# Intrinsic Motivation towards Sports in Singaporean Students: The Role of Sport Ability Beliefs

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## Abstract

This study investigated determinants of active lifestyles in Singaporean university students. Using confirmatory factor analysis, a measure of lay beliefs concerning athletic ability was confirmed. Other results confirmed hypotheses that beliefs reflecting that athletic ability can be developed over time (incremental beliefs) predict an achievement task (self-referenced) orientation, while beliefs reflecting that athletic ability is relatively stable (entity beliefs) predict an ego (other-person, comparative) orientation. Goal orientations directly affect perceived competence which, in turn, influence intrinsic motivation to be physically active. A task orientation had a direct link to intrinsic motivation. Results suggest that intrinsic motivation towards sport and physical activity might be enhanced through interventions that focus on self-referenced and self-improvement notions of ability as well as perceived competence.

## Keywords

*ability beliefs, goals, motivation, physical activity, Singapore*

PHYSICAL inactivity is a key risk factor in premature mortality and morbidity (Bouchard, Shephard, & Stephens, 1994) and its population attributable risk is high (Powell, 1997). Indeed, exercise has been called 'today's best buy for public health' (Morris, 1994). However, with physically inactive lifestyles being the norm in all industrialized countries, there is a need to understand better the determinants of physical activity in people of all ages, although determinants of young people have been identified as a research priority (Sallis, Simons-Morton, Stone, Corbin, Epstein, Faucette et al., 1992). This is an important issue for health psychologists. Psychologists who have investigated the key processes underpinning motivated behaviour have focused their efforts on social cognitive approaches in the past few years, and this is true for sport and exercise (Roberts, 2001) and other health behaviours (Conner & Norman, 1996). In a comprehensive review of correlates of physical activity in children and adolescents, Sallis, Prochaska and Taylor (2000) identified achievement motivation as a key construct.

In this article, therefore, we focus on selected motivational constructs in an effort to understand better the likelihood of young people being physically active. Specifically, beliefs concerning the nature of athletic ability, alongside achievement motivation ('achievement goal orientations'), and how such beliefs might be related to perceived competence and intrinsic motivation for sport and physical activity was investigated. Students from Singapore were sampled—a population rarely studied in this field.

The way people construe the nature of ability, through self-referenced or externally referenced criteria, has been the approach adopted in achievement goal orientations research. This is popular in the educational (Nicholls, 1989) and sport psychology (Duda & Hall, 2001) literatures, but has also received attention in health psychology (Biddle, Akande, Vlachopoulos, & Fox, 1996; Viira & Raudsepp, 2000). Related motivational constructs, such as perceived locus of causality, have also been studied in health psychology (Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002). In addition, Dweck and her colleagues have proposed a model of individual differences centred on beliefs concerning the changeability of human attributes (Dweck, 1996, 1999; Dweck, Chiu, & Hong, 1995). In the current study, we report on both goal orientations and ability beliefs and how they might predict intrinsic motivation towards physical activity.

## Ability beliefs

Initially in the domain of intelligence, Dweck and colleagues have proposed that two clusters of beliefs exist that centre on the way people view the malleability of attributes (Dweck, 1992, 1996; Dweck et al., 1995; Dweck & Leggett, 1988). Those subscribing to the view that a particular attribute is fixed and relatively stable hold an 'entity' view or 'entity theory'. Conversely, those seeing the attribute as changeable and open to development hold an 'incremental' view or theory. Research has shown that those holding an entity view are more likely to have negative reactions, such as helplessness, when faced with achievement setbacks (Dweck & Leggett, 1988). Entity theorists are more likely to endorse ego (externally referenced) goals whereas incremental theorists have been shown to endorse task (self-referenced) goals more.

