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Achievement Goals, Physical Self-Concept, and Social Physique Anxiety in a Physical Activity Context[1]

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Three studies tested relations between self-related constructs and approach and avoidance achievement goals in a health-related physical activity context. Physical self-concept was hypothesized to be positively related, and social physique anxiety to be negatively related, to approach goals in physical activity. Achievement goals were also expected to mediate relations between the self-related constructs and behavior. Structural equation models supported the hypothesized pattern of effects in a physical activity context (Study 1). The model for physical activity was invariant across collectivistic and individualistic cultures (Study 2). Relations between physical self-concept, social physique anxiety, and achievement goals were stronger among regular gym and fitness center users than among nonusers (Study 3). The findings are discussed in relation to achievement goal theory.

There is strong epidemiological evidence linking low levels of physical activity with chronic health conditions, such as cardiovascular disease (Williams, 2001), obesity (Ross, Freeman, & Janssen, 2000), and cancer (Byers et al., 2002). Recent international reports have highlighted the importance of regular physical activity as an important preventive behavior in managing these health risks (U.S. Department of Health and Human Services, 1996; World Health Organization, 2004). Such reports have catalyzed research into the social psychological variables that are associated with health-related physical activity in order to develop population-based

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interventions to change behavior (Marteau, Dieppe, Foy, Kinmonth, & Schneiderman, 2006).

Social psychologists have advocated the need to identify the factors and mechanisms that give rise to and determine changes in physical activity behavior (Baum & Posluszny, 1999; Chatzisarantis & Hagger, 2009; Chatzisarantis, Hagger, Smith, & Phoenix, 2004; Hagger, 2009; Taylor, 2008). In addition, there has also been increased interest in the role of the self in motivating health-related behavior and the degree to which behaviors are congruent with self-related goals (Deci & Ryan, 1985; Sheldon, 2002). There is research to suggest that behaviors that are congruent with the self generate approach goals and behavioral persistence, while behaviors that are incongruent with the self generate avoidance goals and behavioral desistence (Conroy, Elliot, & Hofer, 2003; Elliot & Conroy, 2005; Elliot & McGregor, 2001; Elliot, McGregor, & Thrash, 2002; Elliot & Sheldon, 1997).

The present studies aim to extend this research and establish whether self-related constructs related to a view of the physical self that is positive and competent (i.e., physical self-concept) or a view of the physical self as negative and less competent (i.e., social physique anxiety) are linked to approach and avoidant goal constructs from the 2×2 achievement goal framework (Elliot & Conroy, 2005; Elliot & McGregor, 2001; Elliot & Sheldon, 1997). Furthermore, the present research will test a mediational model in which self-related constructs are related to health-related physical activity behavior mediated by approach and avoidance achievement goals. The effects of culture and current and previous physical activity involvement on the proposed relationships will also be tested.

Achievement Goal Theory and the 2×2 Framework

Achievement goal theory was developed by researchers who were interested in examining the effects of perceptions of success and failure on motivation in educational contexts (Nicholls, 1989). Central to the theory is the manner in which people tend to view or interpret success or failure when engaged in competence-relevant behaviors. Until relatively recently, research in achievement goal perspectives had identified two pervading orientations: mastery-oriented and performance-oriented. Individuals with mastery-oriented or *self-referenced* goal orientations tend to view success and failure in terms of personal improvement, effort, self-referenced goals, and learning. Analogously, people with performance-oriented or *other-referenced* goal orientations tend to view their success and failure in terms of their performance compared to others, fulfilling normative standards, other-referenced goals, competition, and normative comparison. This classic dichotomous concep-

tualization of achievement motivation has formed the basis of numerous theoretical traditions that have viewed achievement goals as generalized orientations that affect individuals' interpretation of competence across a wide variety of contexts (Ames, 1992; Dweck, 1986; Nicholls, 1984).

A relatively recent framework proposed by Elliot and others (Elliot, 1999; Pintrich, 2000) views achievement goals as more dynamic, flexible, and changeable interpersonal constructs that not only vary in terms of the definition of competence in achievement settings, but also in their valence as either approach or avoidant. The integration of an approach–avoidance valence concurrent with the mastery–performance dichotomy has led to the development of a 2×2 conceptualization of achievement goals (Elliot & Conroy, 2005; Elliot & McGregor, 2001; Elliot & Sheldon, 1997). The theory proposes that not only can people define their competence with respect to future actions as self-referenced (either according to a personal or absolute standard) or other-referenced, but also in terms of whether it will lead to adaptive, desirable outcomes or maladaptive, undesirable outcomes. Such evaluations are automatically paired with an approach or avoidance response such that courses of action that are expected to lead to desirable outcomes are approach-valenced and actions leading to undesired outcomes are avoidance-valenced (Bargh, 1997; Elliot & McGregor, 2001). As a consequence, people will tend to perceive their competence with respect to future actions in terms of both the definition and valence dimensions.

The 2×2 framework integrates the definition and competence dimensions to produce four distinct achievement goal constructs: (a) mastery-approach goals in which competence is defined in terms of mastering skills, improving technique, and enhancing self-referenced outcomes and is positively valenced; (b) performance-approach goals in which competence is defined in normative terms and relative to the performance of others and is positively valenced; (c) mastery-avoidance goals in which competence is defined as personally referenced and is negatively valenced; and (d) performance-avoidance goals in which competence is defined normatively and is negatively valenced. According to Elliot and Church (1997), these goal constructs should be viewed as "situation-specific regulators of achievement behavior that are energized and impelled by underlying motive dispositions" (p. 228). Therefore, global goal orientations and motivational dispositions may influence or give rise to these goals, and the goals are also affected by environmental and situational factors that define the behavioral response.

Research with the 2×2 model has illustrated that mastery-approach goals are most strongly related to adaptive outcomes, such as need for achievement (Elliot & Murayama, 2008), self-concept (Hein & Hagger, 2007), perceived competence (Cury, Elliot, Da Fonseca, & Moller, 2006), self-determined forms of motivation (Barkoukis, Ntoumanis, & Nikitaras,

2007; Hein & Hagger, 2007; Wang, Biddle, & Elliot, 2007), enjoyment (Pekrun, Elliot, & Maier, 2006; Wang et al., 2007), and behavioral persistence (Elliot, Cury, Fryer, & Huguet, 2006; Elliot & Murayama, 2008). Research has also investigated relations between achievement goals using the 2×2 framework in physical contexts, but investigations have largely focused on competitive sport behavior (e.g., Adie, Duda, & Ntoumanis, 2008; Barkoukis et al., 2007; Conroy et al., 2003; Conroy, Kaye, & Coatsworth, 2006). Elliot and Conroy (2005) pointed out that relations between the 2×2 achievement goal constructs and health-related physical activity have not been fully investigated:

> Although the value of the expanded 2×2 conceptual framework [of achievement goals] in sport and physical activity domains is a relatively open empirical question, we are optimistic of its potential for enhancing our understanding of achievement motivation in these contexts and eagerly await further investigation. (p. 21)

Recent research has provided evidence to support to Elliot and Conroy's (2005) suggestion that the 2×2 model may offer a useful framework for the understanding of motivation in health-related physical activity contexts. Variables such as intrinsic motivation (Barkoukis et al., 2007), perceived competence (Wang et al., 2007), and self-efficacy (Cumming & Hall, 2004) have been shown to be related to approach goals, while fear of failure and extrinsic motivation have been shown to be related to avoidance goals (Barkoukis et al., 2007; Conroy & Elliot, 2004). This provides an indication of the utility and content of achievement goals in this context. For example, people may perceive engaging in physical activity as an opportunity to achieve personally relevant or self-determined outcomes, such as mastering an exercise technique or losing the most weight in an exercise class. They are, therefore, more likely to develop approach-valenced mastery or performance goals toward their behavioral regulation. However, they may also be motivated to avoid physical contexts if they perceive that they are unlikely to demonstrate competence and have a high likelihood of failure.

For example, people may perceive that doing physical activities may reveal their lack of skills or that they are not as competent as others when it comes to lifting weights or running at speed on a treadmill. Such undesirable outcomes are likely to result in the development of avoidance-valenced mastery or performance goals. Just as high perceived competence and fear of failure may lead to the development of approach and avoidance goals, respectively, other variables related to competence may also be linked to achievement goals (Hein & Hagger, 2007). Self-related constructs (e.g., self-concept) may operate in this capacity. Self-related constructs have

received a great deal of attention in the achievement motivation literature because of their links with competence (e.g., Harter, 1985; Sonstroem & Morgan, 1989; Williams & Gill, 1995). However, the role that self-related constructs have in the development of approach and avoidance achievement goals has not received considerable attention in the literature. The present studies aim to address this gap by examining the 2×2 achievement goal framework and its relations to self-related constructs in a health-related physical activity context.

