BAR05385

The First Step Toward Examining the Question: What Do Students' Motivational Goals and Self-Concept Have to Do With Academic Achievement?

Katrina L. Barker, Martin Dowson, and Dennis M. McInerney
SELF Research Centre, University of Western Sydney, Australia

We propose that student achievement can be more fully explained by examining the dynamic interaction among students' goals and academic self-concept. To unify these two motivational perspectives, it is necessary to examine the psychometric properties of both students' goals as defined by the General Achievement Goal Orientation Scale (GAGOS) and students' academic self-concept as defined by the Academic Self Description Questionnaire (ASDQ) to determine whether these measures (items and scales) remain independent and stable when combined in the one instrument. Hence, we test the ability of a hypothesised first-order measurement model, comprising goal orientation and academic self-concept, drawn from the GAGOS (McInerney, 1997) and ASDQ (Marsh, 1992), to fit three waves of data collected from 1 001 high school students.

The Need for a Comprehensive Model of Academic Motivation

Development of research on academic motivation has increased our understanding of the psychological processes that help explain various patterns of achievement behaviour. A number of reasonable explanations have been proposed to determine why people may display varying reactions to seemingly similar experiences. Some feasible reasons for such varying reactions can be explained by resorting to one or more of the following theories of motivation: Causal attributions (Weiner, 1986), achievement motivation (Dweck & Bempechat, 1983; Dweck & Leggett, 1988), and self-perceptions (Purkey, 1970; Shavelson, Hubner & Stanton, 1976). Despite development of research on academic motivation which contributes toward a deeper understanding of motivational variables, a number of problems have arisen (Bong, 1996). Some of these concerns are addressed in this paper.

Although an abundance of models explore academic motivation, there is no solitary model that fully explains motivated behaviour. Bong (1996) believes competing theoretical orientations that differ between investigators, is primarily responsible for indeterminate findings. For instance, cognitive models of academic motivation are predominantly concerned with 'understanding learners' covert thought processes, often overlooking the impact of social and contextual variables' (Bong, 1996, p.150). Alternatively, models of self-perception (self-concept, self-efficacy) that explain varying motivational patterns for given tasks (Skaalvik, 1997a) rarely consider related social and contextual variables. Arising from cognitive theory is a social-cognitive approach, often conceptualised as goal theory. Unlike those previously described, goal theory pulls together varying aspects of achievement research (Weiner, 1990) as these models formulate and test specific hypotheses on the nature and direction of influential social and contextual factors (See for example Ames, 1992; Ames & Archer, 1988). For this reason, this paper adopts a goal theory framework.

Bong (1996) warns however, social-cognitive models are often inept due to vague construct definitions, as researchers have created their own labels perhaps before thoroughly examining existing terms. For example, conceptualisations of adaptive and maladaptive patterns of academic motivation have coined terms such as: intrinsic versus extrinsic orientations (Lepper & Greene, 1978), task involvement versus ego involvement (Nicholls, 1984), and mastery goals versus performance goals (Dweck & Leggett, 1988). In

addition, d'Ydewalle (1987) acknowledges that many of these constructs lack discriminant validity. This study provides a framework within which goal theory is clarified but importantly, extended to include social factors.

Clarifying and Extending Goal Theory

Goal theory focuses on the goals or purposes perceived for learning, rather than on the actual level of motivation (e.g. students' ongoing interest or deep task involvement) (Middleton & Midgley, 1997). Essentially students are concerned with reasons for doing the task. Students' individual answers to the question, "Why am I doing the task?" (Pintrich & De Groot, 1990; Pintrich & Schrauben, 1992) orientate students' intensity and direction of behaviour toward the academic task. These goals provide a framework within which individuals interpret, experience, and react according to the achievement situation and result in different patterns of affect, behaviour and cognition (Dweck & Leggett, 1988; Elliott & Dweck, 1988; Weiner, 1986; Bouffard, Vezeau & Bordeleau, 1998).

