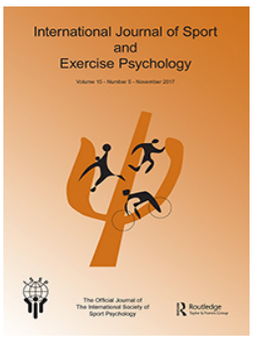

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Psychometric properties of the 3 × 2 achievement goal questionnaire for sport

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The purpose of the present study was to examine the psychometric properties of the 3 × 2 achievement goal questionnaire (AGQ) for sport. A total of 475 university athletes (263 males, 212 females), ranging from 20 to 29 years of age ($M = 24.27$, $SD = 2.30$) took part in the study. The results of the confirmatory factor analysis supported the measurement model of the 3 × 2 AGQ as well as the invariance of the measurement model across gender and type of sport. There were inconsistent loadings to the hypothesised latent factors in the uncorrelated-trait and uncorrelated-method to support the existence of the dual meaning models. Generally, the 3 × 2 achievement goals were linked to other key variables central to the achievement goal literature in a theoretically coherent manner. This study supported the use of the 3 × 2 achievement goal measure in the sport domain. Finally, the findings suggest some cultural differences between Singaporean and Western athletes in the conceptualisation of approach and avoidance tendencies.

Keywords: achievement goals; confirmatory factor analysis; invariance; uncorrelated-trait and uncorrelated-method

In the past three decades, the achievement goal theory has been one of the most popular approaches to the study of motivational research in the sport and physical activity context. It assumes that the individual is a purposeful, sensible, and goal-driven being that behaves and makes decisions based on achievement goals directed by achievement beliefs in an achievement context (Roberts, 2012).

Within the achievement goal theory research, different labels or forms of achievement goals have been identified by different researchers such as Ames (1984), Dweck (1986), Maehr (Maehr & Nicholls, 1980), and Nicholls (1989). Despite the different labels, there is a common agreement that two major achievement goals operate in achievement settings. The first goal perspective focuses on self-referenced mastery or learning how to do the task and is labelled by terms such as "learning", "mastery", and "task-involved" goals. The second perspective emphasises normative comparison of ability or performance relative to others and is labelled by terms such as "performance", "ability", and "ego-involved" goals (Pintrich, 2000). Both of these goals are approach in nature (Ames, 1992; Nicholls, Cheung, Lauer, & Patashnick, 1989). In recent years, the two achievement goals have developed into a trichotomous goal framework (Elliot & Harackiewicz, 1996) with the addition of approach and avoidance dimensions, refinement into a 2 × 2 achievement goal framework (Elliot, 1999), and more recently, a 3 × 2 achievement

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goal model (Elliot, Murayama, & Pekrun, 2011) was proposed. It is important to note that Nicholls' dichotomous achievement goals are linked to the construct of success and thus the measures focus on two ways of defining success that centre around the idea of success being dispositional or situational. On the other hand, Elliot's achievement goal framework is conceptualised by different perceptions and definitions of competence, therefore the measures capture different standards used to evaluate competence (Papaioannou, Zourbanos, Krommidas, & Ampatzoglou, 2012). The latest 3 × 2 achievement goal model has been extended only by Mascret, Elliot, and Cury (2015) into the sporting domain with a French sample; there is a need to further validate the 3 × 2 achievement goal model in a different country and culture. This is the purpose of the current study.

Nicholls (1989) posited that individuals with task/mastery goals would demonstrate adaptive achievement behaviours such as persistence after failure, the seeking of more challenging tasks, exerting more effort in tasks undertaken, and being more intrinsically motivated while doing the task (e.g. Duda & Hall, 2001; Nicholls, 1989; Roberts, Treasure, & Kavussanu, 1997). Individuals with ego/performance goals, on the other hand, are posited to be associated with adaptive achievement behaviours only when their perceived ability is high. They would be very competitive and seek to demonstrate their competence in challenging competitions. However, if their perceived competence level is low, they would seek ways to avoid demonstrating their incompetence and display maladaptive behaviours such as avoid challenges, exert less effort, have reduced persistence in face of failure, and are likely to drop out if the task is too difficult (Roberts, 2012).

In sport and physical education, possessing a task goal orientation has been positively associated with intrinsic motivation and positive affect. The relationship for ego goal orientation is ambiguous, although when coupled with high task goal orientation, ego goals may also be associated with positive processes and outcomes (Biddle, Wang, Kavussanu, & Spray, 2003; Wang & Biddle, 2001).

Elliot and colleagues (Elliot, 2005; Elliot & Church, 1997; Elliot & Harackiewicz, 1996) proffered the inclusion of the approach-avoidance dimension to performance goals, which resulted in a trichotomous achievement goal framework. The three classifications of goals in this framework are performance-approach, performance-avoidance, and mastery. They demonstrated that this approach-avoidance distinction elicited great benefits in various analyses of achievement goals (Elliot, 2005), with many published studies supporting the utility of this model.

