



Reliability and Validity of the Trichotomous and 2x2 Achievement Goal Models in Turkish University Physical Activity Settings

by
Bulent Agbuga¹

The present research is designed to continue exploration of the reliability and validity of the 2 × 2 and trichotomous achievement goal frameworks in Physical Education Teacher Education (PETE) Turkish undergraduate physical activity courses. One hundred and fifty eight Turkish undergraduate students (116 males; 42 females) served as participants. They completed both the trichotomous and 2 x 2 achievement goal scales. Confirmatory factor analysis (CFA) was employed to examine and construct the validity of both the 2 x 2 and trichotomous achievement goal models. The results showed that the 2 x 2 achievement goal model represents an adequate fit to the data ($\chi^2/df = 1.66$, CFI = 0.91, GFI = 0.93, NNFI = 0.89, and RMSEA = 0.06). Cronbach's alpha coefficients for the mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance goals were 0.65, 0.68, 0.72, and 0.60, respectively, indicating acceptable internal consistency. However, CFA analysis pointed out that the trichotomous achievement goal model provided a poor fit to the data ($\chi^2/df = 1.59$, CFI = 0.85, GFI = 0.88, NNFI = 0.69, and RMSEA = 0.06), although Cronbach's alpha coefficients in the trichotomous achievement goal model indicated acceptable reliability (mastery goals = 0.70, performance-approach goals = 0.73, and performance-avoidance goals = 0.64). Results from the present study indicate that only the 2 x 2 achievement goal model provides a reliable and valid measure of achievement goals for Turkish undergraduate students.

Key words: physical activity, validity, reliability, measurement

Introduction

Achievement goals are defined as the purposes students perceive for engaging in achievement-related behaviors and the meanings they ascribe to those behaviors (Ames, 1992; Dweck, 1986; Maehr, 1983; Nicholls, 1989). They influence how students approach learning in schools. The achievement goal approach posits (good vocabulary word, but maybe the word "postulates" or "presumes" would be better) that individuals interpret the subjective meaning of success in two main ways that correspond to two primary achievement goals—mastery goals and performance goals (dichotomous framework). Mastery

goals represent a focus on learning, understanding, competence development, task mastery, and self-improvement; while performance goals focus on demonstrating higher ability relative to others (Ames, 1992; Nicholls, 1989; Solmon and Boone, 1993; Spray and Biddle, 1997; Walling and Duda, 1995; Xiang and Lee, 2002). While a person adopting a mastery goal will define success or construe competence in terms of task mastery or improvement, another person adopting a performance goal will define success as winning or outperforming others (see Chen for a review, 2001).

Recently, Elliot and his colleagues (Elliot, 1999; Elliot and Church, 1997; Elliot & Thrash, 2002) chal-

¹ - School of Sport Sciences and Technology, Pamukkale University, Denizli, Turkey

lenged the dichotomous achievement goal framework with a trichotomous one, as some studies revealed mixed findings regarding performance goals and student outcomes. For example, Ames (1992) reported that performance goals were associated with maladaptive outcomes, such as low persistence in the face of difficulty and the use of less effective or superficial learning strategies. However, Harachiewicz, Barron, Carter, Lehto and Elliot (1997) found that performance goals were positively related to academic performance among college students.

In the trichotomous model, the mastery goal construct remained the same as that in the dichotomous framework (focus on learning, understanding, competence development, task mastery, and self-improvement), but the performance goal construct was partitioned into performance-approach and performance-avoidance goals. A performance-approach goal focused on the attainment of competence relative to others, while a performance-avoidance goal focused on the avoidance of incompetence relative to others (Elliot, 1997; Elliot and Harackiewicz, 1996).

