Antecedents and consequences of approach and avoidance achievement goals: A test of gender invariance

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Abstract

Objective: Based on Elliot's revised achievement goal framework [Elliot and McGregor (2001). A 2×2 achievement goal framework. *Journal of Personality and Social Psychology*, *80*, 501–519], the present study tested the gender invariance of the multiple achievement goal measurement model as well as the hypothesized antecedents and consequences of the multiple achievement goals embedded in a structural model.
Method: A sample of 450 British male and female athletes (M age = 22.17, SD = 6.59) were used. A multi-section questionnaire, assessing approach and avoidance achievement goals, perceived sport competence, fear of failure, and motivation regulations, was administered to the athletes before or after training. Data were collected with the informed consent of the coaches and the athletes.
Design: Cross-sectional design.
Results: Analyses of factorial invariance revealed that the four goal model could be considered as equivalent across gender. Only partial invariance was supported with respect to the antecedents-achievement goals-consequences model. The paths between fear of failure to mastery-avoidance goal, mastery-approach goal to intrinsic motivation, and performance-approach goal to extrinsic motivation regulation were not invariant for males and females.
Conclusion: The factorial validity of multiple achievement goal measure was supported for both genders. The present findings provided only partial support for gender invariance in the 2×2 model.
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Keywords: Achievement goals; Fear of failure; Perceived competence; Self-determination; Gender; Multi-group testing

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Introduction

Over the past two decades, achievement goal frameworks have provided a popular model for the investigation of achievement behaviors in the sport domain (Roberts, 2001). With respect to what are now considered dichotomous achievement goal models, it is assumed that people judge their competence and define successful accomplishment via at least two different goal perspectives (Nicholls, 1989). In the sport literature, the tendency has been to draw from Nicholls' work (1989) and label these two goals as task and ego. People who are strongly task goal oriented tend to desire to demonstrate their competence in a self-referenced manner and focus on realizing personal improvement, task mastery or learning. Individuals who have a strong ego goal orientation have a tendency to want to demonstrate high competence relative to other people. When centered on ego goals, subjective success is achieved when one beats or outperforms others, or performs similarly with less effort (Duda, 2001; Nicholls, 1989).

Variability in task and ego goals corresponds to different achievement-related beliefs, decision making processes, and subsequent behavioral patterns in achievement settings, such as sport (Duda, 2001; Roberts, 2001). Studies grounded in dichotomous achievement goal models in the physical domain have found a task goal orientation to relate to adaptive achievement behaviors and motivational processes. The results regarding the concomitants of an ego goal orientation have been more equivocal. Some studies have found an ego orientation to correlate with positive cognitions or behaviors (e.g., enjoyment and satisfaction, Hom, Duda, & Miller, 1993; Roberts, Treasure, & Kavussanu, 1996) while others have revealed ego orientation to be unrelated to positive outcomes or positively associated with negative responses (e.g., reported less effort, Duda, Chi, Newton, Walling, & Catley, 1995; negative affect, Newton & Duda, 1995; Ntoumanis & Biddle, 1999). As this is also sometimes misrepresented in the sport and educational literature (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Hardy, 1997), it should be noted that such ambiguous findings are not at odds with dichotomous achievement goal frameworks. As emphasized in Nicholls' contributions in particular (1989), the relationship of an ego goal emphasis to achievement-related outcomes and processes should be moderated by the level of perceived competence. When people doubt their competence, an ego goal is hypothesized to correspond to a maladaptive achievement pattern (Duda, 2001; Roberts, 2001).

Recently, with the aim of explicating the observed inconsistent findings for ego orientation, some researchers (e.g., Elliot, 1999; Elliot & Church, 1997) have argued for a revision of dichotomous models of achievement goals by adding the approach-avoidance distinction into the task/mastery and ego/performance dichotomy.[1] Elliot and colleagues (1999; Elliot & Church, 1997) first proposed a trichotomous model which splits the performance goal into performance-approach and performance-avoidance goal dimensions. In the former, the focus is on the attainment of favourable judgements of normatively defined competence whereas performance-avoidance goals reflect a concern with *not* demonstrating normatively-defined incompetence. Elliot and McGregor (2001) subsequently introduced another avoidance-based goal, namely the

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[1]Different terminology has been used to label the different achievement goals; e.g., learning and performance (Dweck, 1999), task and ego (Nicholls, 1989) and mastery and performance (Elliot, 1999). To be consistent with the theoretical framework underlying the present work, we used the terms employed in Elliot and McGregor's (2001) 2×2 model.

mastery-avoidance goal (focus is on *not* demonstrating absolute and/or self-referenced incompetence), which resulted in a multiple four goal framework (Elliot & McGregor, 2001).

Consonant with predictions stemming from the multiple goal model (Elliot & McGregor, 2001), findings mainly from the educational setting have showed that the approach form of goals, both mastery and performance goals, relate to positive achievement-related processes and outcomes (Elliot & McGregor, 2001; Elliot, McGregor, & Gable, 1999; Elliot & Moller, 2003; Smith, Duda, Allen, & Hall, 2002). In the limited studies that have been done in sport and physical education contexts, mastery-approach goals have been found to positively link to the belief that sport competence can be developed, perceptions of a mastery climate, and competence valuation, and negatively relate to state anxiety, amotivation and self-handicapping (Conroy, Kaye, & Coatsworth, 2006; Cury, Elliot, Sarrazin, Da Fonseca, & Rufo, 2002; Cury, Da Fonseca, Rufo, & Sarrazin, 2002; Cury, Da Fonseca, Rufo, Peres, & Sarrazin, 2003; Ommundsen, 2004; Wang, Biddle, & Elliot, 2007). Performance-approach goals have been found to positively correlate with the belief that one's level of sport competence is fixed, perceptions of a performance climate, and competence valuation and negatively link to state anxiety and self-handicapping. Performance-avoidance and mastery-avoidance goals tend to correlate with a network of negative achievement-related processes and outcomes, including maladaptive approaches to learning, self-handicapping, state anxiety and amotivation (Conroy et al., 2006; Cury et al., 2002, 2003; Ommundsen, 2004).

According to Elliot (1999, 2005b), perceived competence is considered to be a primary antecedent of goal adoption. High perceived competence is posited to orient individuals to the possibility of success and to facilitate the adoption of approach goals. In contrast, low perceived competence is assumed to orient individuals to the possibility of failure and to facilitate the adoption of avoidance goals (Elliot, 1999; Elliot & McGregor, 2001). With a French high school male sample, Cury, Da Fonseca and colleagues (2002) found that perceived competence was correlated with performance-approach and mastery goals in a PE setting.

