."), performance-avoidance goals (e.g., "I just want to avoid doing poorly."), and mastery-avoidance goals (e.g., "I worry that I may not learn all that I possibly could."). Each achievement goal includes three items.

The second is the trichotomous achievement goal model and consists of 18 items adapted from Elliot (1999). Each of three goals (mastery-approach goals, performance-approach goals, and mastery-avoidance goals) consists of six items. All items included in the 2*2 achievement goal model are also included in the trichotomous achievement goal model, with the exception of mastery-avoidance goals. Therefore, the achievement goal scale consists of a total of 21 items.

Social goal scale. The original social goal scale, developed by Patrick, Hicks, and Ryan (1997), consists of 11 items. Five items address relationship goals (e.g., "I'd like to get to know my school friends really well.") and six items address responsibility goals (e.g., "I try to do what the teacher asks me to do."). Analysis of validity and internal consistency provides strong support for this original scale (Patrick, Hicks, & Ryan, 1997). An additional item was added to the relationship goals ("when I'm on a team, I like my teammates to feel happy with what we do"), resulted in 12 items for the social goal scale.

Persistence and effort scale. The persistence and effort scale consists of eight items, in which six were adapted from Elliot (1997) and two from Wentzel (1996). Four items were used to examine the persistence variable (e.g., "I work hard to do well even if I don't like what we are doing.") and another four items were used to assess the effort variable (e.g., "I put a lot of effort into preparing for skills tests.").

Procedures

The AGQ-PE was administered by the researcher during regularly scheduled physical education classes and took approximately 25 minutes to complete. Course content was not altered, nor was the normal routine of the classes modified. To ensure the independence of students' responses, the researcher had students spread out so that they could not see one another's responses. Additionally, the researcher carefully monitored students throughout the data collection and answered their questions as necessary. To minimize students' tendency to give socially desirable responses, the researcher encouraged the students to answer as truthfully as they could and ensured them that their responses would not affect their grades. They were also informed that their teachers would not have access to their responses.

Data Analysis

Confirmatory Factor Analyses (CFA) assessed the construct validity of the 2*2 model, trichotomous model, and social goal scale. A number of fit indices can be used to assess the construct validity of a model (for an in-depth review of fit indices, see Hu, Bentler, 1995), and different estimation and fit indices can lead to different outcomes. To date, little consensus has been reached by researchers concerning the best index of

overall fit when evaluating the construct validity of a model. Most researchers suggest using multiple fit indices to assess overall fit of a model (Hoyle & Panter, 1995).

In this study, multiple fit indices including comparative fit index (CFI), Bentler and Bonnett's Non-normed fit index (NNFI), goodness of fit index (GFI), root mean square error of approximation (RMSEA), and the chi-square to degrees of freedom ratio (χ^2/df) were employed to assess the construct validity of the measurement models. CFI, NNFI, and GFI values exceeding .90 are generally considered an indicator of a good fitting model (Hu & Bentler, 1995). Additionally, a RMSEA of less than .10 is considered to be indicative of an adequate model (Browne & Gudeck, 1993). Finally, the χ^2/df should be less than 3.0 for adequate fit (McIver & Carmines 1981). SAS PROC CALIS (version 8.1) was employed to construct and test the measurement models.

Because previous studies showed that persistence and effort were considered mastery-oriented behaviors and a single construct in motivational research (Dweck, 1999; Dweck & Leggett, 1988; Xiang & Lee, 2002), a principle component factor analysis with VARIMAX rotation was conducted on the eight persistence and effort items to determine whether they represented a single construct.

Cronbach's alpha coefficients were calculated to examine internal consistency of test scores for all measurement scales and their subscales. Coefficients around .70 are considered adequate, and below .50 should be unreliable because it indicates that at least 50% of the observed variance is associated with random measurement error (Kline, 1998).

Methods: Study Two

Participants

A total of 366 students (134 boys, 232 girls) served as participants in this study. They came from a different school district in the southern region of the United States. Students consisted of ninth (47.0%), tenth (26.5%), eleventh (16.9%), and twelfth (8.7%) grades and their age ranges from 15-22 years (M = 16.54, SD = 1.31). The majority, 36.6%, were African American, with 35.81% Hispanic American, 9.8% Caucasian, 9.0% Asian-American, and 7.9% others; the remaining .8% did not report their ethnicity.

Instrumentation

AGQ-PE. To evaluate the validity, reliability, and replicability of achievement goal scale, social goal scale, and persistence and effort, the AGQ-PE was used to collect data in study two from a different sample from the same population.

Interviews. To further understand students' achievement goals, social goals, and their persistence and effort in physical education settings, 15 students were selected randomly and interviewed individually. They answered six open-ended questions associated with achievement goals and social goals. Questions included:

(1) Is it important for you to learn in your PE class? Why or why not?

(2) Are you ever concerned about not doing well in PE? Why or why not?

(3) Is it important for you to do better than your peers in PE? Why or why not?

(4) Is it important for you to avoid doing poorly in your PE class? Why or why not?

(5) Is it important for you to do what your teacher asks you in PE? Why or why not?

(6) Is it important for you to have a friend in your PE class? Why or why not?

These six questions represent mastery-approach, mastery-avoidance, performance-approach, performance-avoidance, social responsibility, and social relationship goals, respectively. When answering each of the questions, students were first asked to indicate their level of agreement on a 7-point Likert-type scale ranging from 1 (not at all true of me) through 7 (very true of me), paralleling the 7-point Likert-type scale used in the AGQ-PE. After the student provided a rating score, the interviewer asked why s/he gave such a score to examine perception of his or her achievement goals and social goals in physical education. Follow-up questions were used to clarify vague responses provided by the students. The obtained scores were used compared to those from the questionnaire data.

The purposes of this interview were to: (1) provide an additional source of data to examine high school students' achievement goals and social goals toward physical education, and (2) provide triangulation between the questionnaire data and the interview data.

Procedures

The AGQ-PE was administered by the researcher using the same procedures as used in the study one. The interviews were conducted by the researcher during regularly scheduled physical education classes after students completed the questionnaire, and

lasted no longer than 15-20 minutes. All interviews were audiotaped and transcribed for the purpose of data analysis.

Data Analysis

Validity, reliability, and replicability analysis of instrument. The confirmatory factor analyses (CFAs) were conducted to examine the construct validity of the 2*2 achievement goal scale, trichotomous scale, and social goal scale. The ratio of Chi-square to degrees of freedom (χ^2/df), the Bentler-Bonett Non-Normed Fit Index (NNFI), the Bentler Comparative Fit Index (CFI), the Goodness of Fit Index (GFI), and the Root Mean Square Error of Approximation (RMSEA) were employed to assess the construct validity of all measured models. Crobach's alpha coefficients were calculated to assess internal consistency of the 2*2 achievement goal scale, trichotomous scale, social goal scale, persistence and effort scale, and their subscales. The results from both validity and reliability analyses were used to compare and evaluate the replicability of all measured scales.

Quantitative analyses. Descriptive statistics were used to provide a summary of students' achievement goals, social goals, and their persistence and effort toward physical education. Pearson-product correlations were used to examine relationships among achievement goals, social goals, and persistence and effort. Simultaneous multiple regression was employed to examine how achievement goals and social goals might affect students' persistence and effort toward physical education. Dependent *t*-tests were used to assess the consistency between the questionnaire data and those scores from interviews in the four achievement goals and two social goals. The Bonferroni

method was used to control for experimentwise error for all pairwise comparisons. The alpha level of each comparison was set at .0083, resulting in an overall alpha level of $p < .05$.

Double cross-validation analysis. There are two kinds of methods for evaluating the replicability of results: external and internal. External analyses involve true replication because they generate new data when re-conducting the study, while internal analyses tend to yield inflated internal empirical replicability evaluations (Thompson, 1993, 1994). In this study, external double cross-validation methods were performed to evaluate the result replicability of two regression models in the prediction of students' persistence and effort toward physical education.

Qualitative analysis. The interview data were analyzed using constant comparative method (Glaser & Strauss, 1967). To ensure the trustworthiness of data interpretation, four strategies were used. First, two researchers read the transcript data from each student individually, and then categorized the data, and maintained a master list of themes. This process continued until no new categories emerged or could be integrated into existing categories. Disagreements between the researchers regarding coding were discussed until 100% agreement occurred, so that all final codings were consensual. Second, triangulation of the data provided a comparison between the AGQ-PE data and those from the student interviews. Third, peer debriefing, the process whereby the researchers invited people to comment on their interpretations (Lincoln & Guba, 1995), was conducted with at least one other researcher familiar with naturalistic

inquiry. Finally, negative case analysis (the process of disconfirming findings) was used to refine or revise emergent categories and/or themes.

Results: Study One

The results of the study are presented by phase. Results from the study one are first reported including validity and reliability of achievement goal scales, social goal scale, and persistence and effort scale in high school physical education settings. Results from study two include replicability analyses of validity and reliability of all measured scales, quantitative analyses for achievement goals, social goals, and persistence/effort toward physical education, as well as external double cross-validation analyses. Qualitative analyses of student interviews conclude the results section.

*2*2 Achievement Goal Model*

Multiple indices revealed that the 2*2 model represented an adequate fit to the data (CFI = .94, GFI = .91, NNFI = .91, RMSEA = .08, and $\chi^2/df = 2.13$). Additionally, the CFA results indicated that all the items are strong indicators of the factors they are hypothesized to measure. Factor loadings ranged in size from .50-.86 (Figure 3). Internal consistency of the instrument was acceptable with alpha coefficients of .85, .84, .79, and .70 for the mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance goals, respectively.

Trichotomous Achievement Goal Model

Examination of the fit indices indicated that the trichotomotous model did not fit the data. Although the χ^2/df (2.50) was less than three and the RMSEA (.09) was below .10, the NNFI, GFI, and CFI were .81, .82, .84, respectively, indicating a poor fit for the

trichotomous model. The standardized factor loading and error variance estimated in CFA can be found in Figure 4. The reliability analyses revealed that each of three achievement goals possessed acceptable internal consistency (mastery goals = .83, performance-approach goals = .88, and performance-avoidance goals = .68).

Social Goals

The CFA analysis revealed that the social goal scale did not fit the data. Like the trichtomous model, the RMSEA (.09) was below .10 and the χ^2/df (2.55) was less than 3.00, but the NNFI (.84), GFI (.89), and CFI (.87) were below .90, indicating a poor fit to the data. The standardized factor loading and error variance estimated in CFA can be found in Figure 5. Cronbach's alpha coefficients indicated acceptable internal consistency with responsibility goals = .80 and social relationship goals = .78, respectively.

Persistence and Effort

Principal components analysis with VARIMAX rotation revealed a single factor with an eigenvalue exceeding 1 (Figure 6). The factor accounted for 58.64% of the variance and all factor loadings exceeded .70 (.70-.81). Additionally, the reliability analyses revealed that this factor possessed an internal consistency of .90. The results from principal components and reliability analyses strongly indicated that a single factor for the persistence and effort model was appropriate.