The trichotomous achievement goal model has been widely used in the academic context. Research has been largely based on students from the United States (Elliot, 1999; Elliot and Church, 1997; Midgley et al., 1998), England (Smith, Duda, Allen, and Hall, 2002), and Israel (Levy, Kaplan, and Patrick, 2004). There is, however, limited research in the domain of sport and physical education with French students (Cury, 2000; Cury, Da Fonseca, Rufo, Peres, and Sarrazin, 2003; Cury, Elliot, Sarrazin, Da Fonseca, and Rufo, 2002) and American students (Guan, McBride, and Xiang, 2007). Cury (1999), for example, developed the Approach and Avoidance Achievement in Sport Questionnaire to assess French high school students' achievement goals (mastery and performance-approach, and performance-avoidance goals). The instrument consisted of 15 items adapted from Elliot (1997) and Elliot and Church (1997) with responses on a 5-point Likert scale, ranging from 1 (*don't agree at all*) to 5 (*completely agree*). The research has provided evidence for the validity and reliability of the scores from the instrument in sport and physical education settings.

To fully incorporate the distinction between approach and avoidance into an achievement goal framework, Elliot and McGregor (2001) proposed a 2 x 2 achievement goal model in which the mastery goal construct, like the performance goal construct, was also partitioned into mastery-approach and

mastery-avoidance goals. Individuals with a mastery-approach goal orientation try to focus on mastering tasks, learning, and understanding. Individuals with a mastery-avoidance goal orientation try to avoid misunderstanding, not learning, or not mastering a task.

In the Elliot and McGregor (2001) study, participants responded 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 subscale includes 3 items. Among the 12 items, 9 items were randomly selected from the three-factor achievement goal questionnaire, developed by Elliot (1999) and Elliot and Church (1997). Results of both reliability and validity analyses supported the 2 x 2 achievement goal model in the college classroom.

Nearly all research on the 2 x 2 achievement goal framework have been conducted in academic and work settings, but only a number of studies have been conducted which support the validity and utility of this framework in a physical education setting. In the Guan et al. (2007) study, for example, the trichotomous and the 2 x 2 achievement goal models were tested to determine which model might represent a better fit to high school physical education settings. Researchers found that the 2 x 2 achievement goal model produced more valid scores, with more applicability, than the trichotomous model, used in high school physical education settings.

Most of the previous research have also been conducted with undergraduate and high school students from western countries, such as the United States (Elliot and McGregor, 2001; Guan et al., 2007). However, a few studies from Turkey and Singapore have reflected an international perspective (Agbuga and Xiang, 2008; Wang, Biddle, and Eliot, 2007). The present study, therefore, was designed to continue exploration of the reliability and validity of the 2 x 2 and trichotomous achievement goal frameworks in Turkish undergraduate Physical Education Teacher Education (PETE) physical activity courses. Specifically, the factorial validity and internal consistency reliability of the Elliot (1999) trichotomous model and the Elliot and McGregor (2001) 2 x 2 model of achievement goals were tested to determine which model is a better fit to a sample of students in Turkish undergraduate physical activity courses.

Methods

Participants

One hundred and fifty eight Turkish undergraduate PETE majors from track and field and football courses (116 males, M age = 20.80, SD = 2.12; 42 females, M age = 21.00, SD = 2.33) served as participants.

Instrumentation

Participants completed the 21-item Achievement Goal Questionnaire-Physical Education (AGQ-PE) developed by Guan et al. (2007). The items in the AGQ-PE were analyzed from both the trichotomous and 2×2 achievement goal models. The 2×2 achievement goal model, adapted from Elliot and McGregor (2001), consists of 12 items reflecting four achievement goals: mastery-approach, performance-approach, mastery-avoidance and performance-avoidance. Each achievement goal includes 3 items. The trichotomous achievement goal model consists of 18 items adapted from Elliot (1999) and reflects three achievement goals (mastery-approach, performance-approach, and mastery-avoidance). Each of three goals (Mastery, Performance-Approach, and Mastery-Avoidance) consists of 6 items. 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). All items were prefaced with the heading "In my physical activity class ..."