Within an achievement context, the predominant interest is the demonstration of competence. This may be achieved in two significant ways that are associated with two distinct motivational goals. Various conceptualisation of these two tendencies exist within the literature, however, most research maintains that students who engage in a task in order to master a skill or activity in an attempt to seek competence are claimed to have a *mastery* goal orientation. In contrast, students who engage in a task to attain favourable judgements of competence are claimed to have a *performance* goal orientation (Ames & Archer, 1988; Rose & Thornburg, 1984).

Achievement goal theory has evolved from its initial conceptualisation of mastery goals and performance goals. More recently, studies have examined the pursuit of multiple goals (e.g., mastery, performance, work-avoidance, and social), with a specific focus on the multiple goals independent and interactive effects (Barron & Harackiewicz, 2001; Dowson & McInerney, 2001; Harackiewicz, Barron, Pintrich, Elliot & Thrash, 2002; Linnenbrink & Pintrich, 2000; Pintrich, 2000).

Although not as extensively examined as academic goals (mastery and performance goals), students' social goals are another important class of goals that influence achievement behaviour (Bempechat & Boulay, 2001; Dowson & McInerney, 2003). Unlike academic goals, social goals are directly referenced to individuals or groups associated with the academic task, in addition to being referenced to the tasks themselves (Dowson, 1999). Social reasons for trying to achieve in academic situations are the dominant concerns for individuals pursuing social goals (McInerney, Roche, McInerney & Marsh, 1997; Urdan & Maehr, 1995).

Central to the purpose of the present study was an exploration of three positively oriented goals (mastery, performance approach, and social goals). These goals are 'positively oriented' in the sense that they express students' purposes for achieving, rather than their purposes for avoiding achievement (such as is that case with work-avoidance or performance-avoidance goals). Thus, the present study was primarily concerned with students' goals that orient students towards academic achievement, in contrast to goals that

orient students' way from academic achievement. For this reason, avoidant-type goals were not included in this study. An additional purpose for focusing upon positively oriented goals was to avoid methodological complexities. Negative items and negative constructs, especially when used alongside positive items and constructs can lead to difficulties in model construction and validation (e.g. through the presence of negative item method factors) (Marsh, 1994; 1996).

The examination of multiple goals (mastery, performance and social) allows for scrutiny of the individual goals, and some (first-order) interactions between them. This study builds on this previous research by including social goals in the goal theory framework and integrating these with and independent yet related construct of students' self-concept.

Clarifying the Structure of Self-Concept

Another area in academic motivation research where distinction among constructs often gets blurred is that related to the self or to subjective perceptions' (Bong, 1996, p.152). Self-concept researchers distinguish between evaluative, descriptive and affective/motivational facets however these are differentially categorised by researchers (see for example, Byrne, 1996; Wigfield & Karpathian, 1991). This study pursues a descriptive/evaluative aspect of self-concept (e.g., 'I am good at English') as opposed to an affective/motivational aspect (e.g., 'I am proud with my ability in English') (Rosenberg, 1979; Skaalvik, 1990a). Descriptive components are inclusive of roles and characteristics that are socially ranked and valued. For instance, a person may like or detest their perception of themselves in a particular domain. These related feelings associated with descriptive/evaluative aspects give rise to emotional or affective reactions such as pride and humiliation. Thus motivation to engage (or not) in tasks is significantly impacted by self-perceptions. Research conducted by Skaalvik, Valas and Sletta (1994) examined the relations between self-perceptions and motivation to engage. Their findings strongly indicate that self-perceptions are predictive of students' goal orientation.

Historically, research dealt with self-concept as a unidimensional affective attribute that resides within the individual (Delugach, Bracken, Bracken & Schicke, 1992). Researchers focused on an overall or general construct that relegated specific facets as unimportant to general self-concept. This unidimensional model of self-concept purported disconcerting findings, which prompted Shavelson, Hubner & Stanton (1976) to further define the construct of self-concept. They proposed an empirical model describing self-concept as mulitdimensional and hierarchically ordered. General perceptions of self as a person (i.e. global self-concept) are posited at the apex of the structure. Moving downward, the model becomes increasingly differentiated with general self-concept divided into two facets: academic self-concept and nonacademic (i.e. physical, social, emotional) self-concept. These facets are further divided into specific domains (e.g., mathematics self-concept, physical appearance self-concept). Initially there was little empirical support for Shavelson and colleagues (1976) proposed model. Though, subsequent empirical research is overwhelmingly consistent in supporting the multidimensionality of self-concept (Byrne & Shavelson, 1986;