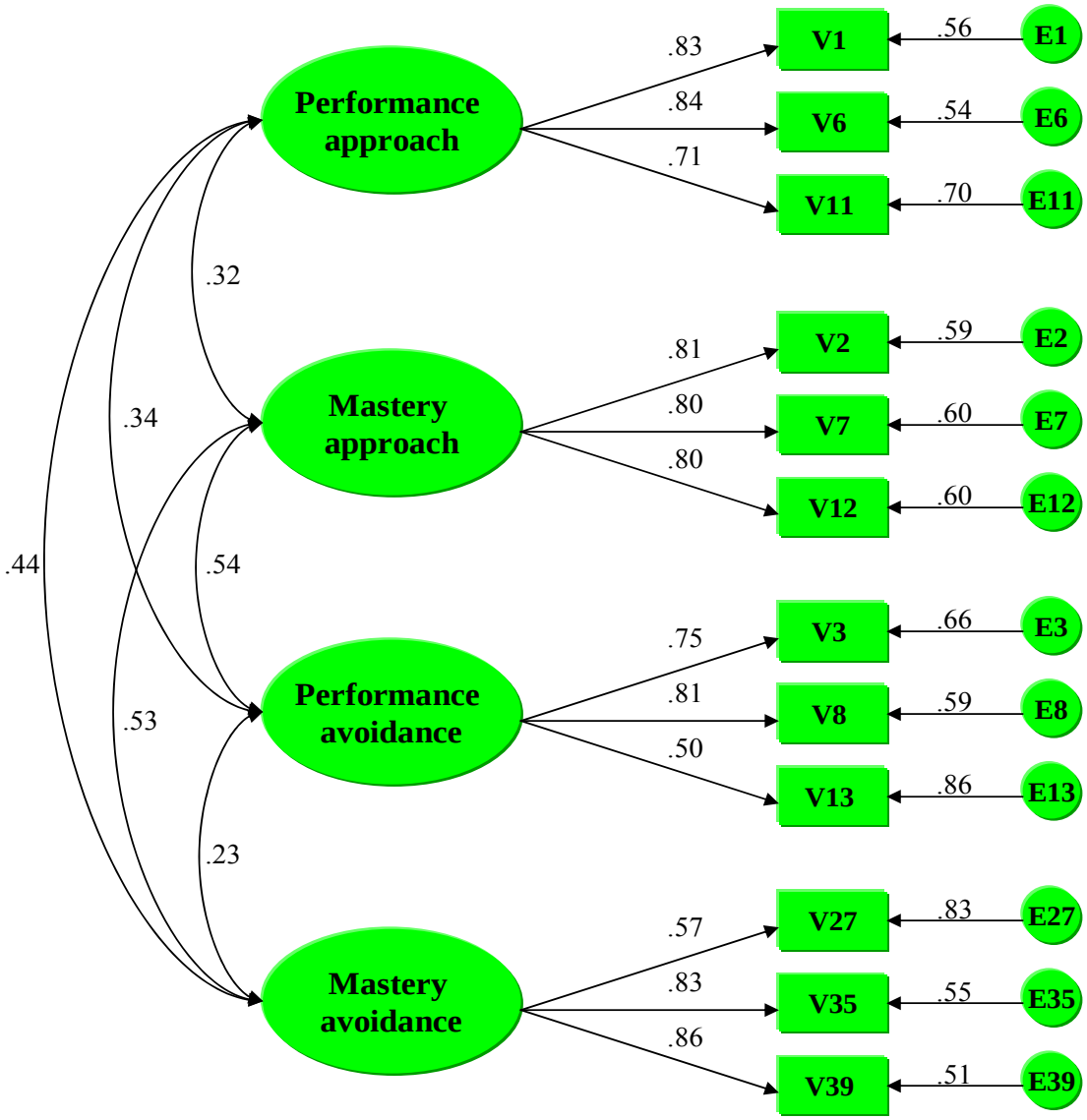

Figure 3. The 2*2 achievement goal model and CFA results from the study one data. (1) One-headed arrows from factors (circles) to variables (squares) represent standardized factor loadings; (2) Two-headed arrows represent covariance between two factors.

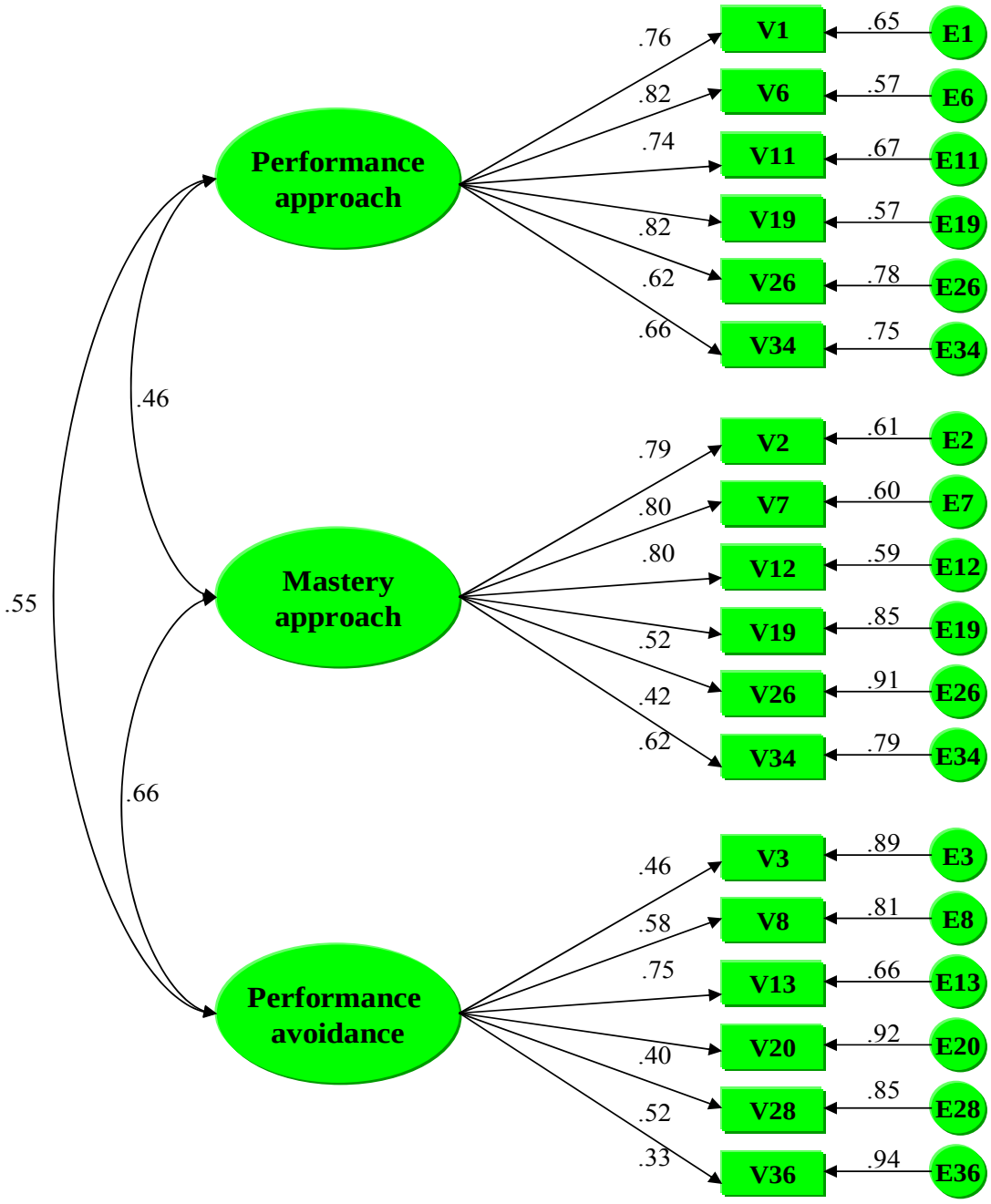

Figure 4. The trichotomous achievement goal model and CFA results from the study one data.

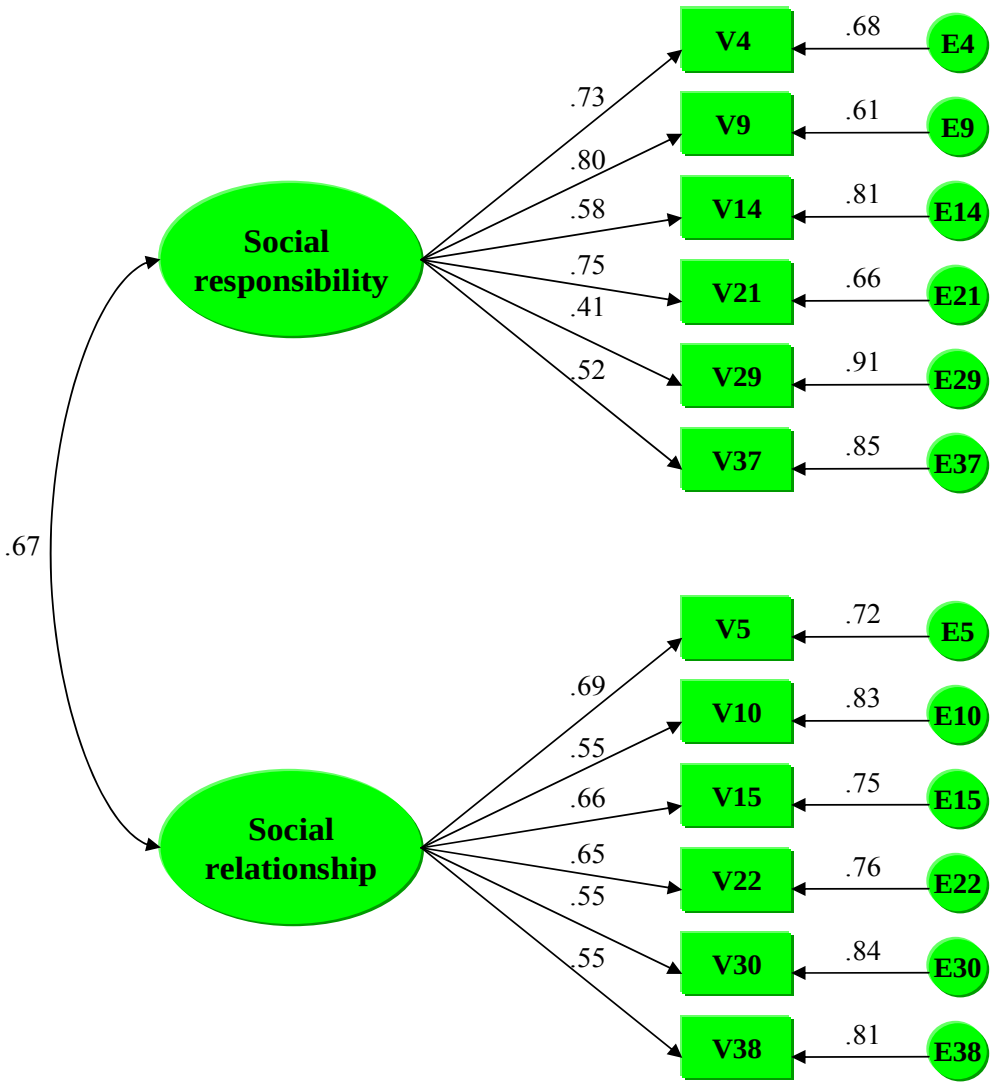

Figure 5. The social goal model and CFA results from the study one data.