Only recently has there been attention given to entity and incremental beliefs in the physical activity domain. In replicating the study by Dweck and Leggett (1988), Sarrazin, Biddle, Famose, Cury, Fox and Durand (1996) found some support for the relationship between beliefs concerning the nature of athletic ability and the adoption of different goals in sport for children. Those choosing a task goal were more likely to endorse incremental beliefs about sport ability than those adopting ego goals. Biddle, Soos and Chatzisarantis (1999) predicted intentions from perceived competence, achievement goals and ability beliefs. For Hungarian youth, they found the sub-domains of entity beliefs (beliefs that sport ability is general and a gift) predicted an ego goal orientation and incremental beliefs (learning and incremental/changeable sub-domains) predicted a task orientation.

The measurement of incremental and entity beliefs has developed from simple bi-polar measures (Dweck & Leggett, 1988; Sarrazin et al., 1996) to multidimensional subscales (Sarrazin et al., 1996). Recently, Wang and

Biddle (2001) have suggested that a psychometric scale, named the Conception of the Nature of Athletic Ability Beliefs Questionnaire, version 2 (CNAAQ-2), be adopted for the assessment of incremental and entity beliefs based on an English sample. However, this scale requires further testing with diverse samples.

## Achievement goal orientations

The goals people may hold in sport have been shown to be important motivational factors over the past two decades (Biddle, 2001; Duda, 2001), and sport may be central to young people's active lifestyles (Vilhjalmsson & Kristjansdottir, 2003). Starting in educational psychology, Nicholls (1989) proposed that people define success and construe ability in different ways. In certain situations, an individual might emphasize task mastery, self-improvement and effort and hence depict a 'task' goal. On the other hand, someone may primarily strive to win and demonstrate high normative ability, even with low effort. This reflects an 'ego' goal in that particular situation. Such situational goals are thought to be a reflection of both individual differences and situational factors. Individual differences associated with goals are the goal 'orientations' held by the individual in a specific life domain, such as sport. These tendencies are usually expressed as 'task' and 'ego' goal orientations and are assessed typically through self-report items referring to when people feel most successful in the domain of interest.

Research predictions, typically, propose that ego-oriented individuals will be motivationally fragile when they doubt their own competence. This is because they are focused on normative ability. Task-oriented individuals, on the other hand, are more interested in self-improvement and thus tend to be motivated regardless of perceived ability or competence. Research has shown that a high task orientation, either singly or in combination with a high ego orientation, is motivationally adaptive in physical activity (Duda & Hall, 2001; Treasure & Roberts, 1995). This is likely to reflect greater feelings of personal control and autonomy when having a high task orientation (Biddle, 1999).

Despite a great deal of research on goal orientations in sport, little is known about possible antecedents of such goals. Dweck and Leggett have hypothesized that 'different theories about oneself . . . would orient individuals toward the different goals' (1988, p. 256). One reason might be that those holding entity views focus more on *proving* their ability whereas those with stronger incremental views focus on *improving* their ability (Dweck et al., 1995). The parallels with ego and task orientations, respectively, are clear. Linking entity and incremental beliefs and achievement goals in models predicting motivational outcomes is therefore required. In addition, little is known about how these constructs are related in samples outside Europe and North America. Testing samples from other countries should advance our knowledge of social cognitive motivational constructs.

## Perceived competence and intrinsic motivation

Perceptions of competence are central to motivated behaviour, although the way people construe competence needs to be accounted for (Biddle, 1997a). In addition, a key motivational construct is that of intrinsic motivation. Ryan and Deci (2000) suggest that intrinsic motivation is important for self-determined and autonomous behaviours and is related to the satisfaction of the need to feel competent. Studies investigating determinants or correlates of physical activity may need to account for variance in intrinsic motivation and perceptions of competence. Rawsthorne and Elliot (1999), through a meta-analysis of 29 self-report and 23 behavioural studies, primarily in the field of education, have reported that ego-type goals have a tendency to undermine intrinsic motivation in comparison to task goals.