Self-Related Constructs

Constructs related to the physical self have been shown to be salient antecedents and outcomes in research on health-related physical activity (Haase & Prapavessis, 1998; Hagger et al., 2007; Kowalski, Crocker, & Kowalski, 2001; Marsh & Redmayne, 1994; Spence, McGannon, & Poon, 2005). Prominent among these self-related constructs are physical self-concept (Marsh, 1996; Marsh & Redmayne, 1994) and social physique anxiety (Hart, Leary, & Rejeski, 1989; Leary, 1992). *Physical self-concept* represents a person's global view of one's physical self, and studies adopting multidimensional models of physical self-concept have shown that the construct reflects individuals' judgment of their competence, conditioning, and appearance in the physical domain. It is, therefore, conceptualized as a generalized, traitlike construct likely to influence perceptions and decisions across many contexts in the physical domain. A key aspect of physical self-concept is competence, such that people's evaluative views of their physical self are linked to their perceived competence in physical contexts. Research adopting this global construct has shown it to be positively related to objective measures of activity, such as body fatness and weight (Marsh, 1996), physical activity involvement (Hagger, Ashford, & Stambulova, 1998), and outcomes such as psychological well-being (Alfermann & Stoll, 2000), perceived competence (Sonstroem, Speliotis, & Fava, 1992), and self-determined forms of motivation (Wilson & Rodgers, 2002).

Conversely, *social physique anxiety* represents an individual's degree of perceived anxiety in situations in which one's physique is deemed to be under evaluation by others (Hart et al., 1989; Leary, 1992). Social physique anxiety has been shown to be empirically distinct from other self-related constructs, such as physical self-concept and global self-concept (Hart et al., 1989; Kowalski et al., 2001). It is also defined as a global, dispositional construct that has a general impact on perceptions, decisions, and outcomes across many contexts in which the presentation of the self is salient. Significant and negative relationships have also been reported between social physique anxiety and physical activity attitudes (Crawford & Eklund, 1994) and

behavior (Kowalski et al., 2001), and significant and positive relationships have been found with disturbed eating attitudes (Haase & Prapavessis, 1998) and behaviors (Frederick & Morrison, 1996). Social physique anxiety has been shown to be negatively related to motivational constructs, such as self-efficacy (Marquez & McAuley, 2001) and intrinsic motivation (Frederick & Morrison, 1996; Thøgersen-Ntoumani & Ntoumanis, 2007).

Self-Related Constructs and Achievement Goals

Physical self-concept tends to be positively associated with outcomes and behaviors that are generally considered adaptive (e.g., physical activity participation), while social physique anxiety tends to be positively associated with behavioral patterns that are deemed to be maladaptive (e.g., lower levels of physical activity; Kowalski et al., 2001). One possible reason for this pattern of relationships may be that individuals perceiving themselves as competent in physical contexts are likely to be attracted to behavioral situations that provide them with further opportunities to engage in experiences of competence (Sonstroem et al., 1992). Therefore, opportunities to participate in physical activity may be regarded by individuals with high physical self-concept as a means to further experience competence.

Research in other domains supports this proposition. Significant, positive relations have been found between self-concept and approach goal constructs, as have significant, negative relations between self-concept and avoidance goals (Elliot & McGregor, 2001; Elliot & Sheldon, 1997). Importantly, the conceptualization of achievement goals as situation-specific perceptions with respect to competence toward a particular action or behavior suggests that general physical self-concept will serve as a distal influence on such goals. In the present studies, we propose that physical self-concept will have a positive impact on approach goals toward engaging in physical activity behavior. Conversely, the general tendency to view competence as low in physical contexts will be negatively related or unrelated to avoidance goals.

Analogously, individuals with high social physique anxiety may be motivated to avoid situations in which aspects of physical competence (e.g., appearance) are deemed to be under evaluation or scrutiny by others and may seek to avoid behaviors like physical activity in which this is perceived to be a likely outcome. This seems to be supported empirically with significant, negative relations found between social physique anxiety and motivational variables associated with approach goals (e.g., self-efficacy; Marquez & McAuley, 2001) and intrinsic motivation (Frederick & Morrison, 1996; Rawsthorne & Elliot, 1999). However, no study, to date, has examined links between social physique anxiety and achievement goal constructs with an

avoidance valence in a physical activity context. The present studies will address this gap in the literature by proposing that generalized tendencies to view physical situations as evoking anxiety and concern over the presentation of the self will be a distal influence on avoidance goals, particularly performance-avoidance goals in a physical activity context.

Present Investigation and Hypotheses

Three studies tested the relations between physical self-concept, social physique anxiety, achievement goal constructs from the 2×2 model, and physical activity participation. In the first two studies, a mediation model was tested, using a prospective, correlational design. In the model, achievement goal constructs are proposed to mediate relations between self-related variables and a self-reported physical activity behavior measured at a second point in time. A diagram of the proposed model is provided in Figure 1.

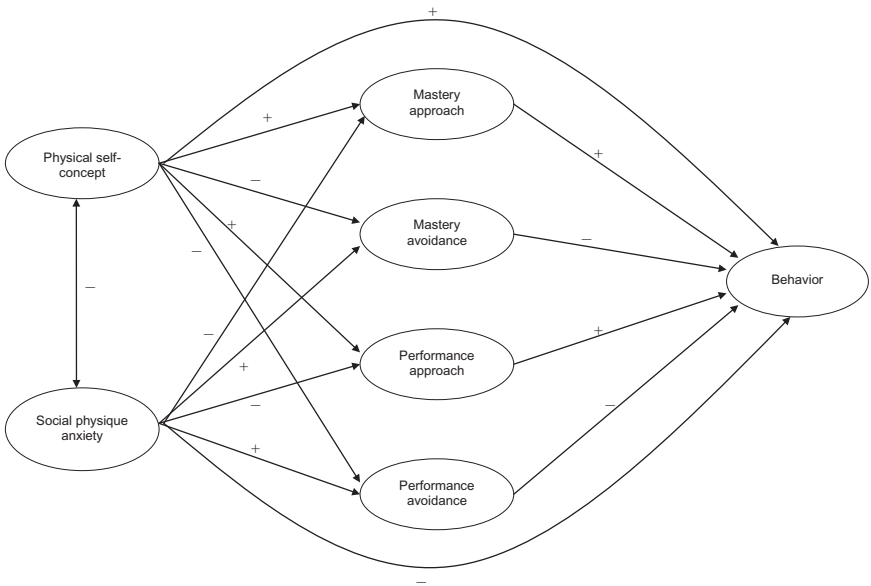

Figure 1. Diagram of structural equation model showing predicted relations between self-related, achievement goal, and behavior constructs. The predicted direction of the effects is depicted using plus (+) and minus (–) symbols. Disturbance (errors in prediction) terms for the achievement goal and behavior constructs, the covariances among the disturbance terms, and the inclusion of relations between past behavior and all constructs as estimated in Study 3 are omitted for clarity.

In Study 1, the model was tested in an initial sample from the UK. In Study 2, the equivalence of the pattern of relations among the study variables in the proposed model was replicated in a national group that endorses a predominantly collectivistic orientation (Estonia). In addition, the measurement and structural parameters from the model were tested for invariance against the UK sample whose cultural orientation is predominantly individualistic. Finally, Study 3 adopted a cross-sectional design and compared the pattern of relations in the model among people who regularly visit gym and fitness center facilities and people who do not regularly use these facilities to account for the effect of current involvement on the proposed relationships.

In terms of specific hypotheses for the proposed model in Study 1, it is expected that physical self-concept will be positively related to approach mastery and performance goals, and negatively related to avoidance goals, in line with previous research (Elliot & Sheldon, 1997). Conversely, it is expected that social physique anxiety will be positively related to avoidance goals, and negatively related or unrelated to approach goals. This will test the hypothesis that individuals who report high levels of social physique anxiety will tend to form avoidance-valenced goals toward physical activity behavior because it is incongruent with their concerns over the presentation of their physical selves to others. It is expected that mastery-approach motivation will exhibit the strongest positive relations with prospectively measured physical activity behavior, in accordance with previous findings (Conroy et al., 2003). Although people are likely to hold performance and avoidance-mastery goals in a physical activity context, deriving competence through mastery with an approach valence is likely to be the type of goal that drives future continued participation in physical activity. This is consistent with research on intrinsic motivation, which has demonstrated that self-determined motives have the strongest influence on physical activity behavior (Hagger & Chatzisarantis, 2009).