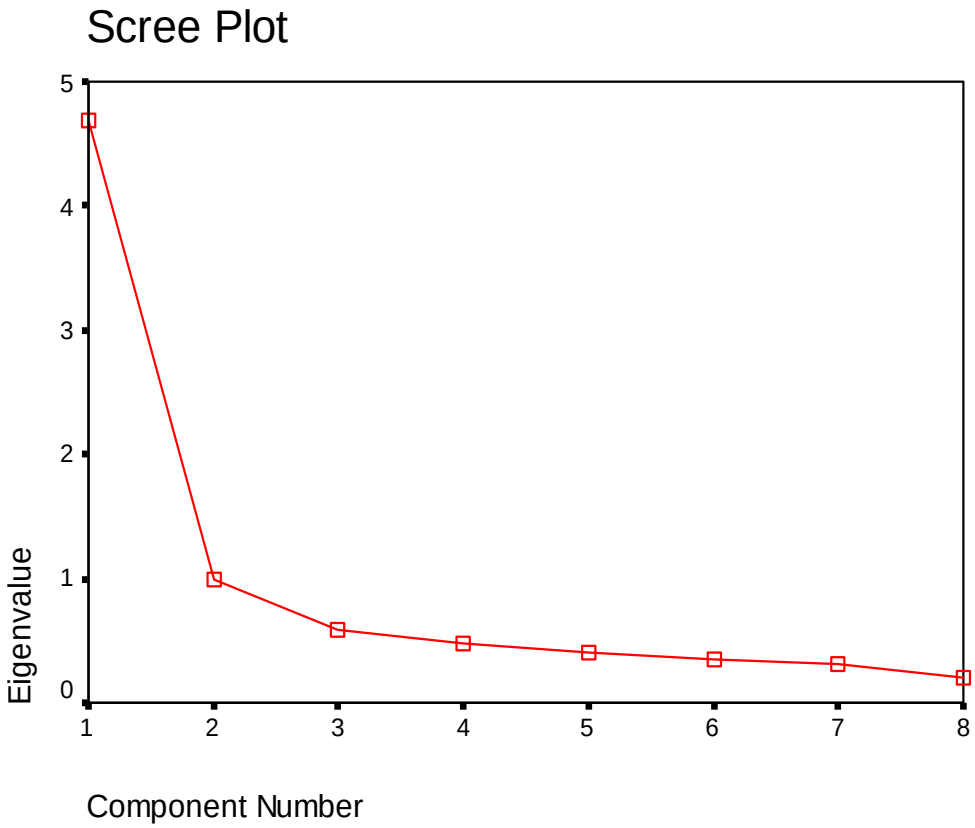

Figure 6. The Eigenvalues of the persistence/effort factor from the study one data.

Results: Study Two

Replicability Analysis of the AGQ-PE

The results of validity and reliability from study two revealed similar findings observed in the study one. CFA analyses indicated that the 2*2 model fit the data (Table 1). The CFI (.95), GFI (.94), and NNFI (.93) all exceeded .90. The RMSEA was .07 and the χ^2/df (2.77) was below three, indicating an adequate fit for both 2*2 model and social goal scale. Examination of the fit indices indicated that trichotomotous model did not fit the data. Like the study one, the NNFI (.82), GFI (.85), and CFI (.85) were all below .90. Additionally, the χ^2/df (3.76) was exceeded three. Only the RMSEA (.09) was below .10. Although the study one revealed a poor fit for the social goal scale, the results from study two indicated that the social goal scale fit data (CFI = .93, GFI = .94, NNFI = .92, RMSEA = .07, and χ^2/df = 2.72). The standardized factor loading and error variance estimated in CFA for the 2*2 achievement goal scale, trichotomous scale, and social goal scale can be found in Figure 7, Figure 8, and Figure 9.

To further validate and confirm the persistence and effort as a single factor, we performed a principal components analysis with VARIMAX rotation to examine whether one factor is more appropriate than two factors. The results again revealed that only one factor's eigenvalue was greater than one (Figure 10). This factor accounted for 58.71% of the variance and all factor loadings exceeded .65 (.65-.82). Based on this result, persistence and effort were considered a single factor (persistency/effort) for subsequent data analyses.

Table 1.

Fit Indices of the AGQ-PE for Both Study One (N = 180) and Study Two (N = 366)

Indexes	2*2 Model		Trichotomous Model		Social Goal scale	
	Study One	Study Two	Study One	Study Two	Study One	Study Two
χ^2/df	2.13	2.77	2.50	3.76	2.55	2.72
NNFI	.91	.93	.81	.82	.84	.92
GFI	.91	.94	.82	.85	.89	.94
CFI	.94	.95	.84	.85	.87	.93
RMSEA	.08	.07	.09	.09	.09	.07

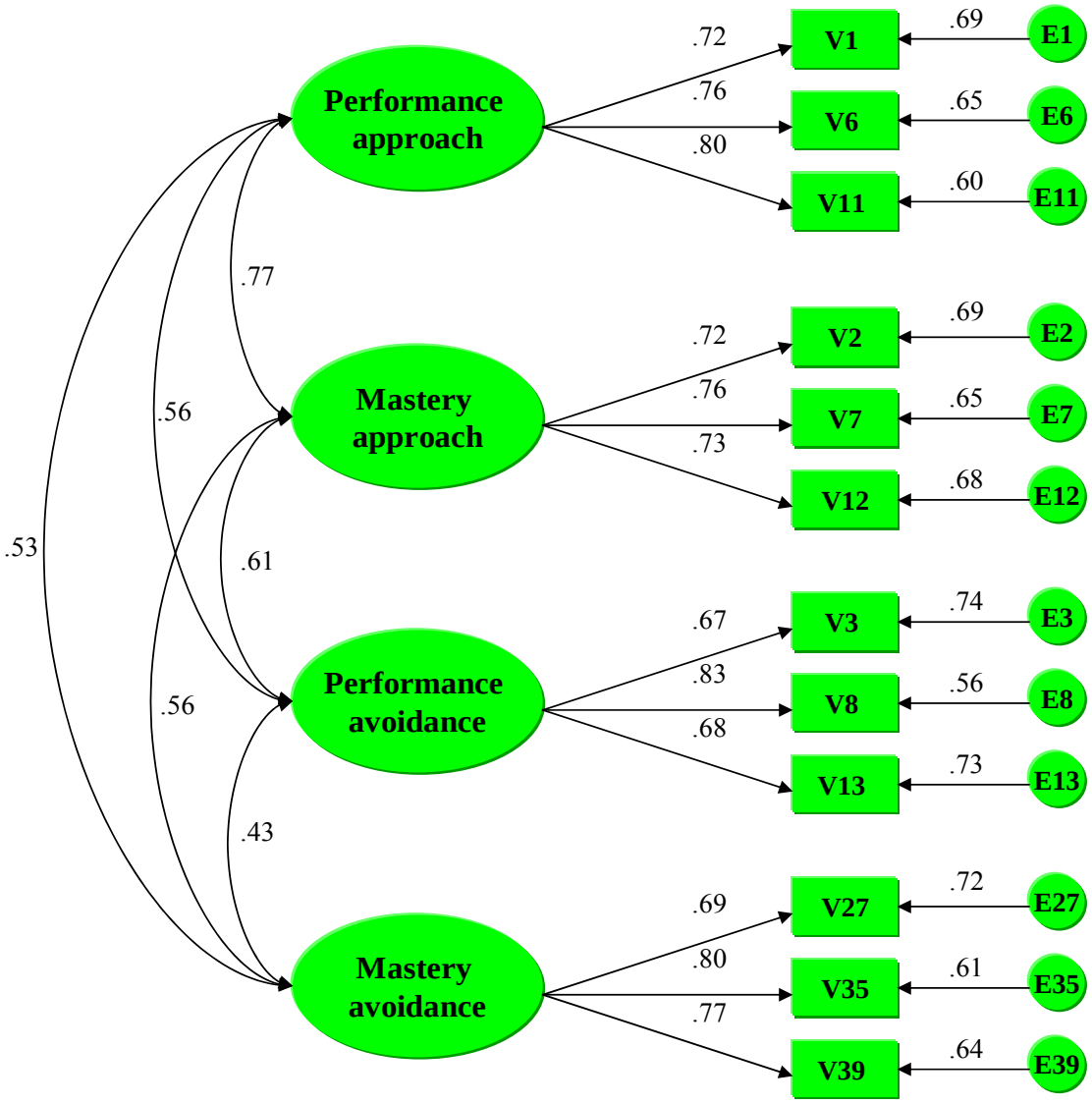

Figure 7. The 2*2 achievement goal model and CFA results from the study two data.