Fear of failure is held to be another individual difference-based antecedent of goal adoption (Elliot, 1999). According to Conroy, Willow, and Metzler (2002), fear of failure is defined as a stable tendency to anticipate shame and humiliation following failure and it is held to not only contribute to an emphasis on avoidance forms of goals but also to be a precursor to the adoption of a performance-approach goal. In this latter case, the desire to avoid failure is strategically served by striving to attain success (Elliot, 1999). In a study of US college students, fear of failure was associated with both avoidance goals and the performance- approach goal repeatedly over a three week time period (Conroy, Elliot, & Hofer, 2003).

Presumed consequences of achievement goals include the motivation regulation(s) under-pinning behavior or reasons for participating in the activity (Vallerand, 2001). Drawing from self-determination theory (Deci & Ryan, 1985, 2000), most of the studies in sport and educational settings have found mastery-approach goals to correspond to greater intrinsic motivation (IM) and other more self-determined regulations, and performance-approach goals to be associated with extrinsic motivation (EM; Elliot & Church, 1997; Smith et al., 2002). Avoidance goals are hypothesized to relate to amotivation (which is manifested when individuals perceive a lack of intentionality and no intrinsic or extrinsic reasons for their participation). The limited research to date has been consonant with this prediction (Smith et al., 2002). Recent work in physical education has shown that children who endorse a mastery goal, regardless of the emphasis placed on performance-approach and performance-avoidance goals, were characterized by more

self-determined motivation and higher positive affect (Carr, 2006). Results from a longitudinal study of swimmers revealed that the positive relationship of performance-avoidance and mastery-avoidance goals to amotivation increased during a competitive season (Conroy et al., 2006).

Utilizing a cross-sectional design, the major purpose of the present research was to examine the relationships between the two assumed antecedents of achievement goals (i.e., perceived competence, fear of failure), multiple approach/avoidance goals, and hypothesized consequences of achievement goals (i.e., motivation regulations) in the sport domain via structural equation modelling. It was hypothesized that perceived competence would positively predict the adoption of the two approach goals and negatively link to the two avoidance goals (Fig. 1). We also expected fear of failure to be a positive predictor of all the targeted achievement goals except the mastery-approach goal. It was predicted that the approach form of goals would relate positively to IM while avoidance-based achievement goals would correspond positively to amotivation. Also, a mastery-approach goal was posited to negatively predict amotivation and a performance-approach goal was posited to positively relate to EM.

According to Elliot (1999), the adoption of the different multiple goals might be influenced by gender. In the limited research examining potential gender differences in multiple achievement goals, such differences have typically been investigated without controlling for measurement error (e.g., Elliot & McGregor, 2001) or focused on other issues rather than factorial invariance (e.g., Conroy et al., 2006; change in mean achievement goal emphasis over time). To our knowledge, no previous studies have examined gender differences in terms of the constructs as well as the theoretical tenets embedded in the multiple four goal model specific to the sport domain. In the present study, we explored possible gender invariance via SEM at the measurement level (i.e., factorial, covariance, and error invariance) and gender differences in latent means in the four
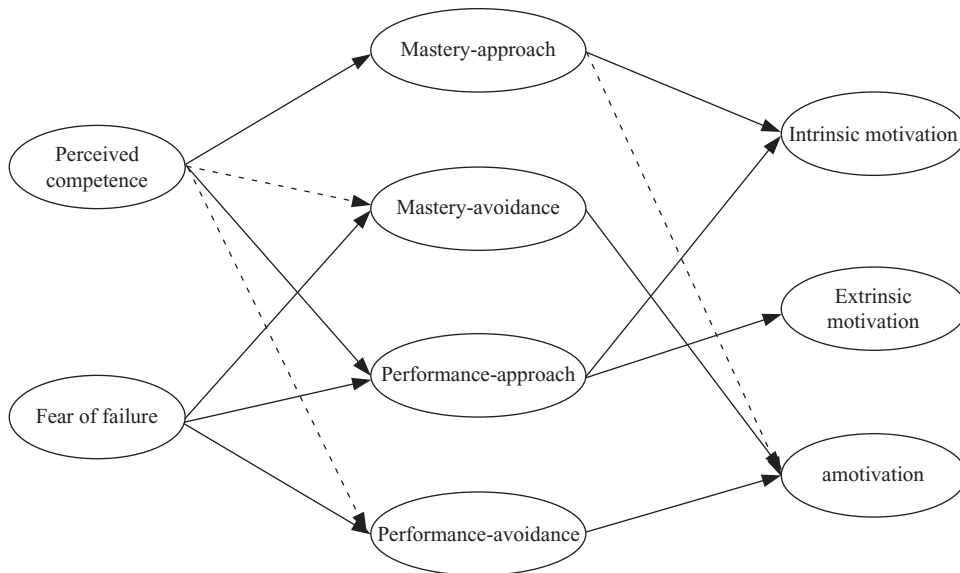

Fig. 1. Hypothesized model of antecedents and consequences of multiple achievement goals. *Note*: circles represent latent factors and dot lines indicate negative paths.

multiple goal model. We also examined the structural invariance of a causal model of theoretically-predicted antecedents and consequences of the four achievement goals. Considering the findings from classroom-based work (Elliot & Church, 1997; Elliot & McGregor, 2001), we expected support to emerge for gender invariance at the measurement level and also in terms of the hypothesized causal structural model (i.e., factor correlations, factor variance and factor uniqueness). In terms of the latent mean and intercepts of multiple four goals, we expected to find some non-invariant results between male and female athletes (Li, Harmer, & Acock, 1996).

Method

Participants and procedures

Four hundred and fifty athletes (249 = male, 197 = female, 4 participants did not report their gender; Mean age = 22.17, SD = 6.59 years) from different universities and sports clubs around the UK voluntarily participated in this study. The participants in this sample represented a variety of sports including American football (50), athletics (25), badminton (26), cricket (40), soccer (55), golf (40), gymnastic (38), hockey (40), judo (15), jitsu (19), netball (31), rugby (50), swimming (15), and other sports (20). The majority of the participants were European-white (91%) and, as a group, they tended to be experienced athletes (years in sport $M = 5.85$ years, SD = 2.58). Ethical consent to conduct the study was obtained and data were collected with the informed consent of the coaches and the athletes. A multi-section questionnaire, also tapping variables that are not reported here, was administered to the athletes before or after training by the principal investigator and took approximately 20 min to complete.

Measures

Antecedents to goal adoption
To measure perceptions of sport competence, the 5-item Perceived Competence subscale of the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989) was employed. An example item is "I think I am pretty good at my sport". Subjects responded on a scale ranging from 1 = "strongly disagree" to 7 = "strongly agree". The internal consistency and test–retest reliability of the IMI have been found to be adequate in previous research in the physical domain (McAuley et al., 1989).

Five items of the General Fear of Failure Scale were employed to measure the athletes' perceived degree of fear regarding failure in sport (Conroy et al., 2002). Items (e.g., "When I am failing, I am afraid that I might not have enough talent") were responded to on a 5-point Likert scale ranging from 1 (do not believe at all) to 5 (believe 100% of the time). Past work has provided evidence for the factorial and predictive validity as well as internal and test–retest reliability of this scale (Conroy et al., 2002).