More recently, Elliot and his colleagues (Elliot, 2005; Elliot & McGregor, 2001) have further extended the trichotomous achievement goal framework to a 2 × 2 achievement goal framework that fully incorporates the mastery-performance and approach-avoidance distinctions. In this model, competence is viewed as the antecedent of the achievement goal constructs. They proposed that competence can be differentiated in two ways – in terms of definition and valence. Competence is defined in terms of the standard used to evaluate competence; this may refer to either the task itself/one's own past performance (mastery) or the performance of others (performance). The valence of competence may be viewed in terms of whether the focus is on a positive possibility (approach) or a negative possibility (avoidance). Crossing these two dimensions yields four achievement goals that are posited to comprehensively cover the types of competence-based goals that individuals adopt and pursue in academic, work, and sport environments. The four achievement goals are: mastery-approach (the focus on task-based or intrapersonal competence, e.g. "I want to learn as much as possible from this class"), mastery-avoidance (the focus on task-based or intrapersonal incompetence, e.g. "I am often concerned that I may not learn all that there is to learn in this class"), performance-approach (the focus on normative competence, e.g. "It is important for me to do better than other students"), and performance-avoidance (the focus on normative incompetence, e.g. "My goal in this class is to avoid performing poorly").

A number of studies have been conducted in support of the validity and utility of this framework (see Moller & Elliot, 2006, for a review). Most of the research has been conducted in the academic and work fields. Fewer studies have been conducted in sport and exercise settings, although there were a few notable exceptions that incorporated the 2 × 2 achievement goal framework (e.g. Cury, Da Fonséca, Rufo, Peres, & Sarrazin, 2003; Cury, Elliot, Sarrazin, Fonseca, & Rufo, 2002; Wang, Biddle, & Elliot, 2007). Generally, it was found that each achievement goal predicted a different pattern of achievement-relevant processes and outcomes. That is, mastery-approach and performance-approach goals contributed to positive effects and consequences, whereas mastery-avoidance and performance-avoidance goals predicted and produced less adaptive motivational patterns. In terms of perceived competence as an antecedent of goal adoption, it was found that perceived competence positively predicted mastery- and performance-approach goals, and was negatively related to performance-avoidance goals (Cury et al., 2002; Standage, Duda, & Ntoumanis, 2003), but Morris and Kavussanu (2008) did not find this relationship significant in sport.

Wu and Chen (2010) argued that each subscale of the 2 × 2 achievement goal measure assesses two constructs concurrently. For example, the items from mastery-approach subscale measure mastery dimension and approach dimension of achievement goal. Therefore, there may be overlapping such that each item loads to two latent factors. It is thus not correct to represent the four factors using mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance. A more logical way is to use mastery, performance, approach, and avoidance to represent the latent factors of the indicators. Each indicator should be loaded on two dimensions. For example, the item measuring mastery-approach should cross load on the mastery factor as well as the approach factor. These four factors should be uncorrelated as they are independent constructs. They used an uncorrelated-trait and uncorrelated-method (UTUM) for analysing a multi-trait and multi-method (MTMM) matrix (Campbell & Fiske, 1959) in comparison with the 2 × 2 achievement goal model, and found that the UTUM model is better than the 2 × 2 four-factor model, supporting the dual meanings of items. This has not been tested with the 3 × 2 achievement goal model.

With the more recent addition of the 3 × 2 model of achievement goals (Elliot et al., 2011), mastery goals were separated to task-based and self-based goals. Task-based goals refer to the absolute demands of the tasks (e.g. to score a goal, apply the right tactics and strategies) and self-based goals take reference on one's own performance (e.g. how well I have done). Consequently, there are six goal constructs: task-approach, task-avoidance, self-approach, and self-avoidance, other-approach, and other-avoidance (previously labelled as performance-approach and performance-avoidance). They argued for the need to separate mastery into task and self-goals because it is possible for people to evaluate mastery goals with reference to the task demands (task-based goals) or to one's past performance (self-based goals).

Mascret et al. (2015) have investigated the 3 × 2 achievement goal model in the sport domain and found that task-based goals and self-based goals are distinct goals. Specifically, perceived competence was correlated positively with task-approach goals but was not related to self-approach goals. In Mascret et al.'s study, items are created to assess each achievement goal in the sport domain. There were a few issues with some of the items created, especially with the task-approach and task-avoidance items. For example, the items for task-approach are "to perform well", "to obtain good results", and "to be effective", and three items for task-avoidance are "to avoid performing badly", "to avoid bad results", and "to avoid being ineffective". These six items may seem ambiguous to the respondent as one may interpret these items as either self- or other-based. Since the mastery of sports involves techniques, skills, and strategies, items assessing task goals should involve these three dimensions. In the current study, we assess task-approach goals using "I aim to execute the skills correctly", "I strive to apply the right tactics

and strategies", and "I want to execute every technique successfully". Task-avoidance goals are assessed using "I avoid making a lot of technical errors", "I avoid applying the wrong tactics and strategies", and "I avoid making a lot of mistakes".