It is also expected that significant positive relations between physical self-concept and physical activity behavior and negative relations between social physique anxiety and physical activity behavior will be mediated by the achievement goal constructs. This will test the hypothesis that self-related variables foster either approach or avoidance achievement goals, which, in turn, are linked to physical activity behavior. Given the expectation that physical self-concept will be related to mastery and performance-approach goals, we expect these goals to mediate the effect of this variable on physical activity. However, as we expect that mastery-approach goals will be the strongest predictor of physical activity, we expect the effect of physical self-concept on physical activity to be largely directed through this variable. We expect that any negative effect of social physique anxiety on physical activity will be direct or mediated by avoidance-valenced goals. However, it is likely

that these goals will not have a strong effect on physical activity behavior; therefore, any mediated effect may be comparatively weak or not significant.

As with many social psychological theories, relations among study variables in a given behavioral context are expected to be universal, irrespective of demographic factors like ethnicity and culture. This is based on an information-processing approach to social psychological processes, which contends that people process social information in the same manner and act accordingly (Ajzen, 1998; Hagger et al., 2007). An opposing view is that the proposed relationships in the model vary across national groups as a result of individual differences in psychological traits that arise from cultural variations, such as individualistic and collectivistic norms (Tafarodi & Swann, 1996).

Study 2 will test whether the proposed relations among the self-related constructs, achievement goal constructs, and physical activity behavior in the proposed model are invariant across individualistic (British) and collectivistic (Estonian) cultures. In keeping with the information-processing model and previous cross-cultural research on models of motivation, we hypothesize that the proposed relations among the self-related, achievement goal, and physical activity behavior variables will exhibit the same pattern of relationships in the Estonian sample as those found in the UK sample in Study 1. We do not expect the relative degree of collectivism or individualism endorsed by cultural groups to give rise to variations in the proposed model.

A final study (Study 3) will test whether the pattern of relations among the self-related constructs and achievement goal constructs in the proposed model are invariant across a sample of people who are regular users of gymnasia and fitness centers, and a sample of people who do not use these facilities regularly. Previous regular engagement with physical activity in such contexts is linked with competence (Sonstroem et al., 1992), and social physique anxiety is related to feelings of incompetence in physical activity contexts (Frederick & Morrison, 1996; Kowalski et al., 2001).

Gym and fitness center attendance might moderate the effects of the social physique anxiety on approach and avoidance goals. For example, although gymnasia and fitness centers are contexts that are potentially evaluative, people who regularly exercise are likely to form approach goals because they are motivated to improve their physique and reduce their perceived anxiety regarding the presentation of their physique. Therefore, social physique anxiety may be positively rather than negatively related to approach goals among such people. This may be a result of a familiarity effect. Experience with gyms and fitness centers may help reduce the avoidance response that normally occurs in people with high social anxiety when presented with the prospect of exercising in evaluative contexts. Furthermore, regular users of such facilities are likely to have a stronger influence of physical self-concept,

as a reflection of their competence, on approach goals. People who are not regular users of gymnasia and fitness centers may not have such positive self-views and are likely to avoid such facilities because they are motivated to avoid displaying their physique. They may still be exercisers, but might opt to exercise on their own.

High social physique anxiety may also evoke avoidance goals because people may want to avoid appearing incompetent in physical situations, as this may draw attention to their physique. Social physique anxiety, therefore, may be negatively related or unrelated to approach goals in this sample, as expected in Studies 1 and 2. Finally, an important consideration when testing such psychological models is to control for past behavior to ensure that hypothesized relations among constructs are independent of previous experience (Ajzen, 2002; Ouellette & Wood, 1998). The study includes measures of past physical activity behavior to test whether the effects among the psychological variables are independent of previous involvement.

Study 1

Method

Participants

Study participants ($N = 243$; 166 female, 77 male) were recruited from undergraduate and postgraduate students and employees from a UK university.[3] Participants' mean age was 27.2 years ($SD = 12.1$). Females' mean age was 26.6 years ($SD = 11.7$), while males' mean age was 28.5 years ($SD = 12.8$).

Measures

Social physique anxiety was measured using an eight-item version of the Social Physique Anxiety Scale (SPAS; Hagger et al., 2007; Hart et al., 1989). This measure has exhibited construct and factorial validity in a number of studies (Eklund, Mack, & Hart, 1996; Hagger et al., 2007; Motl & Conroy, 2000). Responses to items (e.g., "Unattractive features of my physique/figure make me nervous in certain social settings") were rated on a 5-point Likert-type scale ranging from 1 (*not at all*) to 3 (*moderately*) to 5 (*extremely*).

The six-item general physical self-concept scale from Marsh and Redmayne's (1994) Physical Self-Description Questionnaire (PSDQ) was used to

[3]The location is withheld to protect anonymity.

measure physical self-concept. Responses to items (e.g., "I am satisfied with the kind of person I am physically") were rated on 6-point scales ranging from 1 (*not true for me at all*) to 6 (*very true for me*). The scale has been shown to exhibit adequate construct validity and concurrent, discriminant, and predictive validity with other measures of physical self-concept. In addition, it displays satisfactory internal consistency and test–retest reliability (Marsh & Redmayne, 1994).

We developed a revised version of Elliot and McGregor's (2001) 2×2 Achievement Goal Questionnaire (AGQ) to tap achievement goals in a health-related physical activity context in accordance with Elliot and Conroy's (2005) recommendations. Four types of achievement goals were measured, according to Elliot and McGregor's (2001) 2×2 conceptualization, and there were three items per goal type: (a) mastery approach (e.g., "It is important to me to do the physical activities I do as well as I possibly can"); (b) mastery avoidance (e.g., "I worry that I may not participate in the physical activities I do as well as I possibly can"); (c) performance approach (e.g., "It is important to me that I do better in terms of participating in physical activity compared to other people"); and (d) performance avoidance (e.g., "I just want to avoid doing worse in terms of participating in physical activity than other people") goals. Responses were rated on a 7-point scale ranging from 1 (*not at all like me*) to 7 (*completely like me*).

Self-reported physical activity behavior was assessed on two items (e.g., "In the course of a typical week, how often have you participated in vigorous physical activities for 20 minutes at a time?"). Responses were rated on a 6-point scale ranging from 1 (*everyday*) to 6 (*almost never*). The measure has exhibited strong, statistically significant correlations with the physical activity frequency scale and total physical activity score from Godin and Shephard's (1985) Leisure-Time Physical Activity Questionnaire and a comprehensive interview-administered physical activity questionnaire (Cale, 1994; Hagger, Cale, & Ashford, 1997; Hagger, Chatzisarantis, Biddle, & Orbell, 2001). In addition, this two-item questionnaire has demonstrated satisfactory construct, predictive, and nomological validity and reliability in confirmatory factor analyses (Hagger & Chatzisarantis, 2005; Hagger, Chatzisarantis, & Harris, 2006).

Procedure

We employed a two-wave, prospective correlational design. In the first wave, participants were instructed to complete the psychological measures (SPAS, PSDQ physical self-concept scale, and AGQ modified for physical activity) in small groups under quiet conditions. They were told that they were

participating in a survey on self-evaluations, that their responses would remain anonymous, and that the data would be used only for research purposes. They were informed that they had the right to withdraw at any time.

Participants received a standardized set of instructions that clearly defined the target behavior of physical activity as "vigorous physical activities, such as sports and active pastimes that raise your heart rate/pulse and make you breathe deeply for 20 minutes at a time." Four weeks later, the participants completed the self-report measure of physical activity. The measures were matched using date of birth and code number to preserve anonymity.

Data Analysis

Missing data points were resolved through multiple imputation from existing values for other variables using the methods advocated by Schafer and Graham (2002). Data were analyzed using confirmatory factor analysis and structural equation modeling.

We used the EQS computer program (Bentler, 2004) to estimate the models with a robust maximum likelihood method (Satorra & Bentler, 1988). Multiple criteria were adopted to evaluate model goodness of fit, including comparative fit index (CFI), non-normed fit index (NNFI), root mean square error of approximation (RMSEA), and the 95% confidence intervals of the RMSEA (95% CI). Values in excess of .90 are indicative of reasonable model fit for the CFI and NNFI indexes (Bentler, 1990), although values approaching or exceeding .95 are preferable (Hu & Bentler, 1999). A cutoff value of .08 or less for the RMSEA indicates good model fit (Hu & Bentler, 1999). In addition, we examined the adequacy of the solution estimates of the model; namely, standardized factor loadings, which should exceed .70; average variance extracted from the items in each factor, which should exceed .50; and composite reliability (ρ_c) estimates, which should be greater than .80 (Diamantopoulos & Sigauw, 2000).