Drawing on previous research and the rationale presented, therefore, there are two purposes of the present study. The first is to examine the construct validity of the CNAAQ-2, using confirmatory factor analysis, in a Singaporean sample. Specifically, it is hypothesized that the responses to the CNAAQ-2 will be explained by four first-order factors (stable, gift, learning and improvement) and two higher-order factors (entity and incremental), as proposed by Wang and Biddle (2001). The second purpose is to examine the role of sport

ability beliefs in predicting intrinsic motivation. Figure 1 shows the proposed links between conceptions of sport ability, goal orientations, perceived competence and intrinsic motivation. Sarrazin et al. (1996) found that incremental beliefs in the physical activity domain were positively associated with task orientation whereas entity beliefs were related to ego orientation. However, the directions of influence between goals and beliefs were not tested. Dweck and her colleagues posit that implicit beliefs are likely to determine goal orientations (see Dweck, 1999) and this direction has been supported by Biddle and colleagues (Biddle et al., 1999). It was hypothesized that incremental beliefs predict task orientation, and entity beliefs will predict ego orientation. It was also hypothesized that goal orientations directly affect perceived competence, which in turn influences intrinsic motivation. In addition, it was also hypothesized that task orientation has a direct impact on intrinsic motivation (Biddle, 2001).

## Method

### *Participants*

Participants ($n$ = 155; 70m, 85f) were either undergraduate ($n$ = 109) or postgraduate ($n$ = 46) students attending a teacher-training programme in a university in Singapore. They ranged in age from 18 to 35 years (mean = 23.48, SD = 2.82). Most of the sample (84.6%) participated in physical activity less than two times a week. Among sports participants, 52 per cent exercised more than three times a week with 19 different sports listed. Sub-samples included 37 from team sports, such as basketball, volleyball, hockey and soccer, nine were racket sport players and three sea sports athletes (canoeing and sailing). The rest of them took part in individual sports, such as track and field, air rifle and swimming ($n$ = 31).

### *Procedures*

Ethical approval was granted by the ethical review committee of the university and teacher trainees were approached in the university with a formal letter requesting informed consent. All trainees were told that their participation in the study was voluntary, they were free to withdraw at any time and were assured that their responses would be kept confidential. All teacher trainees gave informed consent. The participants took 15 minutes to complete a set of questionnaires administered by research assistants.

### *Measures*

*Goal orientations* Participants' dispositional goal orientations were assessed with the Task and Ego Orientation in Sport Questionnaire (TEOSQ) (Duda & Whitehead, 1998). The stem for the 13 items was 'I feel most successful in sport when . . .'. There were seven items measuring task orientation (e.g. 'I learn a new skill and it makes me want to practise more') and six items measuring ego orientation (e.g. 'I can do better than my friends'). Answers were given on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

*Sport ability beliefs* The 'Conceptions of the

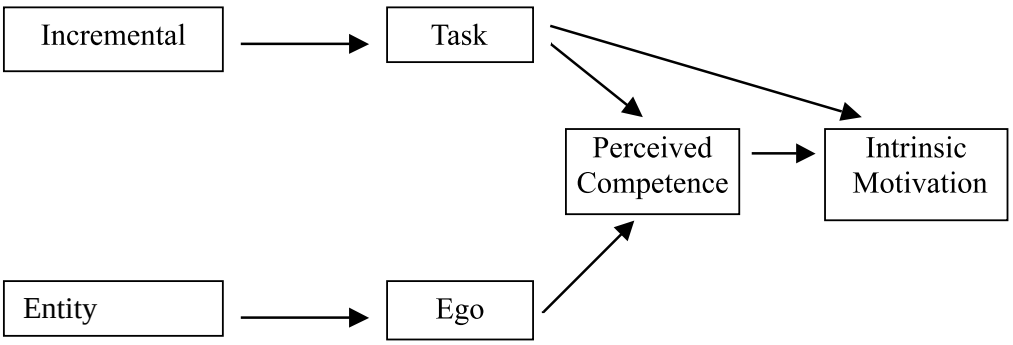


*Figure 1.* Proposed model of the relationship between conceptions of sport ability, goal orientations, perceived competence and intrinsic motivation.

Nature of Athletic Ability Questionnaire, version 2' (CNAAQ-2), from Wang and Biddle (2001), was employed to examine sport ability beliefs. Four subscales were assessed: 'Stable' (three items, e.g. 'we have a certain level of ability in sport and we cannot really do much to change that level'); 'gift' (three items, e.g. 'to be good at sports you need to be naturally gifted'); 'learning' (three items, e.g. 'you need to learn and work hard to be good at sport'); 'improvement' (three items, e.g. 'how good you are at sport will always improve if you work at it'). Responses were made on five-point scales, similar to the TEOSQ.