Hence, the purpose of the present study was to further validate the measurement models of the 3 × 2 model of achievement goal. Specifically, this study examined the psychometric properties of the 3 × 2 achievement goal model and compared with 10 alternative models, similar to Mascret et al. (2015). In addition, the invariance of the 3 × 2 achievement goal measurement model was tested across gender and type of sports. Next, the dual meaning of the 3 × 2 achievement goal measure was examined using the UTUM as proposed by Wu and Chen (2010). Finally, the relationships between the 3 × 2 achievement goals and perceived competence, athletic ability, and intrinsic motivation were examined as these variables are the key variables in the achievement goal literature.

Method

Participants

Responses were collected from 475 university athletes (263 males, 212 females), ranging from 20 to 29 years of age ($M = 24.27$, $SD = 2.30$). Most of the athletes were Chinese (88%), there were about 5% of Malay and 4% of Indian ethnicity athletes, and 3% from other ethnic groups. These university athletes were from a variety of sports. They have been participating and/or training in their sports ranging from 1 to 22 years ($M = 7.66$, $SD = 5.30$) and they were currently participating or training in their sport on a weekly basis. These university athletes were from a variety of sports; 215 were classified under individual sports and 260 under team sports.

Procedure

Prior to any of the studies, ethical clearance was obtained from university's ethical review board. Participants were briefed on the purpose of the study, and told that there is no right or wrong answer to the questions, and that their responses will be kept confidential. When completing the questionnaire, the participants were instructed to consider their present thoughts and feelings regarding their main sport when responding to the items. They were also told that they could withdraw from the study at any time without any negative repercussions. The questionnaire was administered in a quiet setting.

Measures

3× 2 achievement goal questionnaire in sport (3× 2 AGQ-S)

The 3 × 2 AGQ was designed to measure the 3 × 2 achievement goals in the general undergraduate classroom context (Elliot et al., 2011). In the modified version, the 3 × 2 AGQ-S, "questions" and "answers" have been changed to "skills", "techniques", "tactics", and "strategies", "other students" have been changed to "others" or "players", and "in this class" has been changed to "in my sport" as a leading stem from the start. Athletes responded on 7-point scales ranging from "strongly disagree" (1) to "strongly agree" (7). There were three items for each achievement goal (see Appendix 1).

Perceived competence

Six items from the perceived competence scale of the Intrinsic Motivation Inventory (IMI; Deci & Ryan, 2008) were used to measure perceived competence. A 7-point Likert scale ranging from 1

(strongly disagree) to 7 (strongly agree) was used. An example item is, "I think I'm pretty good in my sport".

Conceptions of the nature of athletic ability

To assess participants' implicit theories towards sport abilities, 12 items from the Conceptions of the Nature of Athletic Ability Questionnaire-2 (CNAAQ-2) was administered (Wang & Biddle, 2001). The CNAAQ-2 is assumed to have satisfactory fit indices, invariant across gender and school Years 7, 8, and 9 (CFI = .944–977; RMSEA = .034–.050) (Wang & Biddle, 2001). There are two subscales in the CNAAQ-2, namely entity and incremental beliefs. Each subscale has six items using a Likert scale of 1 (strongly disagree) to 7 (strongly agree). One example of an entity item is "to be successful in sport you need to born with the basic qualities which allow you success", and that of an incremental item is "you need to learn and to work hard to be good at sport".

Intrinsic motivation

Three items from the interest/enjoyment subscale of the IMI (Deci & Ryan, 2008) were adapted to assess participants' intrinsic motivation in their sport (e.g. "I usually enjoy playing my sport"). Participants will respond to the items on a scale from 1 (strongly disagree) to 7 (strongly agree).

Data analysis

Preliminary analyses were conducted to examine the distributional and internal consistency of the measures. Descriptive statistics (means, standard deviations, skewness, and kurtosis), and Cronbach's alpha coefficients were calculated for the original subscales, using EQS 6.2 for Windows (Bentler, 1998), to examine the internal reliability of the subscales.

Confirmatory factor analyses (CFAs) were conducted using EQS 6.2 for Windows to determine the validity of the 3 × 2 achievement goal measurement models and the 10 alternative models, similar to Mascret et al. (2015). Model 1 is the *3 × 2 achievement goal* measure with six separate latent factors (other-approach [*OAp*], other-avoidance [*OAv*], task-approach [*TAp*], task-avoidance [*TAv*], self-approach [*SAp*], and self-avoidance [*SAv*]). Model 2 is a *2 × 2 model* with other-based goals loaded on their hypothesised factors (other-approach, other-avoidance), and the like-valenced task-based and self-based goals loaded together on joint latent factors (task-approach/self-approach, task-avoidance/self-avoidance). Model 3 is a *trichotomous model* with other-based goals (other-approach, other-avoidance) loaded on their respective factors, and the task-based and self-based goals loaded together on one latent factor. Model 4 is a *dichotomous model* with other-approach and other-avoidance loaded on one latent factor and all other items loaded on another factor. Model 5 is a *TAp*/*TAv* (task-approach/task-avoidance) model with five latent factors in which the items for task-approach and task-avoidance load on one factor and the other items load on their respective hypothesised latent factors. Model 6 is also a five-factor model with self-approach and self-avoidance (*SAp*/*SAv*) loaded on one joint latent factor and the other items loaded on their respective hypothesised latent factors. Model 7 (*OAp*/*OAv*) is a model with other-approach and other-avoidance loaded on a joint latent factor and the other items loaded on their respective hypothesised latent factors. Model 8 is an *approach* model with items from task-approach, self-approach, and other-approach loaded on one joint factor and the other items loaded on their hypothesised latent factors. Model 9 is an *avoidance* model with task-avoidance, self-avoidance, and other-avoidance loaded on one joint factor and the task-approach, self-approach, and other-approach items loaded on their respective latent factors. Model 10 is a

definition model in which all the items sharing a competence definition load together on joint latent factors (task-approach/task-avoidance, self-approach/self-avoidance, and other-approach/other-avoidance). Model 11 is a *valence* model in which all items with a shared valence load together on joint latent factors (See Table 1).