Results

Confirmatory Factor Analysis

In the first instance, a confirmatory factor analytic (CFA) model was estimated to test whether the variance/covariance matrices among items could be adequately explained by a set of latent variables representing the hypothesized psychological constructs from the SPAS, the PSDQ physical self-concept scale, the four types of achievement motivation from the

modified AGQ, and measure of physical activity behavior. The model demonstrated acceptable fit according to multiple criteria, Satorra–Bentler (S-B) $\chi^2(329) = 537.46$, $p < .01$ (CFI = .958, NNFI = .951, RMSEA = .051, 95% CI = .043–.059).

Examining the solution estimates of this model indicates that the factor loadings all exceeded the recommended .70, and the average variance extracted per factor was greater than .50. Composite reliability coefficients and factor correlations among the constructs in the CFA model are presented in Table 1. Correlations were significantly different from unity, according to the criteria specified by Bagozzi and Kimmel (1995), supporting the discriminant validity of the constructs. Composite reliability coefficients were acceptable for all constructs in both samples. Finally, descriptive statistics for each variable are provided in Table 2.

Structural Equation Model[4]

Given the adequacy of the CFA model, we then specified a full structural equation model (SEM) that included structural parameters representing the hypothesized relations among the psychological constructs (Figure 1). The model fit the data adequately and exhibited little variation in fit, relative to the CFA model, S-B $\chi^2(329) = 537.49$, $p < .01$ (CFI = .958, NNFI = .951, RMSEA = .051, 95% CI = .043–.059). Structural parameter coefficients and variance explained in physical activity behavior for the single-sample SEM are provided in Table 3.

Physical self-concept significantly predicted mastery approach goals ($\beta = .27$, $p < .01$). Physical self-concept also significantly predicted performance approach goals ($\beta = .34$, $p < .01$). Physical self-concept did not have a significant effect on any of the other achievement goal constructs, and there

[4]Our theory proposed that self-related constructs would act as distal effects on physical activity behavior because they are global in nature and because these effects would be mediated by achievement goal constructs, which are context-specific and are viewed as more changeable. For completion, we estimated an alternative model in which the effects of the achievement goal constructs on physical activity were mediated by the self-related variables. Unsurprisingly, the fit of the model was virtually identical to the original hypothesized model, S-B $\chi^2(329) = 537.47$, $p < .01$ (CFI = .958, NNFI = .951, RMSEA = .051, 95% CI = .043–.059). This is because the models are statistically equivalent, with the same degrees of freedom. In the alternative model, there were no mediated effects of the achievement goal constructs on physical activity behavior by the self-related variables; instead, any direct effects of the self-related variables on physical activity were attenuated to zero by the direct effects of achievement goals on behavior. This is indicative of a pattern of effects in which the effects of self-related variables on physical activity are mediated by the achievement goal constructs. This suggests that the model originally proposed in the present study provides a more reasonable account of the pattern of effects among the proposed variables because it is the achievement goal constructs that mediate the effects of self-related constructs, not vice-versa.

Table 1

Factor Correlations and Composite Reliability Coefficients Among Self-Related Constructs, Achievement Goal Constructs, and Behavior for UK (Study 1) and Estonian (Study 2) Samples

Variable	ρ[a]	1	2	3	4	5	6	7	ρ[b]
1. Physical self-concept	.963	—	−.603**	.076	−.486**	.027	−.073	.206**	.893
2. Social physique anxiety	.893	−.687**	—	−.116	.497**	.202**	.226**	−.017	.877
3. Mastery approach goal	.892	.257**	−.163*	—	.255**	.657**	.362**	.504**	.808
4. Mastery avoidance goal	.933	−.269**	.357**	.140*	—	.361**	.347**	.010	.853
5. Performance approach goal	.880	.114	.092	.614**	.223**	—	.703**	.299**	.880
6. Performance avoidance goal	.915	−.124	.251**	.276**	.327**	.610**	—	.147	.839
7. Behavior	.859	.261**	−.198**	.638**	−.096	.416**	.184*	—	.902

Note. Coefficients below the principal diagonal are for the UK sample (Study 1), while coefficients above the principal diagonal are for the Estonian sample (Study 2). ρ = composite reliability coefficients.
[a]Composite reliabilities for constructs in the UK sample (Study 1). [b]Composite reliabilities for constructs in the Estonian sample (Study 2).
*$p < .05$. **$p < .01$.

Table 2

Descriptive Statistics for Self-Related Constructs, Achievement Goal Constructs, and Physical Activity Behavior for the UK Sample (Study 1), Estonian Sample (Study 2), and Gym Users and Non-Users (Study 3)

	UK sample (Study 1)		Estonian sample (Study 2)		Gym users (Study 3)		Gym non-users (Study 3)	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1. Physical self-concept	3.86	1.06	4.44	0.82	4.25	1.04	3.88	1.00
2. Social physique anxiety	2.68	0.90	2.01	0.80	2.49	0.95	2.69	0.99
3. Mastery approach goal	4.47	1.48	5.08	1.29	5.61	1.06	4.16	1.50
4. Mastery avoidance goal	3.76	1.62	3.61	1.58	3.72	1.71	3.72	1.66
5. Performance approach goal	3.14	1.57	3.55	1.67	3.72	1.68	2.96	1.50
6. Performance avoidance goal	3.75	1.74	4.26	1.61	3.89	1.83	3.84	1.63
7. Behavior	3.05	1.16	3.14	1.24	4.64	0.54	2.68	0.75

Table 3

Standardized Structural Parameter Estimates and Univariate Comparisons From the Structural Equation Model for the UK (Study 1) and Estonian (Study 2) Samples

	Sample	
Parameter estimate	UK	Estonia
Physical self-concept → Mastery approach goal	.274**	.196*
Physical self-concept → Mastery avoidance goal	–.044[a]	–.311**[a]
Physical self-concept → Performance approach goal	.335**	.188
Physical self-concept → Performance avoidance goal	.093	.070
Physical self-concept → Behavior	.041	.169
Social physique anxiety → Mastery approach goal	.025[a]	.191*[a]
Social physique anxiety → Mastery avoidance goal	.327**	.279**
Social physique anxiety → Performance approach goal	.322**	.254**
Social physique anxiety → Performance avoidance goal	.315**	.227**
Social physique anxiety → Behavior	–.023	.038
Mastery approach goal → Behavior	.604**	.530**
Mastery avoidance goal → Behavior	–.192**	–.046
Performance approach goal → Behavior	.048	–.052
Performance avoidance goal → Behavior	.061	.013
Physical self-concept ↔ Social physique anxiety	–.687	–.627
R^2 behavior	.451**	.286**

[a]Significantly different across behaviors.
*$p < .05$. **$p < .01$.

was no direct effect of physical self-concept on physical activity behavior. Social physique anxiety significantly and positively predicted mastery avoidance ($\beta = .33$, $p < .01$), performance approach ($\beta = .32$, $p < .01$), and performance avoidance ($\beta = .32$, $p < .01$) goals. There was no direct effect of social physique anxiety on behavior. Mastery approach goals had a significant, positive effect on physical activity behavior ($\beta = .60$, $p < .01$), while mastery avoidance goals had a significant, negative effect on behavior ($\beta = -.19$, $p < .01$). There was a significant, positive indirect effect of physical self-concept on physical activity behavior ($\beta = .20$, $p < .01$), which was mediated by

mastery approach goals. There was also a significant total effect of physical self-concept on physical activity behavior ($\beta = .24$, $p < .01$). Although social physique anxiety had a significant, negative zero-order factor correlation with physical activity behavior ($\phi = -.20$, $p < .01$; see Table 1), there were no significant indirect or total effects of social physique anxiety on physical activity.

A post hoc analysis in which physical self-concept was omitted as a predictor of the achievement goal and physical activity variables reveals a significant, indirect effect of social physique anxiety on physical activity behavior ($\beta = -.16$, $p < .01$). This provides evidence that inclusion of physical self-concept attenuated any effect of social physique anxiety on behavior. Overall, the model accounted for 45.1% of the variance in physical activity behavior.

Discussion

The present findings corroborate previous research that has found self-related variables to be positively linked (Hagger et al., 1998) and social physique anxiety to be negatively linked (Kowalski et al., 2001) to physical activity. However, the present research provides a unique contribution to the understanding of these relationships by employing constructs from the 2×2 model of achievement goals. The inclusion of achievement goal constructs provides an explanation for the processes or mechanisms by which self-related psychological constructs influence physical activity behavior. The findings indicate that physical self-concept is positively related to approach goals and social physique anxiety to avoidance goals and approach performance goals.

Physical activity usually involves the presentation of the physique in evaluative environments; therefore, a positive view of the self in physical contexts is likely to be a driving force behind this behavior. Importantly, the effect of physical self-concept on physical activity behavior was predominantly directed through mastery approach goals. This is consistent with previous research in education and sport contexts indicating that approach goals are the most efficacious in motivated behavior (Conroy et al., 2003; Elliot & McGregor, 2001).