Procedure

After obtaining institutional approval and informed consent from the participants, all data were collected during the spring semester of 2008. The questionnaires were administered by the researcher to students during regularly scheduled courses. Each item was read aloud to the students. They were also encouraged to answer as truthfully as they could and to ask questions if they had difficulty understanding instructions or items in the questionnaire. They were also informed that their teachers would not have access to their responses. To ensure the independence of their responses, the researcher had students spread out so that they could not see one another's responses. The questionnaires took approximately 30 minutes to administer.

Statistical Analyses

Using Analysis of Moment Structures (AMOS), Version 5.0 (AMOS 5.0; Arbuckle, 2003), confirmatory factor analysis (CFA) was employed to examine and construct the validity of both the 2×2 and trichotomous achievement goal scales. Cronbach's alpha coefficients were also calculated to examine internal consistency of test scores for each of the achievement goal subscales. When using CFA, the chi-square statistics was used to assess absolute fit of the model, but it is sensitive to sample size. As a result, a variety of fit indexes are suggested to evaluate the fit of the specified model(s) (Jöreskog and Sörbom, 1993). They include comparative fit index (CFI), Bentler and Bonnett's Nonnormed fit index (NNFI), root mean square error of approximation (RMSEA), and ratio of chi-square to degrees of freedom. CFI and NNFI exceeding 0.90 are generally considered to indicate a good fit, and exceeding 0.95 are considered to indicate an excellent fit (Hatcher, 1994; Hu and Bentler, 1995). Additionally, a RMSEA of less than 0.10 is considered indicative of an adequate fit and less than 0.05 is considered to an excellent fit (Browne and Gudeck, 1993). Finally, the chi-square to degrees of freedom ratio should be less than 3.0 for an adequate fit (McIver and Carmines, 1981).

Results

The results of descriptive statistics are presented in Table 1. All achievement goals have an average score above the midpoint of the scale. The standard deviations range from 0.81 to 1.59. The correlations of the factor scores range from 0.13 to 0.42 for the trichotomous model and 0.06 to 0.37 for the 2×2 model.

The results showed that the 2×2 achievement goal model represents an adequate fit to the data ($\chi^2/df = 1.66$, CFI = 0.91, GFI = 0.93, NNFI = 0.89, and RMSEA = 0.06). Cronbach's alpha coefficients for the mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance goals were 0.78, 0.77, 0.74, and 0.68, respectively, indicating acceptable internal consistency. However, CFA analysis pointed out that the trichotomous achievement goal model provided a poor fit to the data ($\chi^2/df = 1.59$, CFI = 0.85, GFI = 0.88, NNFI = 0.69, and RMSEA = 0.06), although Cronbach's alpha coefficients in the trichotomous achievement goal model indicated acceptable reliability (mastery goals = 0.70, perform-

Table 1

| <i>Means, standard deviations and correlations</i> | | | | | | |
|--|----------|-----------|--------------------|------------------|------------------|------------------|
| <i>Variables</i> | <i>M</i> | <i>SD</i> | <i>Correlation</i> | | | |
| | | | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> |
| Trichotomous Model | | | | | | |
| 1. Performance-Approach | 5.30 | 1.09 | .73 ^c | | | |
| 2. Mastery | 6.05 | .81 | .42** | .70 ^c | | |
| 3. Performance-Avoidance | 4.57 | 1.19 | .22** | .13 | .64 ^c | |
| 2 x 2 Model | | | | | | |
| 1. Performance-Approach | 5.39 | 1.28 | .77 ^c | | | |
| 2. Mastery-Approach | 6.15 | .90 | .37** | .78 ^c | | |
| 3. Performance-Avoidance | 4.93 | 1.43 | .11 | .06 | .68 ^c | |
| 4. Mastery-Avoidance | 4.56 | 1.59 | .14 | .08 | .29** | .74 ^c |

ance-approach goals = 0.73, and performance-avoidance goals = 0.64).