Maximum likelihood estimates were derived from the covariance matrices, and there was no missing data. Maximum Likelihood estimation with Satorra and Bentler's (1994) robust correction was chosen since the data were not multivariately normally distributed (Mardia's coefficient = 203.22, Normalised estimate = 82.53).

Model fit was assessed with the following indices: Robust Comparative Fit Index (CFI), Robust Non-normed Fit Index (NNFI), and Robust Root Mean Squared Error of Approximation (RMSEA). CFI assesses the lack of fit as estimated by the non-central χ^2 distribution of a target model compared to a baseline model (Bentler, 1990). The NNFI is an incremental fit index that tests the relative improvement of fit by comparing the target model to a more conservative baseline model with no correlations among observed variables (Bentler & Bonnett, 1980). The RMSEA is based on the analysis of residuals and compensates for the effects of model complexity. According to Fan, Thompson, and Wang (1999), the robust CFI, NNFI, and the RMSEA have shown to be least influenced by sample size and were therefore used to assess the adequacy of the models. The ratios of Satorra-Bentler scaled chi-square ($S\text{-}B_{\chi}^{2}$) to the degrees of freedom were also used to evaluate goodness of fit. Although a cut-off value approaching .95 for the CFI and NNFI and a cut-off value less than .06 for the RMSEA are preferred, values greater than .90 for the former, and less than or equal to .08 for the latter are considered adequate fit (Hu & Bentler, 1999).

Other than the indices used above, the chi-square difference tests, the Akaike information criterion (AIC), and the Conditional AIC (CAIC) were used to compare the hypothesised models with the alternative models (Kline, 1998). If a chi-square difference value is significantly greater than zero, this indicates that the alternative model provides a worst fit to the data compared to the hypothesised model. Lower AIC and CAIC values indicate better model fit.

Next, the factorial invariance of the 3 × 2 AGQ across gender and types of sport (individual vs. team) was examined with additional CFAs through multi-sample analyses (Bentler & Wu, 1998) in order to establish the generalisability of the 3 × 2 structure of achievement goals.

In order to further examine the dual meaning of the 3 × 2 achievement goal measures, the UTUM for analysing the MTMM matrix (Campbell & Fiske, 1959) was used. The main focus is on the combined meanings in each item. The hypothesised model for the 3 × 2 five-factor achievement goal (approach, avoidance, task, self, and other) is shown in Figure 1. The variances of the latent factors were fixed at 1, and the error variances to be estimated. In the figure, only

Table 1. Summary of the 16 models tested.

Model no.	Model	Latent factors
1	3 × 2 Achievement Goal Model	OAp, OAv, TAp, TAv, SAp, SAv
2	2 × 2 Achievement Goal Model	OAp, OAv, task-based, self-based
3	Trichotomous Goal Model	OAp, OAv, all other goals
4	Dichotomous Goal Model	Other-based goals, all other goals
5	TAp/TAv 5-Latent Factors Model	Task-based goals, OAp, OAv, SAp, SAv
6	SAp/SAv 5-Latent Factors Model	Self-based goals, OAp, OAv, TAp, TAv
7	OAp/OAv 5-Latent Factors Model	Other-based goals, TAp, TAv, SAp, SAv
8	Approach Goal Model	Approach goals, OAv, TAv, SAv
9	Avoidance Goal Model	Avoidance goals, OAp, TAp, SAp
10	Definition Model	Task-based goals, self-based goals, other-based
11	Valence Model	Approach-based, avoidance-based