Social physique anxiety did not have any effect on physical activity behavior in the model. This supports previous research that has found weak or negative associations between this variable and physical activity behavior. Our analysis also indicates that the negative, zero-order relationship observed between social physique anxiety and physical activity was swamped by inclusion of physical self-concept in the model. This provides further indication that self-concept takes precedence over concerns about presentation of the physique when it comes to physical activity participation. Finally,

the CFA model provided support for the construct and discriminant validity of the adapted measure of approach and avoidance achievement goals in the domain of health-related physical activity.

Study 2

We aimed to corroborate the hypothesized relationships among the self-related variables, achievement goals, and physical activity behavior by testing an independent sample from a different culture. The purpose of the study was to examine whether the pattern of effects found in the UK sample, a culture with an individualistic cultural background, was replicable in a sample from Estonia, a national group that endorses predominantly collectivistic cultural values (Realo, 2003). We hypothesize that the measurement and structural parameters in the model tested in the UK sample will be equivalent (invariant) in a comparable sample from Estonia, lending further support for the proposed model. This hypothesis is in keeping with the information-processing approach, which considers such motivational processes to be universal.

Method

Participants

Study participants ($N = 216$; 146 female, 70 male) were undergraduate and postgraduate students from a university in Estonia.[5] Participants' mean age was 23.4 years ($SD = 3.0$). Females' mean age was 23.0 years ($SD = 2.5$), while males' mean age was 24.3 years ($SD = 3.8$).

Measures and Procedure

The measures and procedure were identical to those used for the physical activity sample in Study 1. Standardized back-translation techniques (Brislin, 1986) were used to develop Estonian language versions of the physical self-concept subscale from the PSDQ, the SPAS, the AGQ modified for physical activity contexts, and the modified version of Godin and Shephard's (1985) self-report measure of physical activity. The correlational two-wave prospective design, identical to that used in Study 1, was adopted.

[5]The location is withheld to protect anonymity.

Data Analysis

After multiple imputation to resolve missing data, single- and multi-sample CFA, SEM, and mean and covariance structures (MACS) analyses were used to test the study hypotheses. The overall fit of the models was evaluated using the multiple criteria and solution estimates cited previously.

Results

Single-Sample Confirmatory Factor Analyses

Single-sample CFAs were initially estimated to establish the adequacy of the six-factor model in explaining covariances among items from the Estonian sample. The analysis was conducted using the methods and goodness-of-fit criteria that we adopted in Study 1. Goodness-of-fit statistics indicate adequate fit with the data, S-B $\chi^2(329) = 469.10$, $p < .01$ (CFI = .953, NNFI = .946, RMSEA = .045, 95% CI = .035–.053). Further, solution estimates indicate that factor loadings and average variance extracted approached or exceeded .70 and .50, respectively. Composite reliability coefficients and factor correlations are presented in Table 1. Reliability estimates were within acceptable limits, and the correlations supported the discriminant validity of the latent constructs. Descriptive statistics for the factors are presented in Table 2.

Single-Sample Structural Equation Model

Given the adequacy of the CFA, a full SEM of the hypothesized network of relations among study constructs was estimated (Figure 1). This model also fit the data satisfactorily, with little variation in fit, compared with the CFA model, S-B $\chi^2(329) = 469.09$, $p < .01$ (CFI = .953, NNFI = .946, RMSEA = .045, 95% CI = .035–.053).

Mean and Covariance Structure Analysis

We tested whether there was any variation in model parameters (i.e., factor loadings, factor variances, factor correlations, latent means) across the Estonian sample and the British sample from Study 1 using MACS analyses (Little, 1997). An initial baseline multi-sample CFA model was estimated to test the feasibility of the hypothesized number of items and factors in the

model across samples. We then estimated a series of nested models following the invariance routine specified by Byrne, Shavelson, and Muthén (1989) in which the following sets of parameters were systematically constrained to be invariant across the samples: factor loadings, factor variances, and factor correlations.

Pending the adequacy of these models, a set of models was estimated to test whether the latent factor means were invariant across samples. The invariance routine for the latent means analyses involved the specification of a baseline model that tested the plausibility of the mean structure across samples, followed by restricted models in which the equivalence of the reproduced means of the factor indicators or intercepts and the equivalence of the reproduced means of the latent factors were specified. To examine the mean differences, one set of factor means was set to zero to act as a reference group. We adopted the recommendations of Cheung and Rensvold (2002) in using these indexes to evaluate whether the degree of misspecification in the nested models across behavior was substantial or trivial. These authors recommend a cut-off value of −.01 as indicative of trivial, nonsubstantial variation in goodness of fit when comparing the constrained models with baseline.

The results from the multi-sample CFA models are presented in Table 4. Models testing the invariance of factor loadings and factor variances indicate no changes in fit indexes that could be considered substantial (Cheung & Rensvold, 2002). Successive nested models testing for the invariance of factor loadings, variances, and covariances indicate no substantial changes in goodness-of-fit indexes (GFIs), supporting the measurement invariance of the model across the samples (Cheung & Rensvold, 2002).

The results from the models testing for mean differences in the latent intercepts and factor means are presented in Table 4. The baseline latent means model exhibited acceptable fit with the data. Subsequent models that constrained factor intercepts and latent means to be invariant did not exhibit significant decrements in fit, indicating that any differences in latent means were largely inconsequential to model fit. Univariate tests examining the differences in the reproduced means using the Estonian sample as a reference group found that mean levels for the physical self-concept (M difference = 0.57; $z = 6.33$, $p < .01$), mastery approach goal (M difference = 0.61; $z = 4.74$, $p < .01$), performance approach goal (M difference = 0.36; $z = 2.29$, $p < .05$), and performance avoidance goal (M difference = 0.50; $z = 3.22$, $p < .01$) constructs were significantly higher in the Estonian sample. The mean level of social physique anxiety was significantly higher in the British sample (M difference = 0.63; $z = 7.30$, $p < .01$). There were no significant mean differences for the mastery avoidance goals and physical activity behavior constructs. The mean levels of the composite variables are presented in Table 2 for comparison.

Table 4

Goodness-of-Fit Statistics for Multi-Sample Confirmatory Factor Analysis, Mean and Covariance Structures (MACS) Analysis, and Structural Equation Model by Culture: Study 2

						RMSEA 95% CI			
Model	S-B χ^2	*df*	CFI	NNFI	RMSEA	LB	UB	$\Delta\chi^2$	Δdf
Confirmatory factor analysis									
Baseline	1008.37**	658	.956	.949	.048	.042	.054		—
Factor loadings invariant	1061.66**	678	.952	.946	.050	.044	.055	53.29**	20
Factor loadings and factor variances	1102.90**	685	.947	.942	.052	.046	.057	94.53**	27
Factor loadings, factor variances, and factor correlations	1130.42**	706	.946	.943	.051	.046	.057	122.05**	48
Mean and covariance structures analysis									
Baseline	1035.82**	671	.956	.951	.047	.041	.053	—	—
Intercepts invariant	1277.10**	698	.954	.948	.052	.047	.058	241.28**	27
Intercepts and latent means invariance	1375.20**	705	.952	.945	.053	.048	.059	339.38**	34
Structural equation modeling									
Baseline	1010.12**	658	.951	.944	.052	.045	.058	—	—
Factor loadings invariant	1065.26**	678	.946	.940	.053	.047	.059	55.14**	20
Factor loadings and factor variances	1090.89**	685	.944	.938	.054	.048	.060	80.77**	27
Factor loadings, factor variances/ disturbances, and structural parameters invariant	1106.44**	699	.943	.939	.054	.048	.060	96.32**	41

Note. S-B χ^2 = Satorra–Bentler scaled chi square; *df* = Model degrees of freedom; CFI = comparative fit index; NNFI = non-normed fit index; RMSEA = root mean square error of approximation; RMSEA CI 95% = 95% confidence intervals of RMSEA; LB = lower bound; UB = upper bound; $\Delta\chi^2$ = change in chi square relative to baseline; Δdf = change in model degrees of freedom relative to baseline.
**$p < .01$.

Multi-Sample Structural Equation Model

A multi-sample SEM tested the invariance of the measurement and structural parameters from the proposed model across the cultural samples. The results of the invariance analysis are presented in Table 4 and indicate no substantial decrement in model fit when the measurement and structural parameters were constrained to be invariant. Lagrange multiplier (LM) tests reveal that only two of the structural parameters were non-invariant across the samples.