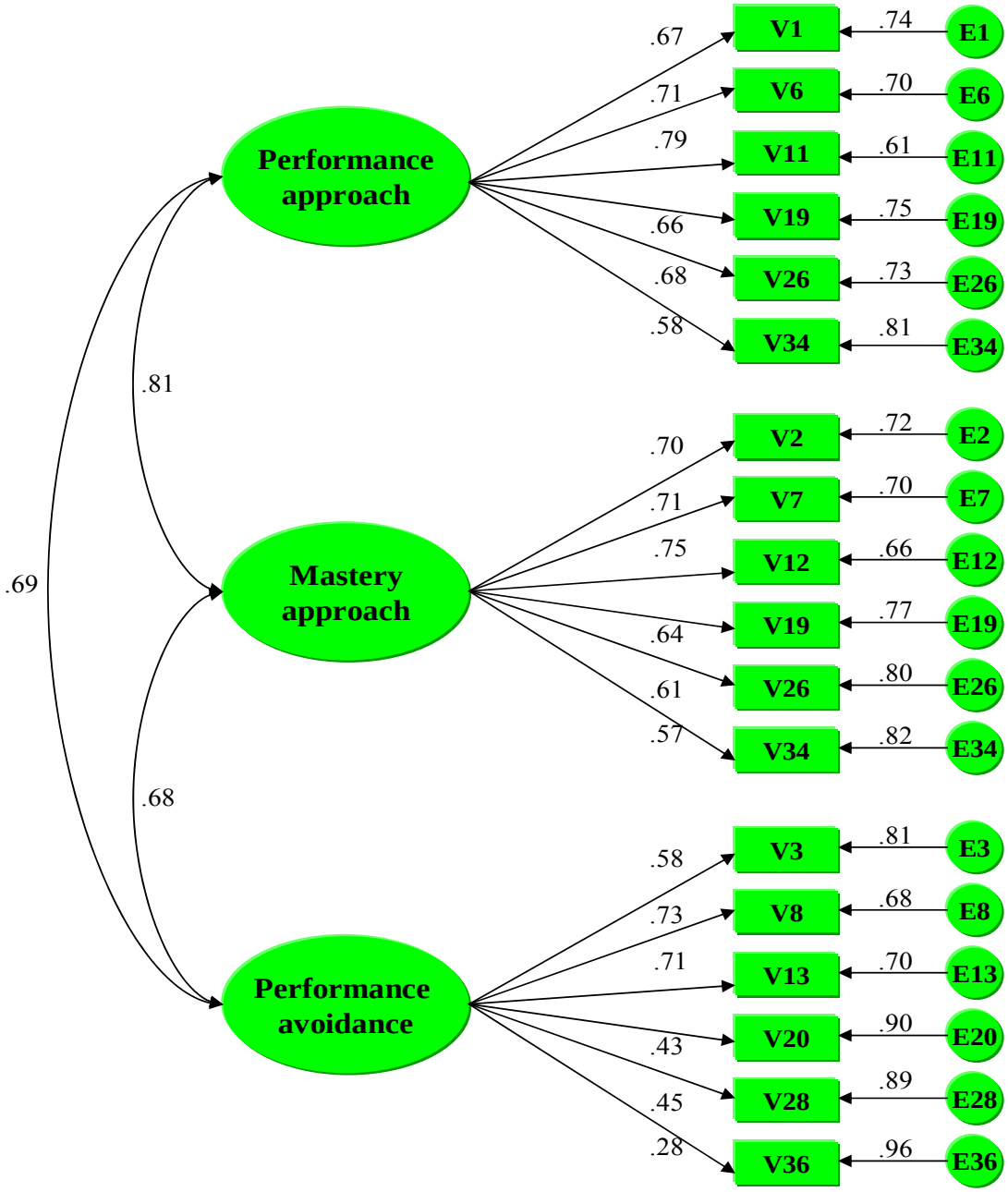

Figure 8. The trichotomous achievement goal model and CFA results from the study two data.

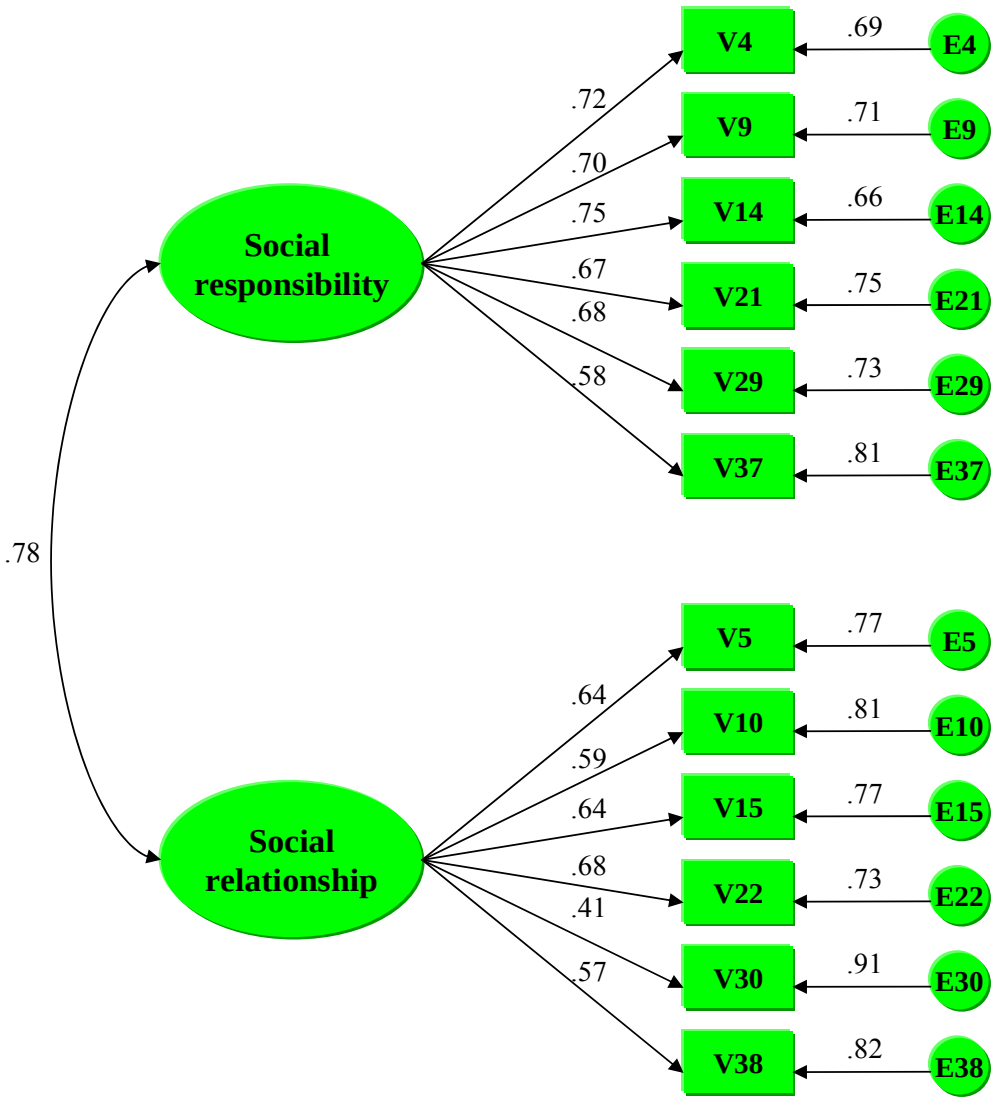

Figure 9. The social goal model and CFA results from the study two data.

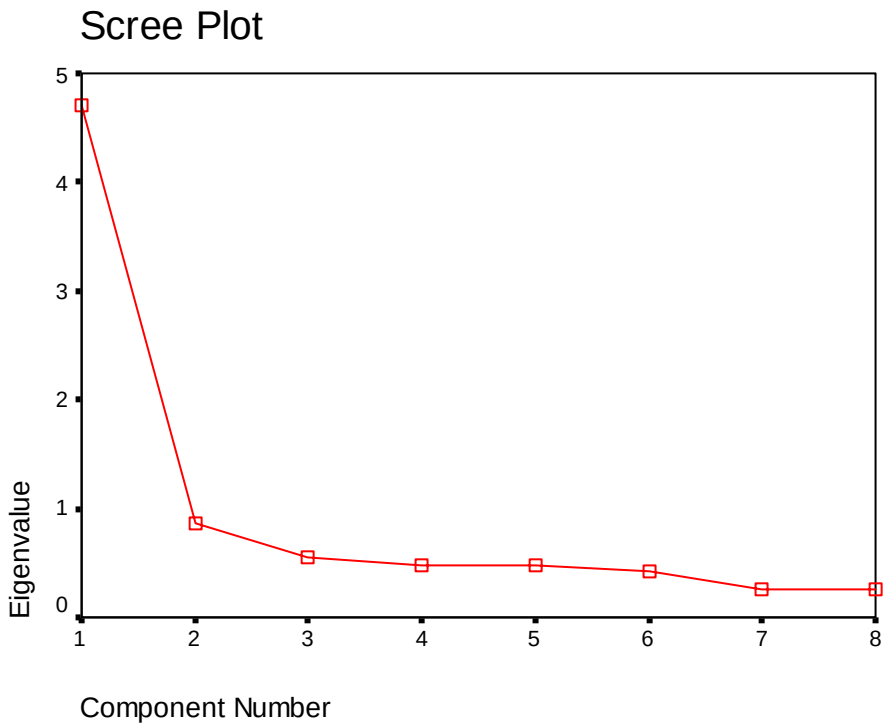

Figure 10. The eigenvalues of persistence/effort factor from the study two data.

Reliability analyses revealed that the 2*2 achievement goal model, the trichotomous model, the social goal scale, and the persistence/effort scale had acceptable internal consistency (Table 2). The similarity of results from the validity and reliability analyses across the two different samples indicated strong replicability for the two achievement goal models, the social goal scale, and the persistence/effort scale in high school physical class settings.

Quantitative Analyses

Descriptive statistics are presented in Table 3. Of the six goals, students placed the highest value on social responsibility goals, followed by mastery approach goals, social relationship goals, performance avoidance goals, performance approach goals, and mastery avoidance goals. The intercorrelations among achievement goals and social goals indicated that all achievement goals and social goals were positively associated with each other. These goals were also positively associated with persistence/effort (Table 4).

Simultaneous multiple regression analysis examined how achievement goals and social goals might affect students' persistence and effort toward physical education. The results revealed that social responsibility goals (β = .541, p = .001), mastery-approach goals (β = .290, p = .001), and mastery-avoidance goals (β = .109, p = .002), and performance-approach goals (β = .081, p = .022) were positive predictors of persistence/effort, whereas performance-avoidance goals (β = -.055, p = .114) and social relationship goals (β = .005, p = .898) were not significant predictors of persistence/ effort. Additionally, R^2 from this multiple regression analysis was .723, indicating a

Table 2.

Cronbach's Alpha Coefficients of the AGQ-PE for Both Study One (N =180) and Study Two (N = 366)

	Scale alpha		Subscale alpha	
	Study One	Study Two	Study One	Study Two
2*2 Model	.85	.87		
Performance approach			.84	.80
Mastery approach			.85	.78
Performance avoidance			.79	.76
Mastery avoidance			.70	.79
Trichotomous model	.88	.89		
Performance approach			.88	.84
Mastery approach			.83	.83
Performance avoidance			.68	.69
Social goals	.85	.86		
Relationship			.78	.76
Responsibility			.80	.84
Persistence/effort	.90	.90		

Table 3.

Descriptive Statistics for Both Study One (N =180) and Study Two (N = 366)

	Study One			Study Two		
	M	*SD*	Range	*M*	*SD*	Range
Performance approach	4.41	1.58	1.00-7.00	4.91	1.48	1.00-7.00
Mastery approach	4.76	1.50	1.00-7.00	5.38	1.33	1.00-7.00
Performance avoidance	4.86	1.38	1.00-7.00	5.28	1.47	1.00-7.00
Mastery avoidance	3.82	1.45	1.00-7.00	4.26	1.58	1.00-7.00
Relationship	5.49	1.07	1.33-7.00	5.28	1.16	1.00-7.00
Responsibility	5.17	1.16	1.83-7.00	5.49	1.20	1.00-7.00
Persistence/Effort	4.41	1.33	1.25-7.00	4.94	1.32	1.00-7.00

Table 4.