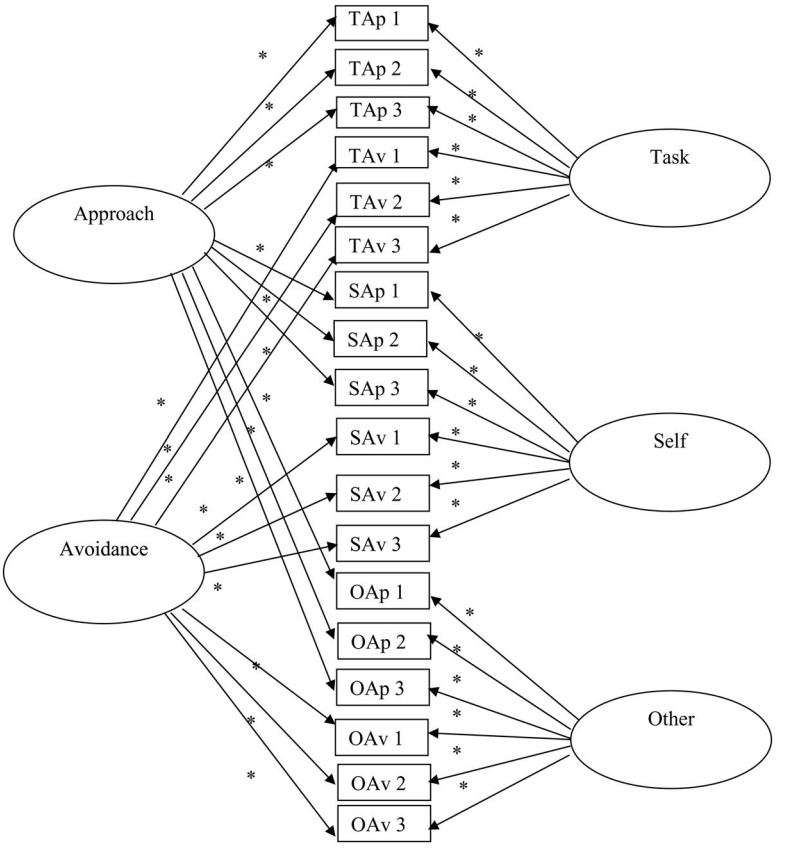

Figure 1. Hypothesised UTUM model of the 3 x 2 AGQ-S.

estimates of the factor loadings are shown. The UTUM five-factor model was then compared with the original 3 × 2 achievement goal measure.

Finally, we examined the zero-order correlation matrix of the 3 × 2 achievement goals with perceived competence, entity beliefs, incremental beliefs, and intrinsic motivation.

Results

Preliminary analyses

Table 2 shows the means, standard deviations, observed minimum and maximum values, and internal reliability coefficients for each of achievement goal subscales. All of the items had

Table 2. Descriptive statistics and internal consistency of the achievement goal subscales.

Variable	α	*M*	*SD*	Range	Skewness	Kurtosis
Task-approach goals	.86	5.82	.80	3–7	−.21	−.34
Task-avoidance goals	.76	5.44	.93	1–7	−.61	1.23
Self-approach goals	.82	5.77	.78	2–7	−.46	.70
Self-avoidance goals	.74	5.31	1.05	1–7	−.59	.51
Other-approach goals	.87	4.53	1.30	1–7	−.30	−.02
Other-avoidance goals	.85	3.95	1.44	1–7	−.08	−.43

distributional indices (skewness and kurtosis values) between +1 and −1, except for the kurtosis of task-avoidance. For all subscales, except other-avoidance goals, the mean values were above 4.5 on a 7-point scale, indicating general endorsement of the subscale items.

Cronbach's (1951) coefficient alphas were calculated to determine the internal consistency of each subscale using EQS 6.2 for Windows. Most internal consistency coefficients revealed reliabilities of at least .74, which are still considered acceptable. In general, the participants scored high for task- and self-based goals and task-approach goals.

Measurement CFAs models

The results of the CFA for the 3 × 2 achievement goal model showed that the hypothesised model is satisfactory, with scaled $\chi^2 = 279.81$, df = 120; NNFI = .936; CFI = .950; RMSEA = .053, 90% CI of RMSEA = .045, .061. The AIC was 39.81 and CAIC was −579.79. The standardised factor loadings and error variances of the 3 × 2 achievement goals are shown in Figure 2.

Additional CFAs were conducted to compare the hypothesised models with 10 alternative models examined by Mascret et al. (2015). The results are shown in Table 3. The analyses show support for the hypothesised 3 × 2 achievement goal model with none of the other models showing a satisfactory overall fit.

The fit statistics for the simultaneous test of invariance across gender and type of sport are scaled $\chi^2 = 475.20$, df = 291; NNFI = .939; CFI = .945; RMSEA = .052, 90% CI of RMSEA = .043, .060, and scaled $\chi^2 = 420.01$, df = 291; NNFI = .949; CFI = .954; RMSEA = .046, 90% CI of RMSEA = .035, .055, respectively. These results provided strong support for the invariance of the 3 × 2 achievement goal measurement model across gender and type of sport.

UTUM analysis

The fit indices of the five-factor UTUM model (scaled $\chi^2 = 448.35$, df = 117; NNFI = .940; CFI = .954; RMSEA = .077, 90% CI of RMSEA = .070, .085). The AIC was 214.35 and CAIC was −389.75. The standardised solutions are shown in Figure 3. It is worthy to note that there are a few interesting findings in terms of the factor loadings of the indicators to the latent factors.

The items for measuring task-approach loaded significantly on the latent factors task and approach. However, the task-avoidance items loaded predominantly on task. The items for measuring self-approach loaded on both self and approach factors, but the items for self-avoidance loaded predominantly on self. Similarly, the items for other-approach loaded on other, and less to the approach factor. The items for measuring other-avoidance loaded on both other and avoidance factors.

From the findings above, it seems that the 3 × 2 achievement goal measurement model and the five-factor UTUM model both provided adequate fit of the data to the hypothesised models. However, careful examination of the item loadings and values of AIC and CAIC revealed that five-factor models may not be ideal as there were many inconsistent loadings on the latent factors.