Multiple four achievement goals
Dispositional achievement goals in sport were measured via the 12-item Achievement Goals Questionnaire for Sport (AGQ-S; Conroy et al., 2003). The AGQ-S was designed to tap athletes' ways to strive for demonstrating high competence or avoid demonstrating incompetence in the

athletic domain. Study participants responded on a scale ranging from 1 = "not at all like me" to 7 = "completely like me". The AGQ-S is comprised of four subscales tapping the emphasis placed on mastery-approach goals (e.g., "It's important to me to perform as well as I possibly can"), mastery-avoidance goals (e.g., "I worry that I may not perform as well as I possibly can"), performance-approach goals (e.g., "It's important to me to do well compared to others"), and performance-avoidance goals (e.g., "I just want to avoid performing worse than others"). Initial research has found the subscales to exhibit acceptable internal consistency and has provided evidence supporting the factorial and external validity of the measure (Conroy et al., 2003).

Motivation regulations

The athletes' motivation regulations for sport participation were assessed with the 28-item Sport Motivation Scale (SMS; Pelletier et al., 1995). The SMS contains 7 subscales capturing 3 types of IM (i.e., motivation to know, accomplishment and stimulation), 3 types of EM regulations (i.e., identified, introjective, and external regulation), and amotivation. These regulations are assumed to represent a continuum from more (i.e., composite IM) to less (i.e., amotivation) self-determined reasons for sport engagement, respectively. In the present study, we focused on three over-riding dimensions; namely IM,[2] which refers to engaging in an activity (i.e., sport) purely for the pleasure and satisfaction derived from doing the activity, EM which pertains to a wide variety of behaviors that are engaged in as a means to an end and not for their own sake, and amotivation which is evident when there is no perceived reason for activity engagement presumably due to perceptions of incompetence and a lack of control (Deci & Ryan, 1985, 2000). Items were indicated on a 7-point Likert scale from 1 (does not apply at all) to 7 (applies exactly). Although the most popular measure of sport motivation regulations in research grounded in self determination theory (Deci & Ryan, 1985, 2000), it should be noted that the literature provides mixed psychometric support for the SMS (Riemer, Fink, & Fitzgerald, 2002; Pelletier et al., 1995).

Analytic strategies

Multi-group invariance testing usually includes the examination of measurement equivalence and structural equivalence. The degree to which the content of each item is perceived and interpreted the same across groups is referred as measurement equivalence. Structural equivalence, by contrast, refers to the degree to which the relationships among the latent variables are similar in each group (Byrne & Watkins, 2003). Testing parameters such as factor loading, factor uniqueness (i.e., error variance) are main areas of interest in tests of measurement invariance. By contrast, structural invariance involves testing the equivalence of parameters such

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[2]A preliminary analysis was conducted to test the construct validity of the assessment of sport motivation regulations. Several alternative models were analyzed, including a 7-factor model (comprised of all the subscales of the SMS), a 5-factor model (comprised of a composite intrinsic motivation factor, the 3 extrinsic motivation subscales, and amotivation) and a 3-factor model (comprised of composite intrinsic and extrinsic motivation factors and amotivation). In contrast to the hypothesized a prior structure of the SMS, the 3-factor model provided the best fit to the data; χ^2 (32, sample = 448) = 92.47, $p < .001$, IFI = .97, TLI = .97, CFI = .97, RMSEA = .065 (.05–.08). The composite intrinsic and extrinsic motivation dimensions were represented by 3 parcel items, which were randomly chosen from each of the three intrinsic and extrinsic motivation subscales.

as factor variance–covariance and mean structures (i.e., correlation paths, covariance and variance, and latent means; Byrne, Shavelson, & Muthén, 1989).

The testing of invariance first starts with estimating the hypothesized structure without constraining any parameter in both (or all) groups simultaneously (e.g., Byrne & Watkins, 2003). An observed adequate fit of this model is required for further testing (Byrne, 2001). All subsequent tests involve comparing a constrained model in which required parameters (i.e., factor loading, correlation paths, variance–covariance, intercept and latent means) are equal for both (or all) groups with an unconstrained model which does not include the equality requirement. If the statistical fit of the constrained model reveals a significantly worse solution than the unconstrained one, this is interpreted as evidence for non-invariance. That is, in this case, when we force the parameters to be equal, the results are suggesting that at least one of the parameters is different across groups.

In terms of examining the measurement invariance of the multiple four goals model, we began by establishing a baseline model ($M_{baseline}$) which is an unconstrained one, followed by constraining the factor loadings in order to examine factorial invariance ($M_{factor–loading}$, M_{FL}), factor covariance–variance ($M_{covariance–variance}$, M_{CV}), factor uniqueness ($M_{residual}$) and latent mean ($M_{I–M}$) of structural invariance. In testing the causal model assumed to be underlying the multiple four goals, the present study followed the recommendations of Bentler (1989) and Byrne (1989, 2001), the tests for the invariance of the factor loadings in the hypothesized causal model were followed by tests of the factor paths and subsequent tests of factor variance–covariance.

According to the well-known problem of the chi-square test being sensitive to sample size, other fit indices (i.e., CFI, TLI, and RMSEA) are also considered when making comparisons to the baseline model. According to Hu and Bentler's (1995) recommendations, we considered the root mean square error of approximation (RMSEA) as a measure of absolute fit and the Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI) as indices of incremental fit. Hu and Bentler (1995) propose a good fitting model to be indicated by values close to or greater than .95 for the CFI and TLI, and values of (or less) than .06 for RMSEA. As the RMSEA is sensitive to the number of parameters considered, a different criterion was used (Browne & Cudeck, 1989, .08–.10 is reflective of a mediocre fit). If the null model is not rejected, this indicates that the restriction of the parameters did not result in a solution that was worse than the baseline model. Otherwise, at least one non-invariant parameter exists and serial "nested" models are then tested to investigate the source(s) of the difference(s). Only invariant parameters remain for further testing.

Although support for total factorial invariance is preferred, it is usually hard to achieve such a result. Therefore, an observation of partial invariance is also considered acceptable (Byrne et al., 1989). Under the prerequisite of partial factorial invariance, one can test structural invariance by constraining all the equivalent items and letting those non-invariant items to be freely estimated. Although what comprises a proper sequence for the testing of structural invariance is still open to question, the present study followed the recommendations of Byrne (2001) regarding latent mean equivalence testing and Bentler (1989) with respect to covariance–variance structure testing.

It is important to be aware that the factor loadings which were constrained to 1 for the purpose of model identification were not estimated in the factorial model (e.g., M_{FL} and MC_{FL}) and, as a result, it is possible that this caused a bias of invariance in terms of factorial equivalence. A further test of the factor–ratio (Cheung & Rensvold, 1999) was conducted in order to detect possible non-invariant items with respect to factorial invariance. Although the intercepts of the

observed variables are not of interest in this study, they are necessary to model identification and interpretation of the latent means. Latent means were constrained to 0 in the female sample and this made females to be the reference group when identifying potential differences in latent means (Sörbom, 1974).