Parameters in the Structural Equation Models

Standardized parameter estimates for the structural model in the Estonian sample are presented in Table 3. With respect to non-invariant parameters in the structural models, we found that the effect of physical self-concept on mastery avoidance goals was negative and significant in the Estonian sample ($\beta = -.311$, $p < .01$) but not in the British sample.

Interestingly, the effect of mastery avoidance on physical activity behavior was not significant in the Estonian sample, although there was a significant negative effect in the British sample. However, this effect was invariant across samples because the size of the effect in the British sample was relatively small, resulting in overlapping confidence intervals with the effect in the Estonian sample. There was also a significant effect of social physique anxiety on mastery approach goals, an effect that was significantly different across samples. None of the other effects differed substantially, suggesting considerable congruence in the pattern of effects across these national samples. There was also a significant total effect of physical self-concept on physical activity behavior in the Estonian sample ($\beta = .278$, $p < .01$), mirroring that found in the British sample. Physical self-concept did not exert a significant main effect on physical activity behavior; therefore, the effect of physical self-concept on physical activity behavior was indirect, with the strongest effect through mastery approach goals ($\beta = .109$, $p = .05$). Finally, only mastery approach goals significantly predicted physical activity behavior in the Estonian sample and explained 28.6% of the variance.

Discussion

Overall, the hypothesized pattern of effects among the self-related constructs (i.e., physical self-concept and social physique anxiety) and the achievement goal constructs in the proposed model was supported. There-

fore, at a global level, the pattern of effects is consistent with the information-processing perspective, as hypothesized.

However, there were two structural relations in the hypothesized models that were non-invariant across the samples. The most important difference is the significant effect of social physique anxiety on mastery approach goals, an effect that was not present in the British sample. It seems that social physique anxiety is not a construct that was related to avoidance goals in the Estonian sample, but instead was related to approach goals. It is possible that in cultures that endorse a cultural orientation that is collectivistic and interdependent, people attach less value to self-presentational concerns in physical contexts and, as a result, are less likely to adopt avoidance-valenced goals in physical situations.

In collectivistic cultures, the self is viewed as inextricably linked to others in society and interdependent in nature (Oyserman, Coon, & Kemmelmeier, 2002). The presentation of the self is likely to be less related to personal appearance and competence, and more in terms of contribution to the social group and the importance of collaborating with others. Support for this can be seen in the significantly lower latent means for social physique anxiety and higher means for physical self-concept in the Estonian sample in the present study, and identical cross-cultural mean differences for these variables in previous studies (Hagger et al., 2007). People in collectivistic cultures may form approach goals to demonstrate social competence, such as exercising with others. This may be a limitation of this conceptualization of physical self-concept (Bond & Cheung, 1983). However, this positive effect did not yield a significant indirect or total effect on physical activity behavior. Therefore, it can be concluded that physical self-concept and mastery approach goals are consistently the strongest predictors of physical activity behavior in British and Estonian samples; and the effect of physical self-concept is indirect through mastery approach goals in both samples.

Study 3

The purpose of Study 3 is to examine whether previous experience with physical activity in evaluative contexts, such as gymnasia or fitness centers will affect the pattern of relations among self-related and achievement goal constructs. We expect positive effects for both physical self-concept and social physique anxiety on approach goals in regular gym users, while non-users are more likely to exhibit similar patterns of relations among the self-related variables to those found in previous studies. We also expect these effects to be independent of past physical activity behavior. These hypotheses were tested using multi-sample CFA and SEM in samples of gym users and non-users.

Method

Participants

Study participants ($N = 442$; 127 female, 305 male, 10 did not report their gender) were undergraduate and postgraduate students and employees from a university in the UK.[6] Participants' mean age was 30.1 years ($SD = 12.9$). Females' mean age was 33.6 years ($SD = 14.7$), while males' mean age was 28.6 years ($SD = 12.0$).

Participants who had previous experience engaging in physical activity in gymnasia and fitness centers (i.e., gym users) were recruited from a university fitness center. Participants who had little or no previous regular experience participating in physical activity in gymnasia or fitness centers (i.e., non-users) were recruited from university lectures, seminars, and offices. The participants were asked to report whether they were members of a gym or fitness center and whether or not they attended regularly. Participants in the sample that was recruited from lectures, seminars, and offices who indicated that they were regular gym users were allocated to the gym user sample ($N = 39$; M age = 35.8 years, $SD = 15.3$; 11 female, M age = 40.3 years, $SD = 14.1$; 27 male, M age = 33.9 years, $SD = 15.9$).

Study participants were also asked to self-report their membership in sports clubs or other athletic pursuits. Sports participants who did not report that they were members of a gym were eliminated to maintain relative homogeneity in the samples. This resulted in final samples of gym users ($N = 186$; M age = 29.1 years, $SD = 12.1$; 58 female, M age = 31.3 years, $SD = 13.2$; 123 male, M age = 28.2 years, $SD = 11.6$) and non-users ($N = 256$; M age = 30.7 years, $SD = 13.5$; 69 female, M age = 35.4 years, $SD = 15.6$; 182 male, M age = 28.8 years, $SD = 12.3$).

Measures

Measures of the self-related and achievement goal constructs were identical to those used for the physical activity sample in Study 1. Previous physical activity involvement was measured as estimated frequency of participation over the previous 6 months. We used two items to measure previous physical activity behavior (e.g., "On average, over the course of the past *six months*, how often have you participated in vigorous physical activities?"). Responses were rated on a 6-point scale ranging from 1 (*every day*) to 6 (*almost never*).

[6]The location is withheld to protect anonymity.

The items were each preceded by the definition of physical activity that was provided in Study 1. The measure was used to provide some criterion validity for participants' self-categorization as gym users or non-users and to control for past behavior. Research has demonstrated that single-item measures of physical activity provide accurate generalizations of physical activity levels evaluated against comprehensive self-report questionnaires and objective measures of physical activity and fitness (Fogelholm et al., 2006; Garcia, George, Coviak, Antonakos, & Pender, 1997; Li, Carlson, & Holm, 2000).

Procedure

We employed a single-wave correlational design. Study participants completed the psychological and behavioral measures in small groups under quiet conditions. They were given identical instructions to those in Studies 1 and 2, including ethical statements regarding confidentiality and the right to withdraw from the study.

Data Analysis

Data were analyzed using single- and multi-sample CFA, SEM, and mean and covariance structures (MACS) analysis. The data were evaluated using the previously cited criteria.

Results

Single-Sample Confirmatory Factor Analysis

As in Studies 1 and 2, initial CFAs were estimated to establish the adequacy of the six-factor model in explaining covariances among items in each sample. Goodness-of-fit statistics indicate well-fitting models in each sample, and the results are presented in Table 5. Solution estimates indicate that factor loadings and average variance extracted in each factor exceeded the recommended levels. Composite reliability coefficients and factor correlations are presented in Table 6. The reliability coefficients were acceptable, and the correlations supported the discriminant validity of the constructs in both samples. Finally, descriptive statistics for the study variables are presented in Table 2.

Single-Sample Structural Equation Model

Full SEMs to evaluate the hypothesized model were estimated in both samples. These models also fit the data satisfactorily, with virtually nil variation in fit, compared with the CFA models (Table 5).

Table 5

Single-Sample Goodness-of-Fit Statistics for Confirmatory Factor Analytic and Structural Equation Models for Gym Users and Non-Users: Study 3

						RMSEA 95% CI	
Model	S-B χ^2	*df*	CFI	NNFI	RMSEA	LB	UB
Gym users							
CFA	530.50**	329	.941	.932	.058	.048	.066
SEM	530.50**	329	.941	.932	.058	.048	.066
Non-users							
CFA	506.19**	329	.962	.957	.046	.038	.054
SEM	506.21**	329	.962	.957	.046	.038	.054

Note. S-B χ^2 = Satorra–Bentler scaled chi square; *df* = model degrees of freedom; CFI = comparative fit index; NNFI = non-normed fit index; RMSEA = root mean square error of approximation; RMSEA CI 95% = 95% confidence intervals of RMSEA; LB = lower bound; UB = upper bound; CFA = confirmatory factor analysis; SEM = structural equation modeling.
**$p < .01$.

Mean and Covariance Structure Analysis

MACS analyses testing the invariance of model parameters and latent means across the gym-user and non-user samples support the invariance of factor loadings, variances, and covariances (Cheung & Rensvold, 2002). The results of the analyses are presented in Table 7. The initial multi-sample CFA model fit the data well; and there were small, unsubstantial decrements in fit indexes for each constrained model relative to baseline, thus supporting multi-sample invariance.