Relationships between achievement goals and other key variables

The results of the correlation between 3 × 2 achievement goals, perceived competence, entity and incremental beliefs, and intrinsic motivation are shown in Table 4. Perceived competence was positive related to task-approach, task-avoidance, self-approach, and other-approach goals. Entity beliefs were negatively correlated with task-approach, task-avoidance, and self-approach goals but positively related to other-avoidance goals. Incremental beliefs and intrinsic motivation were positively associated with task-approach, task-avoidance, and self-approach goals.

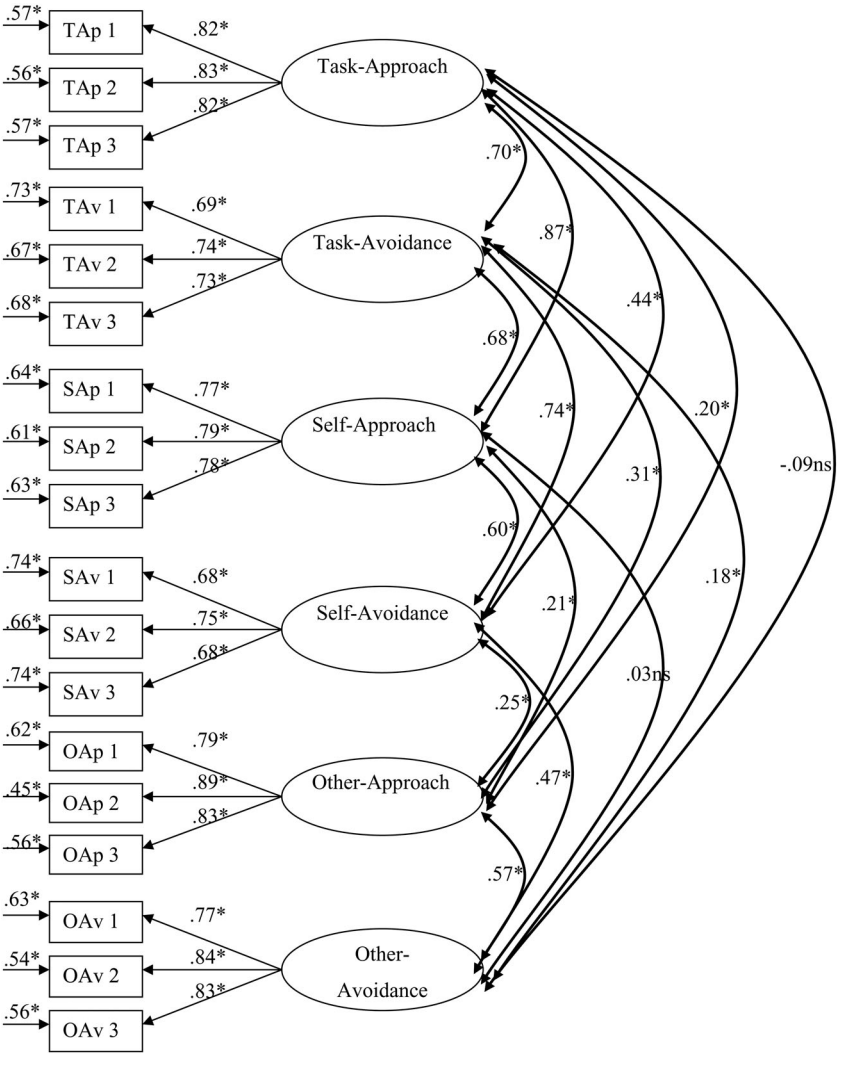

Figure 2. Standardised estimates for the CFA model of the 3 × 2 AGQ-S.

Discussion

The purpose of the current study was to re-examine the measurement model of the 3 × 2 model of achievement goal using a different sample and with modifications of the task-approach and task-avoidance items to better represent the sporting context compared to the previous study. The current study extended the previous research in a few ways. First, it is conducted in the sport context from another country, where the predictive utility of the 3 × 2 achievement goal model is still in its infancy (Nien & Duda, 2008). Second, this study went one step further in testing the invariance of the measurement model across gender and type of sport. Third, the current study also tested the dual meaning of the paired dimensions of achievement goal constructs. Finally, with the modification of the task-approach and task-avoidance items, stronger and consistent relationships were found between the 3 × 2 achievement goals and key variables in the achievement goal literature.

Table 3. Comparison of the hypothesised models and alternative models.