Results

Equivalence of the four achievement goals

Before testing the gender invariance of the structural model regarding the hypothesized antecedents and outcomes associated with the four achievement goals, we needed to be confident of whether the observed data fit the hypothesized four goal measurement model. Several trivial models as well as the hypothesized multiple four goal model were tested with CFA via AMOS 5.0 (Arbuckle, 2005). Results for both genders showed that only the multiple four goal model was considered to be adequate (χ^2[48] = 151.97[male]/126.08[female], CFI = .92/.94, TLI = .90/.92, RMSEA = .10/.09).[3] However, an examination of the modification indices (MIs) revealed that one item (i.e., Map3, item 9, "It's important for me to master all aspects of my performance") from the mastery-approach goal subscale was problematic due to its cross-loading on other factors. The item was removed and, as a consequence, the overall fit improved (χ^2[38] = 107.92[male]/94.08[female], CFI = .95/.95, TLI = .92/.93, RMSEA = .09/.09).[4]

The descriptive statistics for each of the multiple achievement goals items are reported in Table 1 and the result of the testing of invariance are reported in Table 2.[5] Two statistics were used to measure the structure of the multiple goals measure (i.e., composite reliability; Fornell & Larcker, 1981), which represents a measure of the proportion of the shared variance to error variance in a construct (i.e., factors) and Cronbach alpha coefficient which indicates the internal reliability of a factor. The observed values for both of these criteria were considered as satisfactory and above recommended levels (see Table 1 for details; composite reliability over .50; Fornell & Larcker, 1981 and .70 or higher with respect to internal reliability; Nunnally, 1978).

The results (see Table 2) indicated that the model fit of the unconstrained model was good (χ^2[78] = 204.02, $p < .00$, CFI = .95, TLI = .93, RMSEA = .06). Although the overall chi-square fit was significant, the supplemented fit indices indicated that the multiple achievement goals are considered adequately in the baseline model ($M_{baseline}$; without any constraints in the model) for both the male and female athlete samples. Hence, the constrained factor loading model (i.e., M_{FL})

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[3]Several trivial models were examined via CFA across gender and only the multiple four goal model was considered to be adequate: (1) mastery-performance model: χ^2 (53) = 444.51(male)/392.81(female), CFI = .72/.75, TLI = .65/.69, RMSEA = .18/.18; (2) trichotomous model (A) Mastery-Pap-Pav: χ^2 (51) = 313.21(male)/293.75(female), CFI = .81/.82, TLI = .75/.77, RMSEA = .15/.16; (3) trichotomous model (B) Approach-Mav-Pav: χ^2 (51) = 307.04 (male)/431.25 (female), CFI = .81/.72, TLI = .76/.63, RMSEA = .15/.20; (4) Approach-Avoidance model: χ^2 (53) = 495.89 (male)/641.81 (female), CFI = .68/.56, TLI = .60/.46, RMSEA = .19/.24; (5) multiple four goal model: χ^2 (48) = 151.97 (male)/126.08 (female), CFI = .92/.94, TLI = .90/.92, RMSEA = .10/.09.

[4]The internal reliability also improved from .78 to .82.

[5]Because the multivariate Mardia Kurtosis value observed for each sub-sample was not large (male = 23.81, female = 37.19), the normality of the data distribution from both groups were considered as normal and maximum likelihood (ML) estimation was used in the subsequent analyses.

Table 1
Means standard deviations and factor loading of the AGQ-S items

Variable	Male					Female				
	M	SD	UL	SL	R	M	SD	UL	SL	R
Mastery-approach goal				.69[a]	.77[b]				.84[a]	.86[b]
Map1	6.00	1.05	1	.84	.71	6.08	1.07	1	.91	.83
Map2	6.13	1.06	.90	.75	.56	6.20	1.13	.97	.84	.71
Map3*	5.36	1.26				5.21	1.26			
Mastery-avoidance goal				.79[a]	.83[b]				.83[a]	.87[b]
Mav1	4.53	1.60	1.12	.82	.67	4.92	1.52	.86	.72	.52
Mav2	4.70	1.53	1	.77	.59	5.14	1.44	1	.89	.79
Mav3	4.57	1.54	1.03	.79	.62	4.83	1.67	1.16	.89	.79
Performance-approach goal				.80[a]	.85[b]				.91[a]	.85[b]
Pap1	4.50	1.51	1	.79	.62	4.07	1.52	1	.75	.56
Pap2	4.18	1.54	1.14	.88	.77	3.56	1.52	1.15	.86	.74
Pap3	4.15	1.65	1.08	.78	.61	3.40	1.48	1.07	.82	.67
Performance-avoidance goal				.81[a]	.86[b]				.81[a]	.85[b]
Pav1	3.56	1.73	1	.79	.62	3.45	1.60	1	.80	.64
Pav2	3.23	1.75	1.16	.90	.81	3.09	1.50	1.05	.89	.79
Pav3	3.85	1.77	1.02	.78	.61	3.75	1.65	1	.77	.59

*This item was eliminated due to its cross-loading on several factors.
UL = unstandardized factor loading, SL = standardized factor loading, R = squared multiple R.
[a]Composite reliability.
[b]Internal reliability.

was not worse than the baseline model ($\Delta df = 7$, $\Delta\chi^2 = 11.94$, $p = .10$). However, the assumption of total factorial invariance can still be rejected due to bias from the constant item for which the factor loading was set as 1. According to subsequent factor–ratio tests, one non-invariant item (Mav1, item 2) was revealed when the constrained factor loading of 1 was set for another item (Mav2, item 6). This item was released to be freely estimated in all the other tests and partial factorial invariance can be considered supported (M_{FL-1}).

In terms of the structural covariance and variance of the multiple four goal model (M_{CV}), the chi-square difference was significant and the null model was rejected ($\Delta\chi^2 = 18.63$, $\Delta df = 9$, $p < .05$). Results indicated that there was at least one parameter that was non-invariant. The covariance between the mastery-approach and mastery-avoidance goals was found to vary as a function of gender. The association for female athletes was stronger than for the male athletes ($\Phi = .56$ vs. .33, respectively). After releasing this parameter to be freely estimated, the chi-square difference was reduced and the p value became non-significant (M_{CV-1}, $\Delta\chi^2 = 12.49$, $\Delta df = 8$, $p = .13$). Further testing of the equivalence of the measurement errors revealed that the uniqueness of all items was found to be invariant except for two items (i.e., the measurement error of Map1 and Mav2). The uniqueness of the two items was found to be larger for the male athletes when contrasted to the female athletes ($\varepsilon = .36$ vs. .19, .99 vs. .42 for Map1 and Mav2,

Table 2
Chi-square and other indices on invariance testing of four achievement goal model