Harter, 1982, 1984, 1985; Marsh, 1993a; Marsh, Barnes, & Hocevar, 1985; Marsh & Hocevar, 1985; Marsh & Shavelson, 1985; Wigfield & Karpathian, 1991).

Rationale for Combining Goals with Self-concept

To date, few studies endeavour to unify the numerous competing motivational constructs. There have been repeated calls for a comprehensive model to more fully explain the dynamic interactions among motivational variables. Although not as complete as the proposed comprehensive model, this study attempts to display greater depth and breadth by combining two related but independent motivational dimensions specifically, goal theory and academic self-concept. Curiously, there appears to be division between most researchers investigating motivation and those investigating self-concept (although see Skaalvik, 1997a; Skaalvik et al., 1994 and Skaalvik & Valas, 1999 as exceptions). Researchers of goal theory avoid the explicit discussion of self-concept instead refer exclusively to perceptions of ability. Self-concept researchers acknowledge the impact of motivation however avoid a goal theory framework as an explanation. We endeavour to unify Goal theory and self-concept as they are interconnected and when combined can provide valuable insight into student achievement.

Whether a person will attempt a particular task, how much effort is expended, and how much persistence will be demonstrated in the face of difficulty, explicitly recognises the self-concept – motivation linkage. Both students' goals and academic self-concept are influential in students' academic performance and achievement. Therefore, it is reasonable to suggest that goals and self-concept together, may provide a fuller explanation for students' achievement than either taken alone. A basic requirement of such an approach, however, will be to design and validate instruments that capture the multidimensional nature of both self-concept and goals and to determine whether these instruments remain independent and stable when combined in the one instrument (This is the specific focus of this study.) Also, a theoretical rationale for why a combination of constructs from two largely distinct literatures should be explored is also required. Such a rationale is provided immediately below.

Given any achievement-related situation there are at least two fundamental variables, the *task* itself (e.g., a sporting activity, a maths test or poetry writing) and the person doing the task (the *self*). These variables are 'fundamental' in the sense that a task cannot be "achievement-related" unless there is a person (a self) to construe the task as an achievement-related one, and a person cannot construe a task as achievement-related unless there is a task to complete in the first-place. Goal Theory essentially suggests that self-perceptions of the purpose and structure of the task are influential in academic performance and achievement (Harackiewicz, Barron, Tauer, Carter & Elliot, 2000; Kaplan & Maehr, 1999; Skaalvik, 1997b). Alternatively, self-concept theory suggests that self-perceptions of relative ability are influential in academic performance and achievement (Anderman, Anderman & Griesinger, 1999; Marsh & Craven, 1997). Thus, if task and self are the key variables in achievement-related tasks, then Goal Theory and Self-Concept Theory suggest that perceptions of task and self are fundamental psychological drivers of performance and achievement arising from engagement in those tasks. Consequently, if only Goal Theory or only Self-

Concept Theory is used to examine achievement-related behaviours, and indeed achievement itself, then either key perceptions concerning tasks, or key perceptions concerning self may be missing from the respective analyses. To the extent that if this is the case, then a holistic account of *both* foundational variables in achievement-related behaviours may be missing.

In addition to the above, perceptions of the purposes of a *task* and perceptions of the ability of *self* may be interconnected in a learning situation such that perceptions of *task purpose* effects perceptions of *self ability*. For example, there is considerable evidence (e.g. Harackiewicz, Barron, & Elliot, 1998) that if one perceives a task to be competitive in nature this may negatively impact upon self-perceptions of relative ability. On the other hand, non-competitive tasks may enhance self-perceptions of relative ability. Conversely, poor perceptions of ability (low self-concept) may lead to disengagement in achievement-related tasks, and high self-concept may lead to enhanced engagement in tasks (see Zusho & Pintrich, 2001). Thus, perceptions of the purposes of a task and the abilities of the self are not only fundamental to achievement-related behaviours, but are also interactive in determining engagement (or not) in achievement-related behaviours. This latter reason provides further justification for investigating the simultaneous affects of perceptions of task and self on academic achievement.