		Robust fit indices							
	S-Bχ^2	df	S-Bχ^2/df	CFI	NNFI	RMSEA	RMSEA 90% CI	$\Delta\chi^2$ ($N = 475$)	AIC	CAIC
3 × 2 model (baseline model)	279.81	120	2.33	.950	.936	.053	.045, .061	–	39.81	−579.79
2 × 2 model	412.14	129	3.19	.911	.895	.068	.061, .075	132.33**	154.14	−511.95
Trichotomous model	609.20	132	4.61	.850	.827	.087	.080, .094	329.39**	345.20	−336.36
Dichotomous model	811.27	134	6.05	.788	.758	.103	.096, .110	531.46**	543.27	−148.61
TAp/TAv model	395.06	125	3.16	.915	.896	.068	.060, .075	115.25**	145.06	−500.35
SAp/SAv model	472.80	125	3.78	.891	.867	.077	.069, .084	192.99**	222.80	−422.62
OAP/OAv model	1151.01	135	8.53	.681	.639	.126	.119, .133	871.20**	881.01	183.96
Approach model	863.93	129	6.70	.770	.727	.110	.103, .116	584.12**	605.93	−60.14
Avoidance model	817.39	129	6.34	.784	.744	.106	.099, .113	537.58**	559.39	−106.68
Definition model	766.78	132	5.81	.801	.769	.101	.094, .108	486.97**	502.73	−178.77
Valence model	1279.32	134	9.55	.641	.590	.134	.127, .141	999.51**	1011.32	319.43

Notes: CFI = Comparative Fit Index; NNFI = Non-normed Fit Index; RMSEA = Root Mean Square Error of Approximation; AIC = Akaike Information Criterion; CAIC = Conditional AIC.
**$p < .01$.

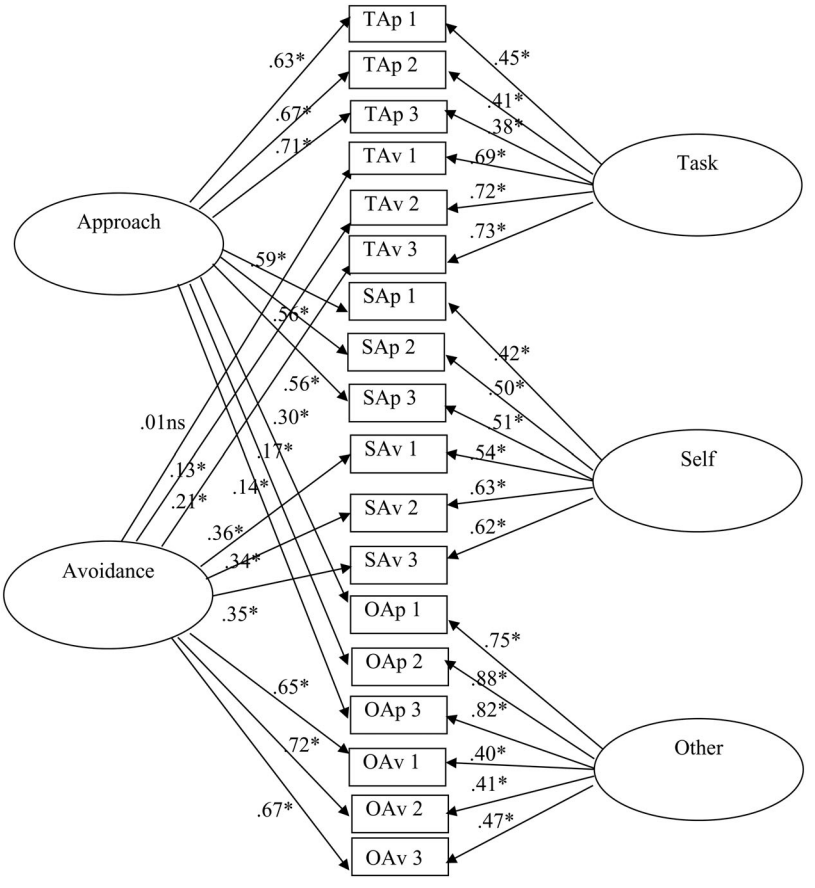

Figure 3. Standardised estimates of the UTUM model of the 3 × 2 AGQ-S.

Table 4. Correlation matrix of the 3 × 2 achievement goals and other variables.

		Perceived competence	Entity beliefs	Incremental beliefs	Intrinsic motivation
1	Task-approach goals	.29** (.15**)	−.29**(−.01)	.54** (.23**)	.49** (.27**)
2	Task-avoidance Goals	.20** (.10)	−.17**(−.05)	.30** (.09)	.29** (.01)
3	Self-approach goals	.24** (.05)	−.24**(−.03)	.46** (.24**)	.40** (.24**)
4	Self-avoidance goals	−.05 (−.03)	.02 (−.01)	.16** (.09)	.19** (.09)
5	Other-approach goals	.15** (.18**)	.08 (.19**)	.11* (.08)	.08 (−.00)
6	Other-avoidance goals	−.07 (.02)	.23**(.13*)	−.07 (.07)	−.07 (−.03)

Note: Correlation coefficients in parentheses are from Mascret et al. (2015).
*$p < .05$.
**$p < 0.01$.

When achievement goals were first conceived by Nicholls (1989), achievement goals specifically dealt with the reasons or purposes for engaging in an achievement task. Elliot (1999), however, argued that a more precise definition of achievement goals should be based on competence alone. The reason is because purpose can have two different connotations, the reasons and aims. Subsequently, the trichotomous and 2 × 2 achievement goal models utilised the

competence-based aim in defining the goal constructs. With the recent inclusion of the 3 × 2 achievement goal model, competence in the mastery dimension is further separated to be based on the task or the self. With the different goal measures and goal constructs emerging in the literature, it is timely to evaluate the measurement model of the latest development of achievement goals in terms of factorial validity, construct validity, and reliability.