Model		χ^2	df	$\Delta\chi^2$	Δdf	p	RMSEA	CFI	TLI
($M_{baseline}$)	Baseline model (without any constrained)	204.02*	78	–	–	–	.06(.05–.07)	.95	.93
(M_{FL})	Factor loading model	215.96*	85	11.94	7	ns(= .10)	.06(.05–.07)	.95	.93
(M_{FL-1})	Released factor loading model (Mav1 to be free estimated)	206.59*	84	2.56	6	ns(= .86)	.06(.05–.07)	.95	.94
(M_{CV})	Covariance–variance constrained model	225.22*	93	18.63	9	.01	.06(.05–.07)	.95	.94
(M_{CV-1})	Released (Map–Mav) covariance model	219.08*	92	12.49	8	ns(= .13)	.06(.05–.07)	.95	.94
($M_{recidual}$)	Measurement residual constrained model	254.30*	103	35.22	11	.01	.06(.05–.07)	.94	.94
($M_{recidual-2}$)	Free error Map1 & Mav2	231.83*	101	12.67	9	ns(= .17)	.05(.05–.06)	.96	.94
(M_{I-M})	Latent mean intercept model	256.94*	95	50.35*	11		.06(.05–.07)	.94	.93

* $p < .01$.

Table 3
Descriptive statistics, internal consistency and latent factor correlations in causal model between males/females

Variable	M	SD	α	1	2	3	4	5	6
Perceived competence	5.47/5.02	.85/.99	.76/.80[a]						
Fear of failure	2.43/2.48	.81/.77	.76/.76[a]						
Mastery-approach goal	5.83/5.83	.89/1.0	.77/.86[a]	.31					
Mastery-avoidance goal	4.6/4.97	1.35/1.38	.83/.87		.87/.60				
Performance-approach goal	4.27/3.68	1.38/1.32	.85/.85	.41	.63				
Performance-avoidance goal	3.55/3.43	1.55/1.39	.86/.85		.75				
Intrinsic motivation	5.12/5.11	.88/.89	.90/.92			.34/.54			
Extrinsic motivation	4.11/3.91	.91/.88	.84/.81					.34	
Amotivation	2.09/2.16	1.12/1.12	.82/.85			−.67	.28		.17

[a]Indicates the internal reliability after eliminating problematic items suggested by MIs. The observed α were slightly lower for the perceived competence and fear of failure subscale: .79/.83, .79/.78; but slightly higher for mastery-approach goal subscale: .70/.84.

respectively). The reliability of the remaining items, except the two non-invariant items, was considered to be stable across gender.

Under the condition of partial factorial invariance, a gender difference in the latent means of the performance-approach and mastery-avoidance goals was observed. Male athletes revealed a higher mean emphasis on the performance-approach goal and lower mean emphasis on the mastery-avoidance goal than their female counterparts. More specifically, for the performance-approach goal latent factor, males scored .55 (s.e. = .12, cr = 4.57, $p < .00$) higher than female athletes, whereas on the mastery-avoidance goal latent construct they scored .34 (s.e. = .12, 24 cr = −1.81, $p < .00$) lower than the female group. The means for the other achievement goals were invariant across gender (cr = −.79 and .85, $p = .43$, .59 for the mastery-approach and performance-avoidance goal, respectively).

Tests of causal model invariance

Beyond the equivalence of the multiple four goals model, it is also of interest to investigate whether the correlation paths, variance and covariance matrices among the theoretically predicted antecedents and consequences of the goals are also invariant across gender. Only the covariance matrix was analyzed. Outliers and complete sets of missing data (i.e., the participant did not complete one of the assessments in this study) were removed using listwise data deletion. Approximately 3% of the original cases were eliminated because of such reasons, however, this value did not exceed the cut-off criterion of 5% as suggested by Roth (1994). Descriptive statistics for each variable in the causal model are reported in Table 3. The internal reliability of each factor ranged from .76 to .90 (mean α = .82) in the male group and .76 to .92 (mean α = .84) in the female group. Thus, the measures in question were considered reliable.[6]

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[6]Because the multivariate Mardia Kurtosis value for each sub-sample was large (male = 73.60, female = 80.49) than in the previous analysis (after the inclusion of hypothesized antecedents and consequences in the model), multivariate non normality was considered. Therefore, the bootstrap procedure was employed in the data analysis (see Table 4).

Several parcels were created to reduce the number of indicators for the motivation regulations accessed in this study (i.e., IM and EM). Prior to testing the measurement and structural invariance of the causal model, we examined the hypothesized causal model via CFA for the male and female athlete groups separately. This was done for the purpose of preserving, in advance, an adequate structure in terms of parsimony and substantive meaningfulness with the observed data. An examination of the MIs revealed several items to be problematic. In addition to Map3 that was revealed to be problematic in previous analyses, two items of the perceived competence subscale (i.e., Item 4 "I can master sport practice drills, after having practiced them for a while" and Item 5 "I can not perform very well in my sport") and one item of the fear of failure subscale (i.e., "When I am failing, I am afraid that I might not have enough talent") were removed in subsequent analyses. Moreover, an examination of the modification indices also suggested that several first order structural error terms (Marsh, 1993) needed to be correlated, (i.e., the residuals between performance-approach and avoidance goals, mastery-approach and avoidance goals, and intrinsic and EM regulations) in order to improve overall model fit.

The overall fit indices of the baseline model ($MC_{baseline}$) indicated that the observed data from both gender groups fit the hypothesized causal model (see Table 4). The next model considered equal factor loadings (MC_{FL}) and this constraint revealed an invariant result for the structural model. However, once again, this result should be interpreted with caution as fixing the factor loading to 1 in both groups does not provide a test of group differences. Additional testing was performed to detect this potential bias. No additional item was found to be non-invariant except the one, which was detected in the previous section (i.e., Mav1). This is an indication of partial factorial invariance (Cheung & Rensvold, 1999; Li et al., 1996) and suggests that the hypothesized model (except for this item) fit the data adequately for both the male and female athletes.

The following model added the constraint of equal factor correlation paths and a significant difference between male and female athletes emerged (MC_{path}, $\Delta\chi^2 = 23.68$, $\Delta df = 11$, $p = .01$). Further tests were found that male and female athletes were different in the fear of failure to mastery-avoidance goal link, as well as with respect to the paths from the mastery-approach goal and performance-approach goal to IM. More specifically, a stronger association between fear of failure and mastery-avoidance goal adoption was revealed for men than women (unstandardized factor correlation male vs. female: $\Phi = .87$ vs. .60, $p < .01$). By contrast, the path from the mastery-approach goal to IM was stronger for females than males (unstandardized factor correlation male vs. female: $\Phi = .34$ vs. .54, $p < .01$). Finally, the path from the performance-approach goal to IM regulation was different across the gender groups due to a negative non-significant result that emerged for the female athletes (unstandardized factor correlation male vs. female: $\Phi = .14$ vs. $-.05$, $p < .01$ and $p > .05$, respectively).