The baseline multi-sample latent means model exhibited adequate fit, and nested models constraining factor intercepts to be invariant did not exhibit substantial decrement in fit (see Table 7). However, there was a substantial reduction in the GFIs greater than the –.01 threshold for the model constraining the latent means to be invariant (Cheung & Rensvold, 2002). This was indicative of large variations in mean levels of constructs across the samples. Univariate tests using the gym-user sample as a reference group indicate that mean levels for physical self-concept (*M* difference = 0.38; $z = 3.69$, $p < .01$), mastery approach goals (*M* difference = 1.55; $z = 11.97$, $p < .01$), performance approach goals (*M* difference = 0.76; $z = 5.03$, $p < .05$), and past physical activity behavior (*M* difference = 2.20; $z = 32.76$, $p < .01$)

Table 6

Factor Correlations and Composite Reliability Coefficients Among the Self-Related Constructs, Achievement Goal Constructs, and Past Behavior for Gym Users and Non-Users: Study 3

	ρ[a]	1	2	3	4	5	6	7	ρ[b]
1. Physical self-concept	.953	—	−.617**	.151*	−.184**	.115	−.027	.149	.947
2. Social physique anxiety	.907	−.652**	—	−.152*	.353**	−.043	.185**	−.005	.914
3. Mastery approach goal	.821	.099	−.012	—	.312**	.624**	.390**	.539**	.868
4. Mastery avoidance goal	.917	−.296**	.442**	.299**	—	.339**	.473**	.157*	.927
5. Performance approach goal	.887	−.015	.280**	.366**	.377**	—	.621**	.470**	.875
6. Performance avoidance goal	.908	−.109	.314**	.159*	.379**	.781**	—	.149	.908
7. Past behavior	.864	−.039	.157	.337**	.187*	.172*	.004	—	.733

Note. Coefficients below the principal diagonal are for the sample of gym users, while coefficients above the principal diagonal are for the sample of non-users. ρ = composite reliability coefficients.
[a]Composite reliabilities for constructs in the sample of gym users. [b]Composite reliabilities for constructs in the sample of non-users.
*$p < .05$. **$p < .01$.

Table 7

Goodness-of-Fit Statistics for Multi-Sample Confirmatory Factor Analysis, Mean and Covariance Structures (MACS) Analysis, and Structural Equation Model Across Gym Users and Non-Users: Study 3

						RMSEA 95% CI			
Model	S-B χ^2	*df*	CFI	NNFI	RMSEA	LB	UB	$\Delta\chi^2$	Δdf
Confirmatory factor analysis									
Baseline	1035.76**	658	.953	.946	.051	.045	.057	—	—
Factor loadings invariant	1056.46**	678	.953	.948	.050	.044	.056	20.70	20
Factor loadings and factor variances	1092.84**	685	.950	.944	.052	.046	.058	57.08**	27
Factor loadings, factor variances, and factor correlations	1122.49**	706	.948	.945	.052	.046	.057	86.74**	48
Mean and covariance structures analysis									
Baseline	1042.24**	671	.956	.951	.049	.043	.054	—	—
Intercepts invariant	1102.85**	698	.964	.958	.052	.045	.057	60.61**	27
Intercepts and latent means invariance	1564.27**	705	.937	.928	.067	.062	.072	522.03**	34
Structural equation modeling									
Baseline	1035.74**	658	.953	.946	.051	.045	.057	—	—
Factor loadings invariant	1056.44**	678	.953	.948	.050	.044	.056	20.70	20
Factor loadings and factor covariances/ disturbances	1077.06**	685	.952	.946	.051	.045	.057	41.32*	27
Factor loadings, factor covariances/ disturbances, and structural parameters invariant	1103.93**	699	.950	.946	.051	.045	.057	68.20**	41

Note. S-B χ^2 = Satorra–Bentler scaled chi square; *df* = Model degrees of freedom; CFI = Comparative fit index; NNFI = Non-normed fit index; RMSEA = Root-mean square error of approximation; RMSEA CI 95% = 95% Confidence Intervals of RMSEA; LB = Lower bound; UB = Upper bound; $\Delta\chi^2$ = Change in chi-square relative to baseline; Δdf = Change in model degrees of freedom relative to baseline.
*$p < .05$. **$p < .01$.

were significantly higher among gym users. For comparison, the composite mean scores for the variables in each sample are provided in Table 2.

Multi-Sample Structural Equation Model

The results of a multi-sample SEM testing for the invariance of the measurement and structural parameters in the proposed model across the gym-user and non-user samples are provided in Table 7. The measurement and structural parameters were found to be invariant across samples. LM tests reveal that two of the structural parameters were non-invariant across the samples. Standardized parameter estimates for the structural models in gym-user and non-user samples are presented in Table 8.

The effect of physical self-concept on performance approach goals was significant in the gym-user sample ($\beta = .279$, $p < .01$), but not in the non-user sample, a finding that was significantly different across the samples in the invariance analysis. Similarly, the effect of social physique anxiety on per-

Table 8

Standardized Structural Parameter Estimates and Univariate Comparisons From the Structural Equation Model for Each Sample: Study 3

Parameter estimate	Gym users	Non-users
Physical self-concept → Mastery approach goal	.121	−.037
Physical self-concept → Mastery avoidance goal	−.027	.017
Physical self-concept → Performance approach goal	.279**[a]	.032[a]
Physical self-concept → Performance avoidance goal	.172	.108
Social physique anxiety → Mastery approach goal	.013	−.172*
Social physique anxiety → Mastery avoidance goal	.405**	.364**
Social physique anxiety → Performance approach goal	.444**[a]	−.021[a]
Social physique anxiety → Performance avoidance goal	.435**	.252**
Past behavior → Physical self-concept	−.039	.149
Past behavior → Social physique anxiety	.158	−.004
Past behavior → Mastery approach goal	.339**	.543**
Past behavior → Mastery avoidance goal	.122	.156*
Past behavior → Performance approach goal	.113	.465**
Past behavior → Performance avoidance goal	−.058	.134
Physical self-concept ↔ Social physique anxiety[b]	−.655**	−.623**
R^2 behavior	.451**	.287**

[a]Significantly different across samples. [b]Coefficients are correlations among disturbance terms of endogenous factors.
*$p < .05$. **$p < .01$.

formance approach goals was significant for gym users ($\beta = .444$, $p < .01$), but not for non-users. This highlights the importance of both forms of self-related constructs in predicting performance approach goals among those who are regular gym users.

There was a small, but significant negative effect of social physique anxiety on mastery approach goals among non-users ($\beta = -.172$, $p < .05$). This effect was not significant among gym users. This is consistent with the hypothesis that social physique anxiety is associated with avoidance goals among those who do not regularly engage in physical activity. In both samples, social physique anxiety was positively related to avoidance goals (gym users, $\beta = .405$, $p < .01$; non-users, $\beta = .364$, $p < .01$). The reported effects were unique after controlling for past behavior. Overall, the constructs in the model accounted for 45.1% and 28.7%, respectively, of the variance in self-reported physical activity behavior in gym users and non-users.

Discussion

The present study supports two important hypotheses. First, it supports the notion that regular users of gymnasia and fitness centers have stronger, positive links between self-related variables and approach achievement goals, relative to non-users. It also provides evidence that a negative link between social physique anxiety and mastery approach achievement goals is an important effect among non-users. Second, it suggests that these effects are independent of past behavioral engagement (Ajzen, 2002).

Finally, participants' self-categorization as regular gym or fitness center attendees was supported, as these participants had significantly higher mean levels of past physical activity behavior, physical self-concept, and approach goals than did non-users. These findings lend further support to the hypothesis that self-related variables are significantly and positively associated to approach achievement goals—particularly performance approach goals—among regular gym users. This is not surprising, since those who regularly engage in physical activity behaviors are likely to have high levels of competence toward their physical activity goals. This is consistent with Elliot and McGregor's (2001) 2×2 framework and the incorporation of approach and avoidance valences into achievement goals. Regular users are likely to have high self-concept and, therefore, high competence toward physical activity in a gym. This is likely to evoke an approach valence to the goals they pursue.

It is also clear that mastery goals are more motivationally relevant, likely because exercisers who use gyms and fitness centers likely define competence by absolute or relative intrapersonal goals, rather than those that are normatively referenced. Conversely, among those who do not regularly attend gyms or fitness centers, physical self-esteem had no influence on achievement

goals, while social physique anxiety was associated with low levels of mastery approach and was unrelated to performance approach goals. This supports the hypothesis that self-presentation concerns are detrimental to approach goals among people with no previous experience (Crawford & Eklund, 1994).