*Perceived competence* Six Sport Competence items from the Physical Self-Perception Profile (PSPP) (Fox & Corbin, 1989) were adapted by modifying the forced-choice format to a five-point Likert scale ranging from 1 (this is not at all like me) to 5 (this is very much like me). For example, 'some people feel that they are good when it comes to playing sport'.

*Intrinsic motivation* Intrinsic motivation was assessed using the items from the enjoyment–effort subscale of the Intrinsic Motivation Inventory (IMI) (McAuley, Duncan, & Tammen, 1989). An example item is 'I usually enjoy playing sport'. The items were measured on five-point scales ranging from 1 (strongly disagree) to 5 (strongly agree).

## Results

### *Confirmatory factor analysis of CNAAQ-2*

Confirmatory factor analysis (CFA) was conducted on the CNAAQ-2 data to examine their construct validity for a Singaporean sample using EQS for Windows 5.7 (Bentler & Wu, 1998). In the initial analyses, there was no evidence of multivariate non-normality in the distribution (skewness and kurtosis $< \pm 1$, Mardia's Coefficient = 30.0, Normalized Estimate = 9.99). Therefore, Maximum Likelihood method was used as the estimation method because it performs well with small sample sizes and excessive kurtosis (Holye & Panter, 1995).

The indices of fit provided by EQS were examined to evaluate the adequacy of the models: chi-square statistic, Bentler-Bonett Nonnormed Fit Index (NNFI), Comparative Fit Index (CFI), Goodness-of-Fit Index (GFI), Root Mean Squared Residual (RMSR) and Root Mean Squared Error of Approximation (RMSEA). The NNFI compares the lack of fit of a target model to the lack of fit of a baseline model. CFI assesses the lack of fit as estimated by the non-central chi-square distribution of a target model compared to a baseline model. GFI is an index of absolute fit, that is, the relative amount of the observed variances and covariances accounted for by a model (Hoyle & Panter, 1995). Typically, for these fit indices, there is a general agreement that an index close to .95 should be an indicator of good fit to the data (Hu & Bentler, 1999).

The RMSR is the square root of the mean of the squared discrepancies between the implied and the observed covariance matrices. The RMSEA is also based on the analysis of residuals and compensates for the effects of model complexity. For these two values, values below .10 indicate a good fit to the data. Hu and Bentler (1999) now recommend a cut-off value close to .06 for RMSEA.

The fit statistics provided by EQS showed that the data fit the hypothesized model well ($\chi^2$ = 64.53, d.f. = 51, NNFI = .965, CFI = .973, GFI = .933, RMSR = .085, RMSEA = .043; 90% CI of RMSEA = .000, .071). The standardized loadings for the parameters of the first-order and second-order factors are presented in Table 1. The first-order loadings ranged from .66 to .82 and the error variances ranged from .57 to .76. The second-order factor loadings ranged from .59 to .86 and error variances ranged from .51 to .81. The variance explained by the items ranged from 35 per cent to 74 per cent. Together, these high-factor loadings and variances suggest that the construct validity of the instrument was sound. In addition, the two higher-order factors (entity and incremental) had a correlation of –.16, indicating the two factors are independent. Cronbach alpha coefficients showed that both the first-order factors and the second-order factors were internally consistent (see Table 2).