Non-invariant parameters (i.e., factor correlations) were free to be estimated and invariance in factor variance and covariance equivalence was examined. Non-significant differences were found ($\Delta\chi^2 = 2.76$; $\Delta df = 2$, $p = .25$) between two independent factor variances (i.e., perceived competence and fear of failure). Based on the previous model (MC_v), the covariance of the first order structural error terms as well as variances of those residuals were further tested. The null model was rejected (MC_{cov}, $\Delta\chi^2 = 28.73$; $\Delta df = 10$, $p = .00$). A covariance between the error term of the mastery-approach and mastery-avoidance goal and the variance of the mastery-avoidance goal error term were found to differ by gender. Males exhibited less measurement error variability with respect to the mastery-avoidance goal than females. This may have contributed to

Table 4
Goodness-of-fit statistics for tests of invariance on casual structural model across male and females: A summary

Model		χ^2	Adjusted χ^{2a}	df	$\Delta\chi^2$	Δdf	p	RMSEA	CFI	TLI
$MC_{baseline}$	Baseline model	1198.59	759.84(1.60)	672				.04(.04–.05)	.92	.91
MC_{FL}	All factor loading constrained model	1227.01	778.43(1.65)	691	28.43	19	ns	.04(.04–.05)	.92	.91
MC_{FL-1}	Free 1 loading model (Mav1)	1214.77		690	16.18	18	ns(= .58)	.04(.04–.05)	.92	.91
MC_{path}	All paths constrained model	1238.45	787.50(1.66)	701	23.68	11	.01	.04(.04–.05)	.92	.91
MC_{path-3}	Released correlation paths model	1222.65		698	7.88	8	ns(= .44)	.04(.04–.05)	.92	.91
MC_v	IVs variance constrained model	1225.41	789.62(1.66)	700	2.76	2	ns(= .25)	.04(.04–.05)	.92	.91
MC_{cov}	All covariances constrained model	1254.15	800.65(1.69)	710	28.73	10	.00	.04(.04–.05)	.92	.91
MC_{cov-2}	Covariance released model	1235.83		708	10.42	8	ns(= .24)	.04(.04–.05)	.92	.91
MC_{err}	Constrained all measure errors model	1319.49	831.73(1.75)	736	83.66	28	.00	.04(.04–.05)	.91	.91
MC_{err-7}	Measured errors released model	1267.56		729	31.73	21	ns(= .06)	.04(.04–.05)	.92	.92

All chi-square were significant at $p < .001$ level and number in brackets are s.e.
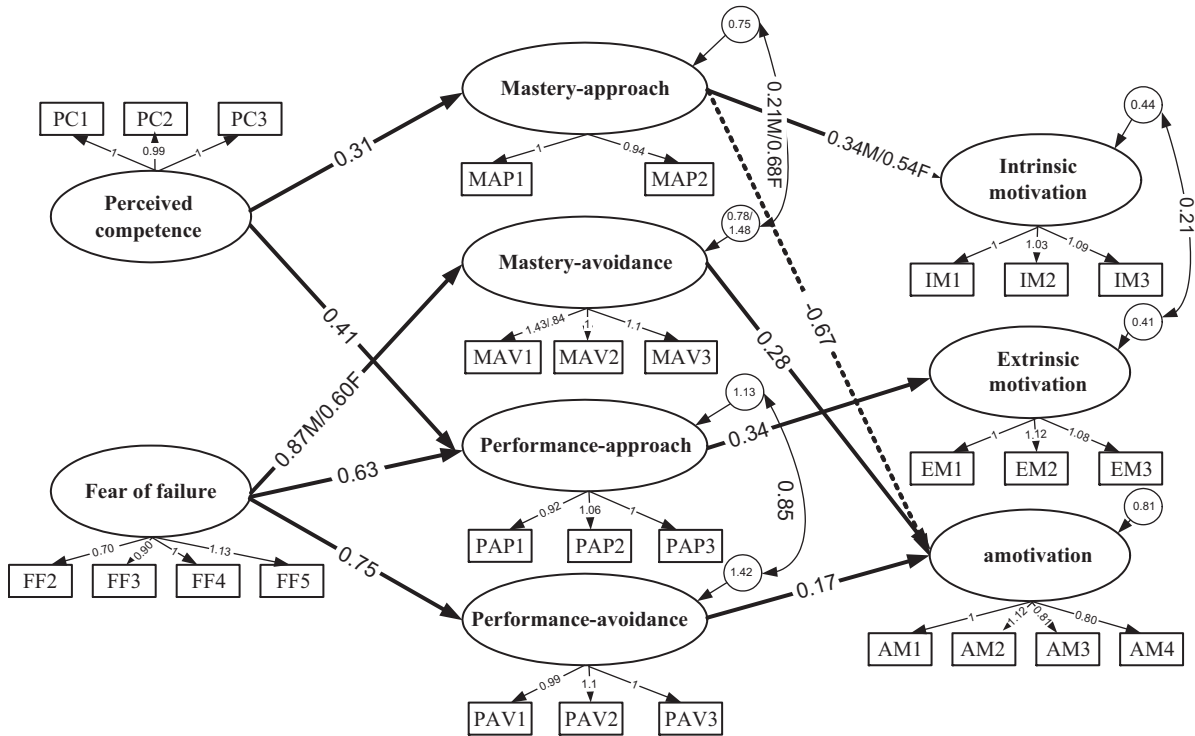[a]Bootstrap mean of χ^2; bootstrap distribution were performed at $N = 2000$.

Fig. 2. Final model of antecedents and consequences of multiple achievement goals. *Note*: Only significant paths are shown ($p < .05$). If revealed to be different, the path coefficients for males (M) and females (F) are provided separately.

the observed weaker relationship in the measurement error term covariate between mastery-approach and mastery-avoidance goal for males when compared to females (unstandardized measurement error variance male vs. female: .78 vs. 1.48; covariance between mastery goals male vs. female: .21 vs. .68, all $ps < .05$). Finally, the results from the test of invariance in the measurement errors revealed that they were not equivalent across gender groups (MC_{err}, $\Delta\chi^2 = 83.66$; $\Delta df = 28$, $p < .01$). Seven of the measurement errors were found to differ between males and females. The final model with indicated path coefficients and correlated residuals for the male and female athletes is presented in Fig. 2.

Discussion

The major purpose of the present study was to test gender invariance in the relationships between theoretically predicted antecedents as well as consequences of the 2×2 achievement goal model (Elliot, 1999, 2005a) in a sport setting. Specifically, we first examined the equivalence of a factorial model that included mastery-approach, mastery-avoidance, performance-approach and performance-avoidance goals. We also tested a causal structural model that proposed perceived competence and fear of failure to differentially relate to the four achievement goals, and also assumed that the goals differentially predict variation in the motivation regulations for sport

involvement. All in all, the findings support the partial invariance of the factorial model as well as the structural model with respect to the male and female athletes sampled.