Intercorrelations Among Achievement Goals, Social Goals, and Persistence/Effort

Subscale	1	2	3	4	5	6	7
1. Performance approach	__						
2. Mastery approach	.61**	__					
3. Performance avoidance	.46**	.50**	__				
4. Mastery avoidance	.42**	.45**	.35**	__			
5. Relationship	.36**	.51**	.29**	.43**	__		
6. Responsibility	.49**	.65**	.45**	.44**	.61**	__	
7. Persistence/effort	.55**	.72**	.41**	.50**	.55**	.80**	__

Table 5

Bivariate Correlation Coefficients from the Invariance Statistics

	Y	$Z_{\hat{Y}11}$	$Z_{\hat{Y}12}$	$Z_{\hat{Y}21}$	$Z_{\hat{Y}22}$
Y	1.000 ($N = 524$)				
$Z_{\hat{Y}11}$	.763[a] ($n = 162$)	1.000 ($n = 165$)			
$Z_{\hat{Y}12}$	.730[b] ($n = 162$)	.954[c] ($n = 165$)	1.000 ($n = 165$)		
$Z_{\hat{Y}21}$	.817[b] ($n = 330$)			1.000 ($n = 338$)	
$Z_{\hat{Y}22}$	.848[a] ($n = 330$)			.966[c] ($n = 338$)	1.000 ($n = 338$)

Note. [a] The actual *R* for the sample. [b] The shrunken *R* for the sample. [c] The invariance coefficient for sample.

stronger linear relationship between the set of predictors (achievement goals and social goals) and persistence/effort. Finally, the dependent *t*-tests revealed no significant difference between the questionnaire data and interview data.

External Double-Cross Validation Analysis

The invariance statistics are produced by the correlation procedures and the resulting invariance coefficients are seen in Table 5. The bivariate correlation of $Z_{\hat{Y}11}$ with $Z_{\hat{Y}12}$ yielded a high invariance coefficient of .954, reflecting the degree of shrinkage between the actual R^2 ($.763^2 = .582$) for sample 1 (study one) and the shrunken R^2 ($.730^2 = .533$). This result indicated that the beta weights from the two samples (study one and study two) produced similar estimates.

Similarly, the bivariate correlation of $Z_{\hat{Y}22}$ with $Z_{\hat{Y}21}$ produced a close invariance coefficient of .966, reflecting the degree of shrinkage between the actual R^2 ($.848^2 = .719$) for sample 2 (study two) and the shrunken R^2 ($.817^2 = .667$). The result also indicated that the beta weights from the two samples yielded similar estimates. Since both invariance coefficients are very close and approach one, the researcher is confident that the regression equation from both samples is an accurate predictor of students' persistence/effort toward physical education. Additionally, the results from this replicability analyses indicated that one may combine the two samples and calculate the regression equation to be used in predication.

Qualitative Analyses

The interview data were transcribed, coded, and analyzed. The results from content analyses of the interview transcripts for four achievement goals and two social goals were addressed below.

Mastery-approach goals. Individuals with a mastery-approach goal orientation focus on mastering tasks, learning, and understanding. Of the 15 students interviewed, 14 endorsed the mastery-approach goals and the remaining one was neutral. A total of 15 responses were generated by students who endorsed mastery-approach goals. Four categories emerged. They were: (1) PE is PE, (2) utility/value, (3) mastery-oriented, and (4) others.

(1) *PE is PE*. Students in this category (n = 5; 33.33%) considered PE an important class, but not as important as other subjects. They also thought it was an easy class but felt they did not need to do as well as in PE as they did in their other subjects. Typical responses included:

> Because it's important to learn from any class you're in, you know, to get something out of it. But I don't know how much you can learn from a PE class. Because PE is PE, physical education, you know. (Jenny)
>
> Because in PE it's not really like academic, it's more like, you know, we run, we work out, we play games and, you know, I learned, like, academic school stuff because I think that in the end, when you grow up, then that school and academics matter more than, you know, if I knew how to play tennis or not. (Susan)

> Um, because, like it's an easy class and you can pass it. If it's easy there's no reason to fail if you know everything about it. It's important to pass your classes anyway. (Mary)

(2) *Utility/Value*. Students in this category (n = 3; 20%) recognized that PE classes were beneficial to their health, fitness, and future careers. For example, Mike said, "It helps me outside of school. Like the house and stuff; keep that clean." Jeff provided another example by saying:

> So, sometimes, like, I try to do good in my exercises or lifting weights so maybe that's giving me a good healthy body so that's a good reason to do well in my PE class.

(3) *Mastery-oriented*. Students in this category (n = 4; 26.67%) tried their best to learn something from their PE classes. For example, Tim said, "To learn things that I don't know." Laura provided another similar response:

> Um, it's just very important for me to do well because I, not just in PE, in any class, I just like to do my best and PE is just another class that I'd like to do good in. And, like I said, I like to just try my best.

(4) *Other*. Three responses (n = 3; 20.00%) made references to this category. Two students (John and Patrick) in this category did not have any specific reasons why it was important for them to learn in PE, while the third student (Jeff) wanted to show his teacher that "I am good in PE".

Finally, the neutral student (Jimmy) on mastery-approach goals simply stated, "Because you don't need to know that much about it, but you need to know a little about it."

Mastery-avoidance goals. Individuals with a mastery-avoidance goal orientation want to avoid any misunderstanding about what is learned in class and also try to avoid not learning or not mastering a task. The interview data revealed that seven students did not endorse the mastery-avoidance goals, five endorsed them, and three were neutral. A total of 15 responses emerged out of the mastery-avoidance goals. Two categories emerged from seven responses generated by students who did not endorse these goals. They were self-confidence and others.

(1) *Self-confidence*. Four (57.14%) of seven responses made references to this category. Students in this category were confident about their ability to do well in their PE class. Typical comments in this category were:

> Not really. I'm pretty confident about myself and I'm pretty sure I can do anything that any of the other kids can do. (Bill)
>
> Uh, not really. The only time I'm ever concerned is if I'm not doing well because I usually do pretty good. (Patrick)

(2) *Others*. Three (42.86%) of seven responses comprised this category. As in the mastery-approach goals, two students (Jimmy and Mike) alluded to the "PE is PE" rational, while the third student (Laura) just wanted to "try my best."

For those students who endorsed mastery-avoidance goals, one category emerged from five responses and was called "extraneous concerns" (e.g., concern for receiving a

bad grade in the class and the possibility of not graduating from high school). Typical responses in this category included:

> Sometimes I am concerned, like if I'm doing well, because I like to keep my grades up. So it's so easy, so it's like no hard to get dressed and then do what teachers tell you to do, cause that's, like, the easiest class you have, so you should at least keep your grades up. (April)
>
> Because I won't pass and I'll fail and then I won't graduate. So yeah that is a concern, a big concern. (Jenny)

Three students recording a neutral score on the mastery-avoidance goals produced three different responses. The first, "PE is PE", came from Steve who said, "Because I don't care about what …(unintelligible)…about me. I like normal." The second response dealt with "self-confidence" and came from Susan. She said, "No. Actually, I'm pretty fine with it. It's not that hard, really." The final response, "perceived ability", came from Jeff:

> Well sometimes, like, I didn't know how to play football. Or sometimes I feel like hide because I ……(unintelligible). Especially because in my country I used to play soccer, this kind of sports, I never played football. So, that's why I'm concerned about that.

Performance-approach goals. Individuals with a performance-approach goal orientation focus on the attainment of favorable judgments of competence. Of the 15 students interviewed, six endorsed the performance-approach goals, five were neutral, and four did not endorse them. Six responses were generated by students who endorsed

the performance-approach goals. Two responses (Bill and Jeff) reflected satisfaction of outperforming others. For example, Bill said, “Well, it’s not something that, you know, is going to make me worry about but I do enjoy whenever I finish before a lot of people.”

The remaining four responses varied. The first response was relevant to competitiveness-oriented provided by Sylvia. She said, “Well, I think that depends on if you’re a competitive person, because if you’re really competitive, then you’re gunna want to do better than them.” The second response came from Steve who referred to his PE grade. He said, “Yeah. But I don’t care what they do. I just want to get my grade. That’s all.” The third response was generated by Tim. He said, “Because if I understand, if I know how to do the things to help another boy that they don’t know how to do things.” The last response came from Jeff. He stated, “Because I want to show them I’m good at PE, so I can feel proud of myself. Self-confidence. So that’s why I like to be the best one in this class.”

Four responses were produced by those who did not endorse the performance-approach goals. Once again, two responses from Jimmy and April alluded to the “PE is PE” theme. They said:

> You don’t need to do better than nobody in PE. You just come out here and have fun in your sport. That’s it. (Jimmy)
>
> It’s not like a real challenge to take a PE class. So I’m not worried about having a better grade than somebody else. (April)

The remaining two responses were mixed. One response came from Jenny who tried her best to learn and master what her PE teacher taught. She said, "Not really. I'm not the competitive type. I feel if I do my best then that's good enough for me. I'm not trying to beat out anyone because it's pointless to me." The other response expressed a "futuristic perspective" from Mike: "Because it doesn't matter how good you are. It matters what you do outside after high school."

Four neutral responses were recorded toward the performance-approach goals. Two of them came from John and Mary who referred to "perceived ability":

> If I can do better than everyone else, that is good for me but I can't do good. (John)
>
> Because, in a way, I like to be on top because I know I'm capable of doing go; better than people. And, in a way, it really wouldn't matter because you shouldn't want to think you're better than everybody else so I say in the middle. (Mary)

Of the remaining three responses, two of them were associated with "self-satisfaction." A typical response was provided by Julie. She stated: "Because I really don't care if it's better. Just be satisfied by myself." The third response came from Laura who appeared to be "mastery-oriented." She said, "Because I don't like to try to do better than people, I only need to strive for my best and not everyone else's best."

Performance-avoidance goals. Individuals with a performance-avoidance goal orientation focus on the avoidance of unfavorable judgments of competence. Of the 15 students interviewed, 14 students endorsed performance-avoidance goals and one was

neutral. The student (Patrick) recording neutral on performance-avoidance goals did not provide specific reasons why it was important for her to avoid doing poorly in PE class. From 15 responses generated by students who endorsed performance-avoidance goals, three categories emerged: external concerns, effort, and others.

(1) External concerns. The major concern of students in this category (n = 6; 40%) was getting a good class grade. For example, Julie said, "Yes. Because for good grade, again. I like to get good grades." Other typical responses for this category included:

> It's very important to me because I don't want to get low grade and I want to make sure to give it at least ninety percent of what I got. I don't want to mess around, you know. (Bill)
>
> Because I had to do it better, I can't do it poorly. If I do it poorly, I can fail the class. (John)

(2) Effort. Students in this category (n = 6; 40%) tried their best to avoid doing poorly in PE class. Typical responses included:

> Yeah, it's important for me to avoid poorly because I always try to do my best and if I'm doing poorly then I know it's myself that's not doing that good. (Laura)
>
> Yeah, it is. I don't want to do like badly at least. I try my hardest. I want to push myself, if I can't do something, I want to push myself so I can do it, you know? So at least I know, oh my god, I can do it, you know? So sometimes when I'm

> running I'm like "I can do it" you know. And try my best and not like worry about doing poorly. If I do poorly, it's okay. But I would try to achieve. (April)

(3) Others. Students in this category generated three mixed responses (20.00%). The first response from Mary indicated that "PE is just PE" category. She said, "Because you don't really have to do poorly. It's an easy in this class. You should pass it. It's not a hard class." The second response was provided by Sylvia and referred to respect for significant others. She stated, "Because it reflects on me and my grade and to me it shows lack of respect for the teacher, and for my family and everything, and my friends." The third response came from Tim. He said, "Because it's like it's not very important but it is important."