Discussion

The present study was designed to continue exploration of the reliability and validity of the 2 x 2 and trichotomous achievement goal models in Turkish undergraduate PETE physical activity courses. Specifically, the factorial validity and internal consistency reliability of the Elliot (1999) trichotomous model and the Elliot and McGregor (2001) 2 x 2 model of achievement goals were tested to determine which model was a better fit to a sample of students in Turkish undergraduate physical activity courses. Cronbach's alpha coefficients and confirmatory factor analysis were used to assess internal consistency reliability and factorial validity of the scores produced by both achievement goal models.

Consistent with the findings reported in the academic (Elliot and McGregor, 2001) and physical education settings (Guan et al., 2007), reliability and validity analyses confirmed the existence of the 2 x 2 achievement goal (four-factor) model. Results of this study revealed the 2 x 2 achievement goal model fit the data better and demonstrated more satisfactory psychometric properties than the trichotomous (three-factor) model. Therefore, it can be said that the 2 x 2 achievement goal model is more applicable

than the trichotomous model for the university level. The results indicate that the mastery-approach and mastery-avoidance goals represent two different types of achievement goals. Results from the present study also indicate that only the 2 x 2 achievement goal model provides a reliable and valid measure of achievement goals for Turkish undergraduate students. Follow-up study, however, is required to support or refute this supposition. As Guan et al. (2007) indicate, this line of research has an important contribution for physical education research, because it offers a theoretically sound and methodologically valid and reliable measure for assessing student achievement goal levels and orientations in physical education settings.

In conclusion, this study represents the first attempt to apply the 2 x 2 and trichotomous achievement goal models to study Turkish undergraduate students in an academic setting. Results of the current study are consistent with American studies (Guan et al., 2007). This study helps in expanding the continuum of achievement goal models, because most of the studies in this field focused on white, middle class North American students (Kaplan et al., 2002). Future research efforts, therefore, are recommended to replicate this study with more ethnic diversity and a larger number of students.

References

- Agbuga, B., Xiang, P. Achievement goals and their relations to self-reported persistence/effort among Turkish students in secondary physical education. *J Teach Phys Educ*, 2008. 27:179-191.
- Ames, C. Classrooms: Goals, structures, and student motivation. *J Educ Psychol*, 1992. 84:261-272.
- Browne, M.W., Gudeck, R. Alternative ways of assessing model fit. In: *Testing structure equation models*. K.A. Bollen and J.S. Long, eds. Newbury Park, CA: Sage. 1993. pp.136-162.