Factorial invariance of the four achievement goals

Results suggested that the psychometric properties of the multiple four achievement goal subscales, as reflected in their composite and internal reliability, were consistent across gender. Additionally, an examination of the standardized factor loadings revealed adequate discriminant validity. All the items loaded on the hypothesized factor in the multiple four goal model. Although evidence of partial factorial invariance was found, gender differences only emerged with respect to one item on the mastery-avoidance subscale (i.e., 10 out of the 11 factor loadings were invariant across gender). There is no reason to expect that this finding diminishes the appropriateness of employing the multiple four goal measure in studies of male *and* female athletes.

In terms of the inter-relationships between the four achievement goals across gender, the results suggested equivalence in the variances of all the goal factors. The goal factors were also found to be significantly related to each other with the exception of the association between the mastery-approach and performance-avoidance goals. The strongest link was between the performance-approach and performance-avoidance goals (1.05), followed by the links between performance-avoidance and mastery-avoidance goals (.70), performance-approach and mastery-avoidance goals (.54), mastery-approach and mastery-avoidance goals (.33/.56; male/female), and mastery-approach and performance-approach goals (.27).

These results parallel the zero-order correlations reported by Elliot and colleagues (1997; Elliot and McGregor, 1999, study 1; Elliot et al., 1999), and Conroy et al. (2003) in academic and sport settings, respectively but are not consistent with the CFA results reported by Elliot and McGregor (1999, study 2) in an academic context. In their research, the strongest association was between mastery-approach and mastery-avoidance goals (standardized correlation coefficient = .37) while a weaker covariance was revealed in the case of performance-approach and performance-avoidance goals.

The observed difference in the magnitude of the covariances between performance-approach/ avoidance goals and mastery-approach/avoidance goals is notable. From a theoretical perspective (Elliot, 1999), it is not surprising that a positive relationship would exist between approach and avoidance performance- or mastery-focused goals in that they share the same competence definition (i.e., competence is defined with respect to interpersonal or absolute/intrapersonal criteria, respectively). One explanation for the observed differential in covariance magnitude is that, when contrasted to mastery goals, performance-approach and performance-avoidance goals are both tied to fear of failure. That is, an orientation toward negative possibilities in achievement-related activities seems to underlie both comparatively-referenced achievement goals (Conroy et al., 2003; Elliot & Church, 1997). Moreover performance-approach and avoidance goals have also been found to relate to entity beliefs about competence (or the view that one's level of sport ability cannot be changed) and perceptions of a performance climate in the physical education setting (Cury et al., 2002). In contrast, from a theoretical and empirical perspective, mastery-approach and mastery-avoidance goals do not seem to share the same situational and person-based antecedents.

A latent means difference on the mastery-avoidance and performance-approach goals for males and females was also revealed. The observed gender difference in performance-approach goal

emphasis is similar to what has been found in studies grounded in dichotomous achievement goal (i.e., research on ego goal orientation; e.g., Li et al., 1996) as well as the trichotomous achievement goal (i.e., research on performance-approach goals; e.g., Ommundsen, 2004) framework in the physical domain.

In sum, although the observed scores for the male and female athletes on the measures of the multiple four goals indicated partial invariance, the hypothesized factorial structure as well as the expected relationships among the different goals could be considered supported. Thus, our findings are aligned with the multiple four goal model proposed by Elliot and McGregor (2001). Further, the results of the multiple group analysis via SEM provided evidence for the cross validation of the AGQ-S (Conroy et al., 2003) across gender.

Causal model of the antecedents/consequence of achievement goals

Overall, the unconstrained model (i.e., baseline model) was found to be adequate in the case of the current samples of female and male athletes. Moderate paths differentially connected the two antecedents to the different achievement goals in accordance with theoretical predictions. Consistent with previous studies (Elliot & Church, 1997; Ommundsen, 2004), perceptions of sport competence emerged as a positive predictor of the two approach forms of goal adoption. Athletes who have high perceived competence would tend to anticipate more favorable outcomes. Thus, it makes conceptual sense that high perceptions of competence would correspond to a greater emphasis on approach-oriented perspectives toward achievement.

An unexpected finding was that perceived competence failed to negatively predict avoidance forms of goal adoption (i.e., mastery-avoidance and performance-avoidance). According to Elliot (1999), low competence perceptions should orient individuals toward avoiding unfavorable possibilities in achievement settings. When an athlete doubts his or her level of competence (e.g., due to an injury, performance slump, salient defeat), the probability of subsequent failures becomes more pronounced. At best, uncertain outcomes and at worse, likely negative outcomes, can lead individuals to adopt avoidance goals rather than their approach goal counterparts. In terms of explicating the present unanticipated results, the female and especially the male athletes in the present study reported high perceived competence. Their subscale scores were marked by a relatively low standard deviation and slightly negatively skewed distribution ($M = 5.02$ and 5.47, skewness $= -.69$ and $-.75$, respectively). In essence, the point that low perceived competence did not significantly correspond to the endorsement of avoidance goals may have resulted from the present sample of athletes not containing a sufficient number of low perceived competent participants (and the perceived competence variable exhibiting limited variability).

Aligned with the hypothesized causal structural model, fear of failure positively predicted the adoption of a performance-avoidance goal. This result is also consistent with what has been reported in the literature (Conroy et al., 2003; Elliot & Church, 1997) and is congruent with Elliot's (1999, p. 174) premise that fear of failure "will prompt the adoption of performance-avoidance goals that focus on the avoidance of a negative possibility".

Gender differences in the hypothesized path between fear of failure and mastery-avoidance goal emerged. More specifically, the path for males was weaker when contrasted with the path for the females. One of the possible explanations for this finding was the larger variance of measurement error for the mastery-avoidance goal evident for the female athletes when contrasted with their male counterparts. This unexpected error noise might have diluted the strength of the path

between fear of failure and the mastery-avoidance goal for the females when compared to the males.

Consonant with theoretical arguments (Elliot, 1999, 2005b) as well as with previous research (Conroy et al., 2003; Elliot & Church, 1997), fear of failure not only positively predicted avoidance goals but also was supported as an antecedent of the emphasis placed on performance-approach goals. Within an important achievement environment that can pose threats to athletes' self-worth, it seems straightforward that a heightened fear of failure could contribute to a desire to avoid the demonstration of incompetence (Elliot, 1999). However, the correspondence between fear of failure and performance-approach goals appears to be more complex (Elliot, 1999). Past work has revealed the adoption of a performance-approach goal to be coupled with both positive challenge-related (perceived competence) and threat-related (fear of failure) determinants of achievement goals (Elliot, 1999). In research primarily based on the dichotomous achievement goal framework, performance/ego goal orientation has been found to relate to heightened anxiety (Hall & Kerr, 1998) as well as perfectionistic tendencies (Hall, Kerr, & Matthews, 1998). The same correlates have emerged for fear of failure (e.g., Conroy et al., 2003; Kaye, Conroy, & Fifer, 2006). So even though athletes who emphasize performance-approach goals are oriented toward success, the demonstration of high perceived competence, and viewing achievement situations as positive challenges, their perspective on achievement seems to be intertwined with self-worth, tendencies to be self-critical, and the view that competition is threatening. With respect to the latter correlates, there seems to be a negative focus inherent in a performance-approach goal that provides an "underlying apprehension" (Elliot, 1999, p. 178). What we may have in this case is a "motive-goal pairing in which the desire to avoid failure is strategically served by striving to attain success" (Elliot, 1999, p. 174). Thus, in terms of the present finding, it is not surprising that performance-approach goals would be coupled with the propensity to view failure as a looming and stressful possibility.