In terms of reliability, the subscales of the 3 × 2 achievement goal model seemed acceptable with all $\alpha > .70$. From model comparisons, results of the CFA supported the 3 × 2 achievement goal measure over the other 10 alternative models. The measurement model is also found to be invariant across gender and type of sport.

The findings of the current study revealed very different correlation patterns between the six achievement goals, compared to the results of Mascret et al. (2015). In the previous study, almost all the achievement goals were positively correlated with each other, except one (between self-avoidance and other-approach goals). This pattern did not emerge in the current study. In fact, several correlation coefficients were high in magnitude but there were also some non-significant correlations that were close to zero in magnitude. This may indicate obvious cultural differences between the two countries. There were very strong associations between task-approach and task-avoidance goals, as well as between self-approach and self-avoidance goals, which indicate that Singaporean athletes concurrently adopt goals synonymous with approach and avoidance goals in the West, in order to master a task and to improve their competence.

The 3 × 2 achievement goal framework proposed by Elliot and McGregor (2001) and Elliot et al. (2011) viewed goal constructs not as four or six distinct constructs, but with a combination of meanings in mastery/performance or task/self/others and approach/avoidance. This study adopted the UTUM (Wu & Chen, 2010) and found some support of the dual meaning of the five-factor model. However, after carefully examining each of the items and factor loadings and model fit, a decision was made that the five-factor model may not be suitable as there were several items with low loadings in the factors "approach" and "avoidance" do not support these definitions for these two factors.

With the changes in the wordings of task-approach and task-avoidance items, the correlation coefficients between entity beliefs, incremental beliefs, perceived competence, and intrinsic motivation were much stronger in this study compared to Mascret et al.'s (2015) study (see Table 4). For example, the correlation between task-approach goals and entity beliefs was −.29 in this study and −.01 in Mascret et al.'s study, and that with intrinsic motivation was .49 in this study and .27 in Mascret et al.'s study. These results showed that the concurrent validity of the 3 × 2 achievement goal measure was stronger than the previous study. In addition, the relationships between perceived competence and task-approach goals and self-approach goals seem to be more coherent with the theory. Clearly, if perceived competence is the antecedent of achievement goals, the approach dimensions of the goals need to be positively correlated with perceived competence (Elliot, 2005). On the other hand, this study found that intrinsic motivation and incremental beliefs were positively related to both task-approach and task-avoidance goals, as well as to both self-approach and self-avoidance goals, which may not support the notion of avoidance goals. The latter finding is also contrary to the findings of Mascret et al. (2015). This points to the possibility of cultural differences between Singaporean and Western athletes, and warrants further investigation.

This study has employed a rigorous method to compare different models beyond the traditional CFA approach. From the multiple approaches, it may be concluded that the 3 × 2 achievement goal measure possesses adequate predictive, discriminant, and convergent validity, as well as internal consistency, in the sporting context. Unfortunately, Wu and Chen (2010) did not report the loadings of their UTUM model, and no other researcher has applied this model to investigate the factor structure of the 3 × 2 achievement goal model. The use of UTUM model and the factor

loadings in the current study shows that this model is useful in assessing measurement models. In terms of limitations, it should be noted that avoidance goals have been widely examined in relation to detrimental motivational outcomes, such as negative affect, worries, negative cognitions, or negative expectations (Elliot, 2005). This study did not examine the relationship between goals with detrimental motivational outcomes, and therefore, explanations of the present findings may be inconclusive. There is a need for more studies to continue the effort to validate the newly adapted 3 × 2 achievement goal measure. There is also a need for experimental studies to examine the causal relationships of 3 × 2 achievement goals in terms of the causes and consequences. To conclude, the results of this study supported the factorial validity of the 3 × 2 achievement goal measure in the sport domain in Singapore but they also imply that the conceptualisation of approach and avoidance tendencies in sport and their implications for athletes' motivation might differ between Eastern and Western cultures.

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Appendix 1. 3 × 2 AGQ for sport

Factor	Item
Task-approach	(1) I aim to execute the skills correctly.
	(2) I strive to apply the right tactics and strategies
	(3) I want to execute every technique successfully
Task-avoidance	(4) I avoid making a lot of technical errors
	(5) I avoid applying the wrong tactics and strategies
	(6) I avoid making a lot of mistakes
Self-approach	(7) I want to perform better than previous performances
	(8) I aim to do well relative to how well I have done in the past on similar challenges.
	(9) My goal is to do better than I normally do
Self-avoidance	(10) I avoid performing worse than I normally do
	(11) I want to avoid performing poorly compared to my typical level of performance
	(12) My goal is to avoid doing worse than I have done on previous similar challenges
Other-approach	(13) It is important for me to perform better than others
	(14) It is important for me to do well compared to others
	(15) My goal is to do better than most other players
Other-avoidance	(16) I just want to avoid performing worse than others
	(17) My goal is to avoid performing worse than everyone else
	(18) It is important for me to avoid being one of the worst performers in the group