Social responsibility goals. Responsibility goals represent a desire to adhere to social rules and role expectations (Wentzel, 1991). The interview data revealed that 14 students endorsed the social responsibility goals and one did not respond. A total of 14 responses generated by students who endorsed social responsibility goals resulted in two categories: (1) respect for teachers and their role and (2) others.

(1) Respect for the teachers and their role. Students in this category (n = 10; 71.43%) respected their teachers both as authority figures and as individuals from whom they could learn. Eight students in this category simply wanted to show respect to their PE teacher. Typical responses included:

> You got to do what your teachers tell you to do in every class. It's just like a regular class but we just play sports in here. That's why. (Jimmy)

> Yes. That's very important because, you know, I'm not a disrespectful person so whatever they ask me to do, I'll do it even if I'm not in a good mood to do it, I'll just do it anyway. I try to give no talk back. (Patrick)

Two students respected their PE teacher because they could acquire new information from their PE teacher. Their comments were:

> Yes, it is. Because like if we're playing something, or in the weight room and you don't know how to work it and if you don't listen to the teacher or you do something wrong, you know, you can mess up your muscles or you don't know how to work the equipment, you can mess it up too or something. So it's important to listen to the teacher's instructions before you do anything. (April)
>
> Because, you know, everything's good for me. Everything that he ask me for, I'm like, "you know what? That's good for me". That's why I have to obey what he asks me for and this kind of stuff. (Jeff)

(2) O*thers*. Students in this category generated four responses. Two students in this category were afraid to "get in trouble" or "get a bad grade", while another two students tried to follow the class rules because they knew this was what their teachers expected. For example, Mary stated, "It is important because it'd be harder on the teacher because she has to focus on lots of kids. So you shouldn't want to act bad. You should want to do your best."

Social relationship goals. Relationship goals refer to focus on the desire to form and maintain positive peer relationships in school (Hicks, 1996). Of the 15 students interviewed, 13 students endorsed the social relationship goals while two did not. A total

of 14 responses were generated by students who endorsed these goals. Two categories emerged: helping each other and enjoyment.

(1) Helping each other. Students in this category (n = 6; 42.86%) thought that it was important to have a friend because students could help each other through the friendship. Comments included:

> Yeah, I think so. Because like with running and doing different activities, you need someone there kind of, to help you, not really help you, but like buff you out, to be motivating each other or whatever, like when you are running, walking, doing something that you are not used to doing. Teach each other or what. You know what I mean? It's good to have friends in class. (Jenny)
>
> Because it's very important to have a friend in PE class. Like if you're playing football maybe and maybe you'll have the friend on the same team so you can give him the pass. Or, in the weight room, he can be the spotter for you when you're lifting the weight. Or even maybe he'll be in the team who you are against with so you can say like me and him are challenging each other. So it's very important to have friends in PE. (Jeff)

(1) Enjoyment. Students in this category (n = 8; 57.14%) considered that having friends would lead to a more enjoyable class or didn't want to feel lonely. Four responses were associated with having fun. For example, Julie said, "Because having friends is fun. You can enjoy the PE class more." Another typical response came from Susan, She stated, "If you have a friend there, you know, moral support and you just hang out. It's just more fun if you have a friend with you."

The other four responses were related to not being alone. The typical responses included:

> Because you do need a friend, if you don't have a friend who you get along, you feel lonely. So that's why. (John)
>
> Yeah. I like to have friends. I'm not the kind of guy that needs, you know, a whole bunch of friends, but I guess I would like to have a few friends that I can talk to. I've got like three or four in there. Like I said, so I can race them on the track and talk to them, so I can feel better about myself and not being alone and do everything by myself. (Bill)

Students who did not endorse social relationship goals generated two different responses. The first response came from Mary. She did not see any need for friendship. She said, "Because I can do anything by myself. I don't need anybody to help me. Like, no friends." The second response came from by Mike. He considered that friends outside of school were more important than in the PE class. He stated, "Because you don't really need any friends in a PE class. You don't need friends in a PE class, you need friends outside of school that you can depend on."

Discussion

This study was completed in two phases. A total of 546 students served (Study one: 180; Study two: 366) as participants in this study. The major purposes of this study were to examine whether the 2*2 and trichotomous achievement goal frameworks applied to university undergraduate classrooms existed in high school physical education classes and which model might represent a better fit to the data. Second, we wanted to

assess how achievement goals and social goals might affect students' persistence/effort toward physical education. This section discusses each of the study's primary research questions. It begins with addressing reliability and validity of the Achievement Goal Questionnaire-Physical Education (AGQ-PE), and then addresses how achievement goals and social goals affect high school students' persistence/effort toward physical education. The section concludes with implications for both future research and the use of achievement goal models in high school physical education.

Reliability and Validity of the AGQ-PE

*Reliability and validity of the 2*2 achievement goal model.* Many statisticians (e.g., Cronbach, 1951; DeVellis, 1991; Kline 1998; Nunnally & Bernstein, 1994) noted that reliability (internal consistency) is acceptable if a Cronbach alpha value greater than .70. This guideline for the acceptable alpha value was employed in this study. Because the alpha values across the two samples for the overall scale as well as the subscales were greater than .70, the scores produced by the 2*2 achievement goal scale were reliable.

Confirmatory factor analyses were performed to test construct validity. Consistent with the findings reported by Elliot and McGregor (2001) in the academic and university settings, validity analyses strongly confirmed the existence of the 2*2 achievement goal model in high school physical education settings. Scores from the mastery-approach (factor 1), mastery-avoidance (factor 2), performance-approach (factor 3), and performance-avoidance (factor 4) factors exhibited favorable psychometric properties of validity. All the indexes (χ^2/df, NNFI, CFI, GFI, and RMSEA) were in the

acceptable range (greater than .90), indicating that the 2*2 achievement goal scale produced valid scores and each of the four achievement goals represents a distinct construct. Additionally, similar results from CFAs across the two samples demonstrated strong replicable scores of the 2*2 achievement goal scale.

Reliability and validity of the trichotomous achievement goal model. Cronbach's alpha coefficients across the two samples for the overall scale as well as the subscales (mastery-approach goals and performance-approach goals) were greater than .70. The only exception was the performance-avoidance goal subscale (.68 in study one and .69 in study two). These alpha values suggested that the model demonstrated acceptable reliability in general.

The validity of the trichotomous model, compared to the 2*2 model, was problematic. Three of five indexes (NNFI = .81, GFI = .82, and CFI = .84 in study one; NNFI = .82, GFI = .85, and CFI = .85 in study two) across the two samples did not meet the minimum criteria, indicating that the trichtomous achievement goal model did not generate valid scores for three factors (mastery-approach, performance-approach, and performance-avoidance goals) in high school PE settings.

Given validity analyses from CFAs across the two samples revealed that the 2*2 achievement goal model produced more valid scores than the trichotomous one, we believe that the 2*2 model is better than the trichotomous model in high school PE settings. The results also supported Elliot and McGregor's (2001) finding in college settings. That is, the 2*2 achievement goal model represents a better fit to the data than the trichtomous one.

Reliability and validity of the social goal scale. Reliability and validity analyses indicated that the social goal model can produce reliable and valid scores to assess students' social goal levels in high school physical education settings. Cronbach's alpha coefficients across the two samples for the overall scale as well as the subscales (responsibility goals and relationship goals) were greater than .75, indicating the scores from the social goal scale were reliable.

Although Patrick et al. (1997) supported the differentiation between responsibility and relationship goals by using principle factor analysis with varimax rotation, they did not report specific statistical indices (e.g., eigenvalues, factor loadings) to demonstrate how the social goal scale fit the data. Additionally, the literature review revealed no previous studies used confirmatory factor analysis (CFA) to confirm the validity of testing scores for a social goal scale. The present study used CFA to test and assess the construct validity of social goal model in high school physical education settings. Examination of the fit indices in study one indicated that the social goal scale did not fit the data. Three of five indexes (NNFI = .84, GFI = .89, and CFI = .87) did not meet the criteria. However, CFA from study two confirmed the existence of two independent social goal constructs (responsibility goals and relationship goals). The inconsistent results might be attributed to the increase of sample size from study one to study two because the fit indexes substantially underestimate goodness of fit in small samples (Hatcher, 1994).

Interview Data

The present study employed interview data in an attempt to provide an additional data source from which to examine achievement goal and social goal models in high school settings. The results from the interview data not only further confirmed the existence of 2*2 achievement goal and social goal models in high school physical education settings, but also provided additional findings for future studies. The results for each type of goals from the interview data are discussed below.

Mastery-approach goals. Mastery-approach goals focus on mastering tasks, learning, and understanding and are hypothesized to lead to a host of positive outcomes such as intrinsic motivation and self-determination (Elliot, 1999). The results from interview data provided evidence for the existence of mastery-approach goal factor because one of the major reasons students endorsed mastery-approach goals was "to learn things that I don't know." This is consistent with the hypothesis of mastery-approach goals.

The interview data, however, also revealed that many students considered their PE classes to be "PE is PE". That is, PE is an important class, but not as important as other subjects because they were not sure that how much they can learn from their PE classes. While this finding appears to contradict their motivational pattern of mastery-approach goals, these students still endorsed the mastery-approach goals. These explanations for endorsing mastery-approach goals implies an important need to include interview data since the quantitative data do not illustrate why high school students in PE settings endorse mastery-approach goals. Additionally, the notion of "PE is PE"

indicates that students do not value their PE classes, which is a big challenge for physical educators. Solutions to this challenge need to be explored in future studies.

Mastery-avoidance goals. Results from the interview data provided strong support for the existence of mastery-avoidance goal factor. According to the general hypothesis of mastery-avoidance goals, individuals with a mastery-avoidance goal orientation try to avoid a negative possibility (e.g., avoid losing physical ability). In other words, these goals focus on task-referential or self-referential incompetence (Elliot, 1999). The results from the interview data seemed consistent with the assumption of mastery-avoidance goals because students who endorsed the mastery-avoidance goals tried to avoid receiving a bad grade in the class and the possibility of not graduating from high school. In contrast, students who did not endorse mastery-avoidance goals were highly self-confident. They were confident about their ability to do well in their PE class. The existence of mastery-avoidance goal factor attests to the importance of separating mastery goals into approach and avoidance forms of regulation in high school PE settings.