General Discussion

The present investigation aimed to examine relations among self-related constructs; namely, physical self-concept and social physique anxiety, approach and avoidance mastery and performance goals, and health-related physical activity. Results from single- and multi-sample structural equation analyses in Study 1 found that physical self-concept was positively associated with mastery and performance approach goals, while social physique anxiety was positively related to mastery and performance avoidance goals and performance approach goals. Mastery approach goals were a significant, positive predictor of prospectively measured physical activity behavior. The relationship between physical self-concept and behavior was mediated by mastery approach goals.

The pattern of effects found in Study 1 in a sample from an individualistic culture (UK) was largely replicated and was found to be invariant in a sample from a collectivistic culture (Estonia) in Study 2. Finally, relationships between self-related constructs and approach goals were stronger among gym users, and social physique anxiety was negatively related to mastery approach goals among non-users in Study 3 while simultaneously controlling for past physical activity behavior.

The pattern of findings from these three studies supports the proposed model linking self-related variables, achievement goals, and physical activity. The hypothesis that physical self-concept is positively related to approach goals and actual behavior in a leisure-time physical activity context was corroborated in these three studies. This is in keeping with achievement goal theory (Elliot & McGregor, 2001) and theories of self-concept (Marsh & Redmayne, 1994). Physical self-concept, in part, reflects generalized perceptions of competence in physical situations (Marsh, 1996; Marsh & Redmayne, 1994; Sonstroem et al., 1992). Research has shown that high levels of competence are associated with engagement and persistence. High competence is likely to evoke approach-valenced goals toward behaviors like physical activity because this will likely enable the actor to demonstrate competence (Elliot & McGregor, 2001; Elliot et al., 2002).

Interestingly, physical self-concept was associated with both mastery and performance approach goals in physical activity in all three of the present studies. This is in keeping with self-concept as a reflection of generalized

competence, rather than competence that is oriented about the pursuit of personally referenced, skill-related goals or the pursuit of normatively referenced, performance-related goals (Deci & Ryan, 1985). However, it is clear from Studies 1 and 2 that mastery-oriented goals are those that are most strongly related to physical activity behavior, and are implicated in the mediational process by which physical self-concept influences physical activity behavior. Performance and avoidance goals had comparatively weak or null influences.

The present data support the theoretical proposal that individuals with high levels of physical self-concept tend to form approach-oriented mastery goals, which, in turn, affect behavior. Importantly, this pattern of effects was invariant across the British and Estonian samples, lending some support for the universality of this process across individualistic and collectivistic cultures. It may be that competence defined by personal improvement and learning is likely to promote future physical activity engagement. This is consistent with theories of motivation in which personally referenced goals and motives foster behavioral persistence because they are less variable (Deci & Ryan, 1985). In contrast, defining competence with respect to others is likely to be fragile in that those comparisons are less consistent (e.g., people to compare oneself to may not always be present), less controllable (e.g., comparisons with others are likely to be inconsistent because the makeup of the comparison group may vary), and less predictable (e.g., others' performance may improve, the task on which the comparisons are made may vary).

These results are further supported by the findings for social physique anxiety. Social physique anxiety was consistently and positively linked with mastery and performance avoidance goals, but also with performance approach goals. This pattern of findings was consistent in the British and Estonian samples, and also in the sample of gym users. The relationship between social physique anxiety and avoidance goals may be a result of the potential for exercise to evoke perceptions of incompetence and a focus on physique. To speculate, people with concerns about the presentation of the self in physical contexts are likely to be motivated to avoid those contexts because it might highlight a lack of competence in the activity and, as a consequence, draw attention to their physique (Leary, 1992).

However, the positive link between social physique anxiety and performance approach goals is contrary to expectations. One possible reason is that performance approach goals are externally referenced, just as concern about the physique is externally referenced. There may be people who are concerned about their physique and who are attracted to goals that are externally referenced because such goals may help resolve their self-presentational concerns.

It is interesting to note that this link was only present for gym users in Study 3, but not among non-users. This may lend further support to the premise that social physique anxiety may engender an approach valence toward performance-related goals among those who are physically active, but not among those who are sedentary. To speculate, an explanation of this may lie in people's perceptions of the context as evaluative or not evaluative. Crawford and Eklund (1994) found that women who did not perceive their exercise context to be evaluative had a positive correlation between social physique anxiety and attitudes toward physical activity, while the link was negative in those who perceived it to be evaluative. Therefore, in contexts in which the exerciser is conscious of being evaluated, social physique anxiety may be negatively related or unrelated to approach goals; while in situations in which it is not perceived to be threatening—such as when the environment is familiar for regular exercisers, or if they have developed strategies to allay that threat potential (e.g., wearing loose-fitting clothing)—social physique anxiety may be positively related to approach goals.

As is cursory in research adopting correlational designs, it must be stressed that the direction of effects found in the proposed model is based on theory, rather than actual causative relations. One cannot unequivocally support the causal effect of self-related constructs on achievement goals and achievement goals on behavior on the basis of these data alone. While a strength of this research is the adoption of a rigorous analytical approach permitting the indication of latent variables that are ostensibly free of measurement error (Martin, 1982), superior support for direction of effects needs to be gleaned from research manipulating self-related variables and examining the effects on achievement goals. Previous research has demonstrated that social physique anxiety can be manipulated in a physical activity context by having participants exercise in evaluative conditions, such as wearing clothing that emphasizes the physique (Crawford & Eklund, 1994). Similarly, positive competence feedback may be useful in manipulating physical self-concept. Such research may provide further support for the effects presented here.

In the present studies, we developed measures of constructs from the 2×2 model of achievement goals for health-related physical activity based on Elliot and McGregor's (2001) original AGQ. While this measure resulted in items that exhibited good construct, predictive, and nomological validity—and composite reliability on the basis of the models tested herein—the measure has been criticized. The criticisms involve problems of correspondence between operationalization and conceptualization of the goals in questionnaire measures that result in increased error variance attributable to interpretational ambiguity (Elliot & Murayama, 2008).

To resolve this, Elliot and Murayama produced a revised AGQ that addressed the problems of interpretability by making the goal explicit in the items, as well as reducing ambiguity by ensuring the goal is separate from reason and is unconfounded by exclusivity concerns. Therefore, rather than stating a value (e.g., "It is important . . .") or concern (e.g., "I worry . . ."), the items make explicit reference to goal striving (e.g., "My goal is . . ."; "My aim is . . ."). Given the clear pattern of findings and clean factor structure found with the revised questionnaire, future research would do well to heed these new advances in measurement and develop revised items accordingly.

We did not control for past physical activity behavior when predicting behavior prospectively in Studies 1 and 2. We did control for past behavior while simultaneously testing the pattern of effects among the self-related and achievement goal constructs in Study 3, and this is a strength of the present investigation. This suggests that the pattern of relations between the distal (self-related) and proximal (achievement goal) constructs in the model is robust and independent of past physical activity engagement. However, it does not provide evidence in support of unique effects of achievement goals on physical activity behavior independent of past behavior. It is clearly important that future research controls for past behavior when predicting future behavior prospectively. This will further strengthen the mediated model presented here and demonstrate that changes in the psychological constructs will result in concomitant changes in behavior, independent of previous experience.

Finally, participants in the present study were samples from a relatively homogeneous group of university students and employees. An advantage of using a homogeneous group is that it permits generalization of results to that specific group and minimizes the influence of extraneous demographic variables on the proposed effects. Analogously, a limitation of this approach is that it limits the generalizability of findings to the wider population and does not permit the evaluation of demographics as moderators. Further research should evaluate physical self-concept, social physique anxiety, and their relations with achievement goals and physical activity behavior across different age, ethnic, and socioeconomic groups.

The present studies advanced knowledge of the psychological antecedents of physical activity by demonstrating the pattern of relations between self-related and achievement goal constructs from the 2×2 framework. These findings suggest that mastery approach achievement goals mediate relations between the self-related constructs of physical self-concept and social physique anxiety and physical activity behavior. Furthermore, physical self-concept was positively associated with approach goals in physical activity. Social physique anxiety tended to be unrelated to mastery approach goals, and positively linked to avoidance goals and mastery performance goals.

However, social physique anxiety was related only to avoidance goals in people who were not regular gym users.

More research is needed to evaluate the mechanisms by which the self-related variables—particularly social physique anxiety—predict achievement goal constructs. The present studies illustrate that the effect of social physique anxiety on performance approach goals is moderated by previous experience in physical activity contexts. Future studies must identify other moderators of relations between social physique anxiety and achievement goal constructs, such as coping strategies. Future studies should also seek to manipulate self-related variables using techniques such as competence-affirming feedback for physical self-concept (Deci & Ryan, 1985) and physique salience for social physique anxiety (Crawford & Eklund, 1994), and examine their causal effects on achievement goals from the 2×2 model. Such manipulations may form the basis of behavior-change interventions based on the present findings to promote increased physical activity participation in populations.

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