- Chen, A. A theoretical conceptualization for motivation research in physical education: An integrated perspective. *Quest*, 2001. 53:35-58.
- Cury, F. New directions for achievement goals theory in sport: Development and predictive validity of the AAASQ. *J Sport Exercise Psy*, 1999. 20: S15.
- Cury, F. Predictive validity of the approach and avoidance achievement in sport model. *J Sport Exercise Psy*, 2000. 22: S32.
- Cury, F., Da Fonseca, D., Rufo, M., Peres, C., Sarrazin, P. The trichotomous model and investment in learning to prepare for a sport test: A mediational analysis. *Brit J Educ Psychol*, 2003. 73: 529-543.
- Cury, F., Elliot, A., Sarrazin, P., Da Fonseca, D., & Rufo, M. The trichotomous achievement goal model and intrinsic motivation: A sequential mediational analysis. *J Exp Soc Psychol*, 2002. 38:473-481.
- Dweck, C.S. Motivational processes affecting learning. *Am Psychol*, 1986. 41:1040-1048.
- Elliot, A.J. Approach and avoidance motivation and achievement goals. *Educ Psychol*, 1999. 34, 169-189.
- Elliot, A.J. Integrating the "classic" and "contemporary" approaches to achievement motivation: A hierarchical model of approach and avoidance achievement motivation. In: *Advances in motivation and achievement*. M.L. Maehs and P.R. Pintrich, eds. Greenwich, CT: JAI Press. 1997. pp. 243-279.
- Elliot, A.J., Church, M.A. A hierarchical model of approach and avoidance achievement motivation. *J Pers Soc Psychol*, 1997. 72:218-232.
- Elliot, A.J., Thrash, T.M. Achievements goals and the hierarchical model of achievement motivation. *Educ Psychol Rev*, 2001. 13:139-156.
- Elliot, A.J., Harackiewicz, J.M. Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *J Pers Soc Psychol*, 1996. 70:461-475.
- Elliot, A.J., McGregor, H.A. A 2*2 achievement goal model. *J Pers Soc Psychol*, 2001. 80:501-519.
- Guan, J., McBride, R., Xiang, P. Reliability and validity evidence for achievement goal models in high school physical education settings. *Meas Phys Educ Exerc Sci*, 2007. 11:109-129.
- Harackiewicz, J.M., Barron, K.E., Carter, S.M., Lehto, A.T., Elliot, A.J. Determinants and consequences of achievement goals in the college classrooms: Maintaining interest and making the grade. *J Pers Soc Psychol*, 1997. 73:1284-1295.
- Hatcher, L. A step by step approach to using the SAS system for factor analysis and structural equation modeling. Cary, NC: SAS Institute Inc, 1994.
- Hu, L., Bentler, P.M. Evaluating model fit. In: *Structural equation modeling: Concepts, issues, and applications*. R.H. Hoyle, ed. London: Sage. 1995. pp.76-99.
- Jöreskog, K., Sörbom, D. LISREL 8: Structural equation modeling with the SIMPLIS command language. Hillsdale, NJ: Erlbaum, 1993.
- Kaplan, A., Middleton, M.J., Urdan, T., Midgley, C. Achievement goals and goal structures. In: *Goals, goal structures, and patterns of adaptive learning*. C. Midgley, ed. New Jersey: Lawrence Erlbaum. 2002. pp.21-53.
- Levy, I., Kaplan, A., Patrick, H. Early adolescent's achievement goals, social status, and attitudes towards cooperation with peers. *Soc Psychol Educ*, 2004. 7:127-159.
- Maehr, M.L. On doing well in science: Why Johnny no longer excels: why Sarah never did. In: *Learning and motivation in the classroom*. S.G. Paris, G.M. Olson, and H.W. Stevenson, eds. Hillsdale, NJ: Erlbaum. 1983. pp.179-210.
- McIver, J.P., Carmines, E.G. Unidimensional scaling. *Quant Appl Soc Sci*, 1981. 24:96-107.

- Midgley, C., Kaplan, A., Middleton, M., Maehr, M.L., Urdan, T., Anderman, L.H., et al. The development and validation of scales assessing students' achievement goal orientations. *Contemp Educ Psychol*, 1998. 23:113–131.
- Nicholls, J.G. *The competitive ethos and democratic education*. Cambridge, MA: Harvard University Press, 1989.
- Smith, M., Duda, J., Allen, J., Hall, H. Contemporary measures of approach and avoidance goal orientations: Similarities and differences. *Brit J Educ Psychol*, 2002. 72:155–190.
- Solmon, M.A., Boone, J. The impact of student goal orientation in physical education classes. *Res Q Exerc Sport*, 1993. 64:418-424.
- Spray, C.M., Biddle, S.J.H. Achievement goal orientations and participation in physical education among male and female sixth-form students. *Eur Phys Educ Rev*, 1997. 3:83-90.
- Walling, M.D., Duda, J.L. Goals and their associations with beliefs about success in and perceptions of the purposes of physical education. *J Teach Phys Educ*, 1995. 14:140-156.
- Wang, C.K., Biddle, S.J.H., Elliot, A.J. The 2×2 achievement goal framework in a physical education context. *Psychol Sport Exerc*, 2007. 8:147–168.
- Xiang, P., Lee, A. Achievement goals, perceived motivational climate, and students' self-reported mastery behaviors. *Res Q Exerc Sport*, 2002. 73:58-65.

Corresponding author

Bulent Agbuga

School of Sport Sciences and Technology
Pamukkale University
Kinikli Kampusu, Denizli, Turkey
Phone: +1190 258-295-2854
Fax: +1190 258-295-2941
E-mail: bakboga@yahoo.com