Performance-approach goals. According to achievement goal theory, individuals with a performance-approach goal orientation focus on the attainment of favorable judgments of competence (e.g., students want to do well in the class to show their ability to their peers, friends, and others). The results from interview data revealed that the major reason students endorsed the performance-approach goal was that they "enjoy whenever I finish before a lot of people" or "want to show them I'm good at PE". This

indicated the existence of the performance-approach goals among high school students in physical education settings.

Performance-avoidance goals. The results from interview data also provided evidence for the existence of performance-approach goal structure because the major reason students endorsed mastery-avoidance goals was that they were afraid of getting low grades or doing poorly. This was consistent with the assumption of performance-avoidance goals. That is, the fear of failure and fear of rejection may orient the individual toward a negative possibility.

Relationship goals. Consistent with the quantitative data, the results from the interview data also confirmed the role of social goals in a high school physical education setting. The major reason students endorsed social relationship goals was for enjoyment and "helping each other," an indication that peer relationships are an important source of support for the success in physical education settings. Based on this indicaton and the positive relationship between academic success and relationship goals (see Parker & Asher, 1987), physical educators should help their students to find ways to build positive peer interactions into their physical education settings. Providing meaningful and collaborative group tasks, for example, may be an ideal instructional context for high school students to actively participate in physical activites.

Responsibility goals. The major reason students endorsed social responsibility goals was out of respect for their teachers and "don't want to get in trouble", indicating the existence of responsibility goal factor in high school PE settings. This result also provided additional evidence that responsibility goals are associated with their

participation in (i.e., the degree of persistence/effort) physical education. A possible explanation is that high school students are mature enough to recognize that their successes in physical education are closely associated with their behaviors. Additionally, students recognized that they can regularly learn something from their PE teachers or can get their grade up by showing the respect to their teachers and following class rules. Given these positive roles of social relationship and responsibility goals, achievement goal research should include social goals in future studies.

Finally, the results from the dependent t-tests revealed consistency between the questionnaire data and interview data. This further demonstrated that the Achievement Goal Questionnaire-Physical Education produced reliable scores. Based on the obtained results, we believe that scores from the 2*2 achievement goal model and social goal scale are valid, reliable, replicable, and appropriate for measuring students' motivation in high school physical education settings.

Influence of Achievement Goals and Social Goals on Students' Persistence/Effort Toward Physical Education

Elliot and McGregor (2001) reported mixed results regarding the intercorrelations among achievement goals. His study consisted of two phases. In phase one, Elliot found that all four achievement goals were positively associated with each other. In phase two, however, Elliot reported that mastery-avoidance goals were positively related to both mastery-approach and performance-avoidance goals, and negatively associated with performance-approach goals. The results in the present study were consistent with Elliot and McGregor's phase one results.

Previous studies (e.g., Hicks et al., 1995) revealed that mastery goals were positively associated with both responsibility and relationship goals, while performance goals were positively related to relationship goals. The results from this study provided additional support to these findings. However, this study also revealed that the two social goals were positively associated with all four achievement goals. Given that no previous empirical evidence was available for comparison, the results in this study may provide a specific empirical profile for the relationships among social goals and achievement goals on the basis of the data obtained. There is a need to further explore their relationships in the future studies.

Multiple regression analyses revealed that mastery-approach goals significantly contributed to students' persistence/effort toward physical education. This result was consistent with those reported by Elliot, McGregor, and Gable (1999) who found that college students' mastery goals and performance-approach goals were positive predictors of persistence and effort. The result also further supported the proposition: the pursuit of mastery-approach goals is hypothesized to lead to a host of positive outcomes.

Although no empirical data on mastery-avoidance goals are available to date, Elliot (1999) provides the following hypothesis of mastery-avoidance goals:

> The pursuit of mastery-avoidance goals will be linked to some positive and some negative consequences, with the most positive consequences being for quantitative variables, such as persistence and effort expenditure, and the most negative consequences being for phenomenological variables such as intrinsic motivation and self-determination (p. 182).

This study revealed that mastery-avoidance goals had a positive impact on students' persistence/effort toward physical education and provided empirical evidence to support Elliot's (1999) hypothesis of mastery-avoidance goals.

Elliot (1999) pointed out that the pursuit of performance-approach goals is posited to elicit similar processes and outcomes produced by mastery-approach goals when the focus of performance goals can be congruent with individual motivational foundation (e.g. when undergirded by challenge cues or by need for achievement). Given that performance-approach goals are grounded in the need for achievement and focused on positive possibilities, these goals are hypothesized to be positive predictors of persistence and effort (Elliot, McGregor, and Gable (1999). The present multiple regression analyses revealed that performance-approach goals significantly contributed to students' persistence/effort toward physical education, which provided strong evidence to support this hypothesis.

It should be noted, however, that the pursuit of performance-approach goals may lead to some negative outcomes when evoked by threat cues or undergirded by fear of failure (Elliot, 1999; Elliot, MeGregor, & Gable, 1999). For example, Scantling, Stand, Lackey, and McAleese (1995) found that one of major reasons students dislike PE class is that there is too much emphasis on winning and losing. Therefore, future research should further explore how and when to apply performance-approach goals to the real PE settings in order to lead to positive outcomes.

It is widely assumed (e.g., Elliot, 1999; Elliot & McGregor, 2001) that the pursuit of performance-avoidance goals is hypothesized to elicit negative affective,

cognitive, and behaviors that lead to a host of negative outcomes. Therefore, performance-avoidance goals are predicted to be negatively related or unrelated to persistence and effort (Elliot, McGregor, & Gable, 1999). The results of the present study revealed that performance-avoidance goals did not positively affect students' persistence/effort toward physical education, which further confirmed the hypothesis that performance-avoidance goals are unrelated to positive outcomes.

Previous studies generated by the dichotomous achievement goal model revealed a mixed pattern of results regarding the relationship between performance goals and persistence (Bouffard, Boisvert, Vezeau, & Larouche, 1995; Miller, Greene, Montalvo, Ravindran, & Nichols, 1996; Pintrich, Simith, Garcia, & McKeachie, 1993) or effort (MacIver, Stipek, & Danniels, 1991, Miller, Greene, Montalvo, Ravindran, & Nichols, 1996; Wentzel, 1996). The major reason for this mixed pattern is that performance goals were not partitioned into approach and avoidance forms of regulation (Elliot, McGregor, & Gable, 1999). In fact, performance-approach and performance-avoidance goals are different types of goals and yield differential predictive results of persistence and effort (Elliot, McGregor, & Gable, 1999). The results from this study further confirmed that performance-approach goals and performance-avoidance goals are two differential predictors of students' persistence/effort toward physical education. The results also attest to the importance of partitioning performance goals into approach and avoidance forms of regulation because they produced differential results on persistence/effort.

Multiple regression analyses revealed that social responsibility goals represent the greatest contributor to students' persistence/effort toward physical education. This

finding provided empirical evidence that students' goals to behave responsibly in the physical education class are significantly associated with their degree of participation in physical education. The results also were in line with Hick's et al. (1995) findings. They found that students who wanted to be socially responsible were likely to engage in academic work in order to obtain a personal sense of mastery or to demonstrate their ability in comparison to others rather than out of a desire for extrinsic rewards (e.g., grades).

With regard to social relationship goals, the current study found they did not significantly contribute to the students' persistence/effort toward physical education. This indicated that the students' desire to form intimate relationships with their peers did not relate uniquely to their persistence/effort when achievement goals and social responsibility goals were considered. The results seem to not be in line with previous findings addressed by Wentzel and Watkins (2002). Their study showed that there was a positive relationship between peer relationships and academic outcomes. A possible explanation is that students did not value their PE classes as they did other subjects. This explanation may need to be tested in the future studies.

Implications for Future Research

The validation of the 2*2 achievement goal model makes an important contribution to physical education research because it offers a theoretically sound and methodologically valid, reliable, and replicable measure for assessing student achievement goal levels in high school physical education settings. Previous achievement goal research in physical education settings focused solely on the

dichotomous achievement goal framework. Although this work generated beneficial and productive findings, the 2*2 model can be used in subsequent studies to further investigate and assess the achievement goals in high school PE settings and facilitate empirical and deeper research on students' motivation.

The structure of achievement goals has been a subject of controversy by many achievement goal researchers (Conroy, Elliot, & Hofer, 2003; Duda, 2001; Elliot & Church, 1997; Elliot & McGregor; 2001; Roberts, 2001; Smith, Duda, Allen, & Hall, 2002). The results from this study demonstrate the importance of partitioning mastery and performance goals into approach and avoidance forms of regulation. This study provided evidence that mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals are differential predictors of persistence/effort. Given only one outcome variable (persistence/effort) was used for this study, future work should measure more outcome variables (e.g., degree of improvement, physical activity levels) and examine how the four achievement goals yield differential results on outcome variables.

This study revealed that social responsibility, mastery-approach, performance-approach, and mastery-avoidance goals positively affected students' persistence/effort toward physical education. The results suggested that students have multiple goals for trying to succeed in physical education. To have a more thorough understanding of student motivation in school-based achievement activities, there is a need to take a multiple goal approach in future research on student motivation and achievement.

Given that students' achievement goals and social goals are associated with their persistence/effort toward physical education, PE teachers should facilitate the development of students' mastery or positive motivational patterns and avoid negative processes and outcomes. For example, this study revealed that social responsibility, mastery-approach, mastery-avoidance, and performance-approach goals are positively related to students' persistence/effort toward physical education. PE teachers should develop students' responsibility, emphasize the importance of learning PE knowledge (mastery-approach goals), and provide opportunities for success at all ability levels (mastery-avoidance goals). Additionally, winning and losing should not be overemphasized as doing so may lead to some negative outcomes evoked by a fear of failure or threat of punishment. Finally, given the simultaneous influence of multiple goals on students' persistence/effort toward physical education, we should further examine the simultaneous influence of multiple goals on different outcome variables such as physical activity levels or intrinsic motivation.

CHAPTER III

CONCLUSIONS

Students' achievement goals, social goals, and persistence and effort are associated with students' participation in physical education in high school. This study is designed to evaluate the reliability, validity, and replicability of the AGQ-PE and examine how achievement goals and social goals affect students' persistence/effort toward physical education in high school settings. This study is valuable in several aspects.

First, this study represents the first attempt to apply the 2*2 achievement goal model to the physical education domain. The 2*2 model is appropriate for high school students in PE settings, and provides a better fit to the data than the trichotomous model. The validation of the 2*2 achievement goal model makes an important contribution to physical education research because it offers a theoretically sound and methodologically valid, reliable, and replicable measure.

Second, this study represents the first attempt to provide triangulation between the questionnaire data and the interview data. The results from the interview data not only further confirmed the existence of the 2*2 achievement goal model and social goals in high school physical education domain, but also provided some insight of why students endorsed or did not endorse certain goals.