In general, the multiple achievement goals corresponded to the motivation regulations in a manner that was theoretically consistent. The mastery-approach goal was positively correlated with IM and also negatively correlated with amotivation. The former path was stronger for females than males but, overall, is aligned with Elliot's theoretical arguments (1999). Although latent means differences in motivation regulations, perceived competence and fear of failure were not tested in the present study, it should be noted that reported perceived competence was higher for the male athletes when contrasted with their female counterparts ($p < .05$). A focus on mastery (approach) goals is assumed to buffer the prospective detrimental impact of low perceived competence (Nicholls, 1989) and elevated perceptions of competence are held to correspond to greater IM (Deci & Ryan, 1985). Thus, this may be a reason why the path between IM and the mastery-approach goal was more pronounced for females. Such an achievement goal emphasis may be particularly relevant to the maintaining/fostering of IM in their case.

A negative path between a mastery-approach goal and amotivation emerged. According to self-determination theory (Deci & Ryan, 2000), low perceived competence and a lack of contingency between one's actions and outcomes (i.e., low perceptions of control) contribute to a sense of being amotivated in an activity. As described above, the adoption of a mastery-approach means that judgments of competence tend to be self-referenced; thus, perceiving oneself to possess inadequate competence should be less likely as well as less debilitating when this achievement goal is emphasized (Duda, 2001; Nicholls, 1989). Moreover, the self-referenced and approach-oriented

features of mastery-approach goals are also presumed to contribute to a heightened sense of personal control over one's achievement striving.

As predicted and compatible with previous classroom-based studies (Elliot & Church, 1997; Smith et al., 2002), the emphasis placed on performance-approach goals was moderately associated with EM. Consonant with the arguments expressed by Nicholls (1989), a focus on demonstrating superior competence relative to others means that one's achievement involvement is a means to an end rather than an end in itself.

The expected positive path between performance-approach goals and IM was revealed only among the male participants. Drawing again from self-determination theory (Deci & Ryan, 1985, 2000), satisfaction of the need for competence should foster more self-determined regulations for sport engagement (such as IM). Given that the male athletes reported higher perceived competence than the female athletes in our study, it is understandable that the performance-approach goal corresponded positively to IM among the male competitors.

As predicted (Elliot, 1999), the avoidance form of goals emerged as positive predictors of amotivation. When the concern is with avoiding the demonstration of incompetence, it is more difficult to gain positive competence feedback from one's sport involvement. This would be expected to contribute to a lack of motivation (Smith et al., 2002).

Several correlated residual variances needed to be added while analysing the hypothesized causal structural model in order to improve the overall model fit. The residual variances between the approach and avoidance manifestations of performance goals and mastery goals were the first two pairs that needed to be correlated based on the observed modification indices. This was not surprising given the observed strong link between performance-approach and avoidance goals (and the significant but less pronounced covariance between mastery-approach and avoidance goals). A possible measurement-related reason for the need to correlate the structural measurement errors is the similar wording between the approach and avoidance subscales of the AGQ-S which tap performance as well as mastery goals (Elliot & Church, 1997). In essence, we may have a method effect which should be teased out in subsequent research.

Limitations and methodological issues

All in all, the results provided support for the reliability and factorial (discriminant and convergent) validity of the four goal scales assumed in the multiple four goal measurement model underlying the Achievement Goal Questionnaire for Sport (Conroy et al., 2003). However, this finding should be interpreted with caution as one of the items on the scales employed was eliminated from subsequent analyses (i.e., Map3) due to an improper solution of cross-loading on other factors. It could be argued that the content of the removed item from the mastery-approach goal subscale (i.e., Map3, item 9, "It's important for me to master all aspects of my performance") meant that the subscale now captures a slightly different concept. More specifically, given the items remaining on the subscale, the mastery-approach goal subscale on reflects a focus on performing well rather than also a concern with mastering the task.

In this study, we formed composite motivation regulation dimensions (i.e., IM, EM and amotivation) and used an item parcel strategy to reduce the number of indicators of the different motivation regulations. This was done for the purpose of reducing parameters in the causal structural analysis but also for improving the reliability of the indicators and reducing

measurement error. It should be noted that this data-driven strategy could cause potential difficulties in future attempts to replicate the present study. It is also important to keep in mind that an initial CFA at the item level failed to support the a priori 7 factor structure of the Sport Motivation Scale (Pelletier et al., 1995).

The observed correlated error term between IM and EM could be explained by the inclusion of identified regulation along with introjected and external regulations in the latter dimension. When an athlete is identified regulated, he or she highly values sport engagement and feels that his or her participation is personally important. Thus, although classified as an extrinsic regulation, identified regulation represents a more self-determined type of involvement (Vallerand, 2001). Future studies that are able to tease out the relationships between multiple achievement goals and the different types of extrinsic regulations (as well as IM and amotivation) would make an important contribution to the literature. Moreover, drawing from the present results, more work on the psychometric properties of the Sport Motivation Scale appears warranted.

A limitation of the present study is that it is cross-sectional. As a result, it is not possible to discount potential reciprocal effects between the presumed antecedents (i.e., fear of failure, perceived competence), the achievement goals themselves, and motivational regulations. To address such issues and provide evidence for the presumed causal sequencing, further research is needed entailing longitudinal and experimental (e.g., manipulating perceptions of competence or achievement goals) designs.

Finally, it should also be noted that the participants in this study were nested in sport type and teams. Unfortunately though, we did not have the numbers to examine such potential multi-level effects on multiple goals and their correlates. This represents another interesting avenue for future study.

Conclusion

In conclusion, this study examined the gender invariance of the four multiple achievement goal model and a causal structural model grounded in Elliot and McGregor's (2001) 2×2 model. Some latent mean differences in achievement goals were revealed but the factorial validity of the multiple goal model was supported for both males and females. The results stemming from the analysis of invariance in the causal structural model provided only partial support. All in all, the present findings call for subsequent work testing the theoretically expected links between presumed antecedents and multiple goals as well as multiple goals and motivational regulations in sport settings (Elliot, 1999, 2005b).

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