### *Descriptive statistics*

Table 2 shows the descriptive statistics for the scales used in the structural equation model. An inspection of the mean scores suggests that participants were task oriented, had high

*Table 1.* First- and second-order standardized loadings for CNAAQ-2

| *Scale* | *1st order loadings* | *Error variance* | *2nd order loadings* | *Error variance* |
|---|---|---|---|---|
| Stable 1 | .68 | .73 | | |
| Stable 2 | .68 | .73 | .77 | .64 |
| Stable 3 | .74 | .67 | | |
| Gift 1 | .68 | .73 | | |
| Gift 2 | .73 | .68 | .72 | .69 |
| Gift 3 | .82 | .57 | | |
| Improvement 1 | .73 | .68 | | |
| Improvement 2 | .67 | .74 | .86 | .51 |
| Improvement 3 | .78 | .62 | | |
| Learning 1 | .67 | .74 | | |
| Learning 2 | .66 | .73 | .59 | .81 |
| Learning 3 | .76 | .66 | | |

*Table 2.* Means, standard deviations and Cronbach's alphas for all variables

| | *Mean* | SD | α |
|---|---|---|---|
| Task orientation | 3.92 | .53 | .79 |
| Ego orientation | 2.96 | .84 | .85 |
| Entity | 2.85 | .65 | .79 |
| Stable | 2.44 | .76 | .73 |
| Gift | 3.28 | .78 | .79 |
| Incremental | 3.97 | .53 | .77 |
| Learning | 4.27 | .54 | .74 |
| Improvement | 3.66 | .77 | .76 |
| Perceived competence | 3.00 | .80 | .86 |
| Intrinsic motivation | 3.71 | .72 | .92 |

incremental beliefs and were intrinsically motivated towards sports. Mean scores for task and ego goal orientations were within the range found in studies of young people from Spain, Korea, Romania and Greece (task range 3.76–4.36, ego range 2.70–3.46), but higher task scores were found in the present study than with athletes from Thailand ($M$ = 3.00) (Duda & Whitehead, 1998). Scores on goal orientations, ability beliefs, perceived competence and intrinsic motivation were broadly comparable with a large sample of British youth (Wang & Biddle, 2001).

A one-way MANOVA was conducted to determine if differences existed between males and females on the subscales. No significant gender differences were found (Wilks' $\Lambda$ = .96, $F$ (6, 147) = 1.06, $p$ = .39), thus the two groups were combined for all analyses. The intercorrelations among the variables used in the model are showed in Table 3. The results revealed that task orientation was positively correlated with incremental beliefs, perceived competence and intrinsic motivation. Ego orientation was positively, though weakly, correlated with perceived competence. Intrinsic motivation was positively associated with incremental beliefs but negatively and weakly correlated with entity beliefs.

## *Structural equation analysis*

The network of relationships between sport ability beliefs, goal orientations, perceived competence and intrinsic motivation was examined through structural equation modeling (SEM). The chi-square statistic and the degrees of freedom are presented in addition to the indices of fit of NNFI, CFI, GFI, RMSR and RMSEA. Model modifications can be investigated through the use of the Wald and Lagrange Multiplier (LM) Tests. The Wald test assesses whether any free parameters of a model can be restricted without substantial loss of information (Bentler, 1995). The LM test tests the opposite, that is, whether any parameters that were set to zero in the model are, in fact, not zero. It tests the effect of adding free parameters to a model (Bentler, 1995; Byrne, 1994). It is suggested that although these post-hoc modifications are influenced by chance, the information can be useful in providing insight into variations of the hypothesized model. Changes are usually advised only when theoretically or logically justified.

Results indicated a good fit of the model to the data ($\chi^2$ = 12.71, d.f. = 7, NNFI = .945, CFI = .974, GFI = .974, RMR = .064 and RMSEA = .073, 90% CI of RMSEA = .000, .136) The Wald Test did not suggest any parameters be dropped

*Table 3.* Correlation matrix for the variables in the model

| | *1* | *2* | *3* | *4* | *5* |
|---|---|---|---|---|---|
| 1. Task orientation | | | | | |
| 2. Ego orientation | .22** | | | | |
| 3. Incremental | .54** | .11 | | | |
| 4. Entity | –.14 | .18* | –.04 | | |
| 5. Perceived competence | .44** | .28** | .16* | –.07 | |
| 6. Intrinsic motivation | .53** | .20* | .29** | –.19* | .70** |

* $p < .05$; ** $p < .01$

for the model but the LM Test revealed that if a path linking entity beliefs to intrinsic motivation is added, a marginally significant improvement in the model's fit would result. The standardized residuals indicated a negative correlation between entity beliefs and intrinsic motivation. The model is shown in Fig. 2.