Third, this study also represents the first attempt to use external samples and double cross-validation methods to evaluate the replicability of research results. This provides researchers with information regarding the replicability of research results.

Fourth, this study integrates both achievement goals and social goals into a single study and provides a more complete picture of how achievement goals and social goals affect student persistence/effort toward physical education in a high school setting. The findings may help us better understand the factors that influence student participation in physical education. They also may lead to beneficial information for both teachers and students.

Finally, this study revealed that social responsibility goals represent the greatest contributor to students' persistence/effort toward physical education. This is followed by mastery-approach goals, mastery-avoidance goals, and performance-approach goals. Performance-avoidance goals and social relationship goals did not significantly affect students' persistence/effort toward physical education. Based on the findings, we advocate the use of multiple goals for a comprehensive understanding of student motivation and achievement in high school physical education.

One major limitation of the study should be recognized. Only one outcome variable (persistence/effort) was used for this study. In the future, additional variables (e.g., intrinsic motivation, physical activity levels, perceived ability, and motivational climate, etc.) should be added to future research so that achievement goals, social goals, and their variety correlates can be understood.

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APPENDIX A

ACHIEVEMENT GOAL QUESTIONNAIRE-PHYSICAL EDUCATION

Directions: Please answer each question truthfully. **Circle one number only for each statement**. There are no right or wrong answers. If you have questions, please ask me.

- Your Name _____ (first) _____ (last)
- Date of Birth ____ (month) _____ (day) _____ (year)
- What is the name of your school? _____
- Gender _____
- What grade are you in _____
- Race (Check one): Caucasian _____ African-American_____
  Hispanic-American_____ Asian-American_____ Other_____

In my P.E. class:	Not at all true of me → Neutral → Very true of me						
1. It is important for me to do better than other students.	1	2	3	4	5	6	7
2. I want to learn as much as possible.	1	2	3	4	5	6	7
3. I just want to avoid doing poorly.	1	2	3	4	5	6	7
4. I try to do what the teacher asks me to do.	1	2	3	4	5	6	7
5. I'd like to get to know my school friends really well.	1	2	3	4	5	6	7
6. It is important for me to do well compared to others.	1	2	3	4	5	6	7
7. It is important for me to understand the content of this course as thoroughly as possible.	1	2	3	4	5	6	7
8. My goal is to avoid performing poorly.	1	2	3	4	5	6	7
9. It's important to me that I follow class rules.	1	2	3	4	5	6	7
10. I'd like to keep promises I've made to other kids in my class.	1	2	3	4	5	6	7

In my P.E. class:	Not at all true of me → Neutral → Very true of me						
11. It is my goal to get a better grade than most of the other students.	1	2	3	4	5	6	7
12. I desire to completely master the material presented in this class.	1	2	3	4	5	6	7
13. My fear of performing poorly is often what motivates me.	1	2	3	4	5	6	7
14. It's important to me to keep working even when other kids are goofing off.	1	2	3	4	5	6	7
15. I would like to have a friend in my class I can confide in.	1	2	3	4	5	6	7
16. I am motivated by the thought of outperforming Others.	1	2	3	4	5	6	7
17. I hope to gain a broader and deeper knowledge of how to live a healthy and active lifestyle.	1	2	3	4	5	6	7
18. I often think to myself, " What if I do badly in the gym?"	1	2	3	4	5	6	7
19. I'd like the teacher to think I'm a responsible student.	1	2	3	4	5	6	7
20. It's important to me to have one or two really close friends.	1	2	3	4	5	6	7
21. I strive to demonstrate my ability relative to others in this class.	1	2	3	4	5	6	7
22. I prefer physical activities that arouse my curiosity, even if it is difficult to learn.	1	2	3	4	5	6	7
23. Sometimes I'm afraid that I may not understand the content as thoroughly as I'd like.	1	2	3	4	5	6	7
24. I worry about the possibility of getting a bad grade.	1	2	3	4	5	6	7
25. I do not like to distract a classmate when he/she is performing an individual activity.	1	2	3	4	5	6	7

In my P.E. class:	Not at all true of me →			Neutral			→ Very true of me
26. It's important to me that I am accepted by other students.	1	2	3	4	5	6	7
27. I want to do well in this class to show my ability to my family, friends, advisors, or others.	1	2	3	4	5	6	7
28. I prefer activities that really challenge me so I can learn new things.	1	2	3	4	5	6	7
29. I'm often concerned that I may not learn all that there is to learn in this class.	1	2	3	4	5	6	7
30. I'm afraid that if I ask my teacher a "dumb" question, people might think I'm not very smart.	1	2	3	4	5	6	7
31. When I'm on a team, I like my teammates to feel happy with what we do.	1	2	3	4	5	6	7
32. I'd like to get along with most other students.	1	2	3	4	5	6	7
33. I worry that I may not learn all that I possibly can.	1	2	3	4	5	6	7
34. When I have trouble performing some skills, I go back and practice.	1	2	3	4	5	6	7
35. Regardless of whether or not I like the activities, I work my hardest to do them.	1	2	3	4	5	6	7
36. When something that I am practicing is difficult, I spend extra time and effort trying to do it right.	1	2	3	4	5	6	7
37. I try to learn and do well, even if an activity is boring.	1	2	3	4	5	6	7
38. I put a lot of effort into preparing for skills tests.	1	2	3	4	5	6	7
39. I work very hard to prepare for our skills tests.	1	2	3	4	5	6	7
40. I work hard to do well even if I don't like what we are doing.	1	2	3	4	5	6	7
41. I always pay attention to my teacher.	1	2	3	4	5	6	7

APPENDIX B

STUDENT ASSENT FORM

I have been invited to participate in a study examining achievement goals among high school students in physical education. Jianmin Guan, a graduate student at Texas A&M University in the Health and Kinesiology Department, is the principal investigator for this study. The purpose of the study is to examine high school students' achievement goals, persistence, and effort in physical education class.

I understand that 400 children in ninth, tenth, eleventh, and twelfth grades will all be participants. During a regularly scheduled physical education class, I will complete a questionnaire entitled "Achievement Goal Questionnaire" (AGQ) one time only. The AGQ has nothing to do with my class grade or school records. Additionally, I understand that I may be selected and interviewed individually. The content of the interview will focus on my perceptions of what goals I have for physical education. The interview will be conducted during a regularly scheduled physical education class and last no longer than 15-20 minutes. The interview will be audiotaped for the purpose of data analysis only. All audiotapes will be erased after the data analysis. All results will be kept strictly confidential. Only the investigator will have access to my answers.

It is important for me to know that I can choose to answer these questions or I can choose not to. I can withdraw at any time should I so choose. Everything is up to me. My grade for physical education class or school records is not based upon participation in this study.

I understand that if I choose to participate, I may skip any questions I do not feel comfortable in answering. I also understand that if I choose not to participate, I will be given an alternative physical education activity for the duration of the tests. I also understand that there will be no physical, mental or social risks to myself.

I understand that I may contact Jianmin Guan, or Dr. Ron McBride, graduate advisor at Texas A&M University, College Station, Texas 77843 regarding any questions. Phone calls can be made at the following number: (979) 862-3230.

I understand that this research study has been reviewed and approved by the Institutional Review Board-Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, I can contact the Institutional Review Board through Dr. Michael W. Buckley, Director of Support Services, Office of vice President for Research at (979) 458-4067.

I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.

I have been given a copy of this assent form.

_____	_____
Signature of Child	Date
_____	_____
Signature of Principal Investigator	Date

APPENDIX C

INFORMED CONSENT FORM
(PARENT/GUARDIAN)

My child is being asked to participate in a study titled "Achievement Goals among High School Students in Physical Education." Jianmin Guan, a graduate student at Texas A&M University in the Health and Kinesiology Department, is the principal investigator for this study. Participation in this study entails completing a questionnaire entitled "Achievement Goal Questionnaire" (AGQ) during a regularly scheduled physical education class. There will be about 400 students in the ninth, tenth, eleventh, and twelfth grades participating in this study. Additionally, my child may be selected and interviewed individually. The content of the interview will focus on my child's perceptions of what goals he/she has for physical education. The interview will be conducted during a regularly scheduled physical education class and last no longer than 15-20 minutes. The interview will be audiotaped for the purpose of data analysis only. All audiotapes will be erased after the data analysis. The study seeks to examine high school students' achievement goals, persistence, and effort in physical education class.

I understand that participation in this study is voluntary and my child may choose not to participate or withdraw at any time without penalty of any kind. My child's grade for physical education class is not contingent upon participation in this study. I understand that if my child chooses to participate, he/she may skip any questions he/she does not feel comfortable in answering. I also understand that if my child chooses not to participate, he/she will be given an alternative physical education activity for the duration of the tests.

I understand that my child's responses to the questionnaire will be kept strictly confidential. Only the investigator will have access to my child' results. My child's name will not appear in the final report and all information will be destroyed as soon as the final report is written. I also understand that there will be no physical, mental or social risks to my child.

I understand that I may contact Jianmin Guan, or Dr. Ron McBride, graduate advisor, at Texas A&M University, College Station, Texas 77843 regarding any questions concerning the study. Phone calls can be made at the following number: (979) 862-3230.

I understand that this research study has been reviewed and approved by the Institutional Review Board-Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, I can contact the Institutional Review Board through Dr. Michael W. Buckley, Director of Support Services, Office of vice President for Research at (979) 458-4067.

I have read and understand the above explanations and give my permission for my child _____ to participate in the above physical education project.

I have been given a copy of this consent form.

_____ _____
Signature of Parent or Guardian Date

_____ _____
Signature of Principal Investigator Date

VITA

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Academic Degrees

Sept. 1999-Aug. 2004	Ph.D. Texas A&M University
Sept. 1997-Aug. 1999	M.Ed. Wayne State University, 1999
Sept. 1990-Aug. 1993	M.Ed. Shanghai Institute of Physical Education
Sept. 1982-Aug. 1984	Diploma, Huizhou Normal College, China

Professional Experience

Sept. 1999-Aug. 2004	Graduate Assistant, Texas A&M University.
Sept. 1997-Aug. 1999	Graduate Assistant, Wayne State University.
Sept. 1993-Aug. 1997	Lecturer, Shanghai Institute of Physical Education
Sept. 1984-Aug. 1990	Coach, Huangshan No. 1 Secondary School, China

Publications

Guan, J., Xiang, P., & Keating, X.D (in press). Evaluating the replicability of sample results: A tutorial of double cross-validation methods. *Measurement in Physical Education and Exercise Sciences*.

Xiang, P., McBride, R., & Guan, J. (2004). Children's motivation in elementary physical education: A longitudinal study. *Research Quarterly for Exercise and Sport. 75*, 71-80.

Xiang, P., McBride, R., Guan, J., & Solmon, M. (2003). Children's motivation in elementary physical education: An expectancy-value model of achievement choice. *Research Quarterly for Exercise and Sport, 74,* 25-35.