## Discussion

The main purpose of this study was to investigate the relationships between key motivational constructs with a sample of Singaporean students. The sport and exercise psychology literature is strongly oriented towards the study of samples from North America and Western Europe (Biddle, 1997b) therefore there is a need to investigate participants from other countries and cultures.

Results suggested that a hierarchical and multidimensional measure of sport ability beliefs, developed in Europe, was generalizable to the present sample. In addition, the proposed model of interrelationships between ability beliefs, goal orientations, perceived competence and intrinsic motivation was largely supported. As with other studies (Biddle, 2001), intrinsic motivation is clearly associated with a task goal orientation, both directly as well as indirectly through perceived competence. This is likely to be the result of greater perceived control that such an orientation affords due to its self-referenced nature (Biddle, 1999). In addition, task orientation itself is associated with a belief

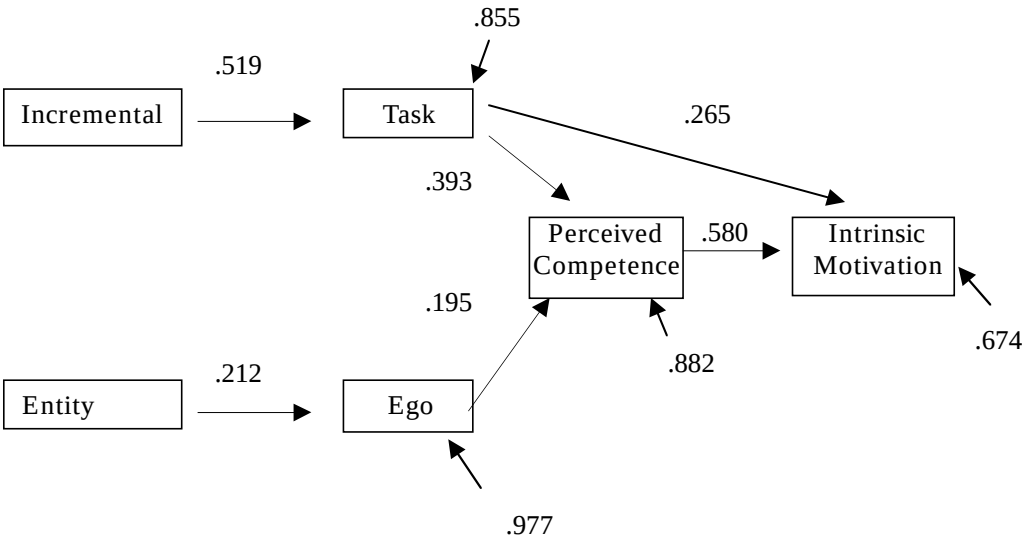


*Figure 2.* Standardized solution for the proposed model of the relationship between conceptions of sport ability, goal orientations, perceived competence and intrinsic motivation.

that sport ability can be developed rather than being a fixed entity. Logic dictates that such a view will give rise to control and optimism.

The zero-order correlations and model suggest that perceived competence is a strong predictor of intrinsic motivation. However, while this is wholly consistent with prior research, there is also conceptual overlap between the two constructs. Although we only assessed the effort/enjoyment dimension of intrinsic motivation, perceived competence is also part of the wider intrinsic motivation construct (Deci & Ryan, 1985). Nevertheless, task orientation and incremental beliefs were also strongly associated with intrinsic motivation, whereas ego orientation and entity beliefs were not. These findings suggest that intrinsic motivation towards sport and physical activity might be enhanced through interventions that focus on self-referenced and self-improvement notions of ability as well as perceived competence. Of course, if perceptions of competence are primarily externally or entity focused, one might predict limited success in enhancing physical activity motivation.

Our results have clear implications for a better understanding of motivation for a health behaviour, namely physical activity. However, it is recognized that the study has limitations. These include the cross-sectional design, the selection of teacher education students as the sample and the prediction of an index of motivation rather than behaviour. Future studies should address these concerns and build on the results presented.

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