The above discussion postulates that the nature of the *task* impacts upon perceptions of *self*, and that these causally related influences affect achievement outcomes. An alternative (perhaps complementary) perspective is that perceptions concerning "Why am I doing this?" (goal orientation), and perceptions concerning "Can I do this?" (self-concept), may interact reciprocally to influence both academic engagement and academic achievement. For example, one individual may perceive that the purpose of a task is to demonstrate competitive superiority (i.e. "I am doing this to win"), but be unsure that they have the ability to "win". Another student, may perceive the same task as competitive, but be sure of their ability to win. Yet another student may perceive the purpose of the task to be mastery (competence) related, yet evaluate themselves to be incompetent, and so on. The point is that the relative salience of the 'mix' of task and self evaluations is crucial in determining engagement in a task, and hence achievement outcomes from the task. Thus, it may be (from the paragraph above) that perceptions of task affect evaluations of self, which in turn affect academic engagement and achievement. Alternatively, (from this paragraph) perceptions of task and self may interact to influence engagement and achievement. Whatever the case, a pre-requisite for investigating both these alternatives is an instrument capable of simultaneously measuring both goals and self-concept equally well for males and females.

Figure 1 is a pictorial representation of the literature reviewed above. That is, the revised conceptualisation of goal theory, comprising social goals in addition to mastery and performance goals, are examined along side academic self-concept (English and math self-concept) to explore the interaction between goals and self-concept.

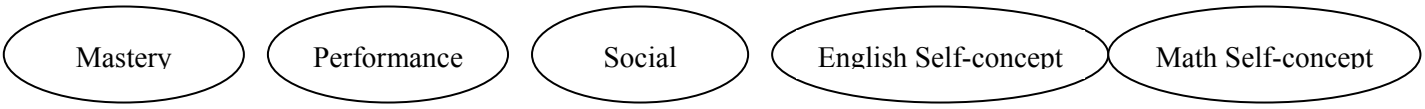

Figure 1: Multidimensional nature of students goals and academic self-concept.

Purpose

In an attempt to respond to calls requesting unification of the extensive literature on academic motivation, researchers of this study have combined two substantial dimensions. To date, few researchers have explored relations between self-concept and goals (although see Anderman, Anderman, & Griesinger, 1999; Martin & Debus, 1998; Skaalvik, 1997a; and Skaalvik, Valas, & Sletta, 1994; for some exceptions to this generalisation). Of these studies, most have been limited to an investigation of mastery and performance goals with self-concept. Within this context, the purpose of the present study was to build upon this previous work by providing a measurement framework within which the interaction of multiple goals and domain specific self-concepts may be examined simultaneously.

The nature of students' academic motivation may not be uniform across different points in time (Bong, 1996). To determine whether motivation and self-concept change across time, a longitudinal design has been implemented. Importantly, we planned to assess the stability of goals and self-concept using three waves of data.

Specifically, we wished to examine whether multiple goals (mastery, performance and social) represent three distinct goals. We also wished to examine whether academic self-concept could be represented in two specific domains (i.e., English and maths). Additionally, students' achievement data were included in the analysis to examine the stability over three waves. Exploring correlations between the multiple first-order factors provided the opportunity to demonstrate the multidimensionality of goals and academic self-concept and their stability over three waves of data.

Method

Participants

Participants in the study were 1 001 secondary school students in Years 7, 8 and 9 in the first year of data collection, which took place in November 2000. The second data collection took place one academic year later when the students attended Years 8, 9, and 10. In the final year of data collection, students were in Years 9, 10, and 11. The participants were from eleven high schools broadly representative of school settings in New South Wales, Australia. 52% (n = 521) of these students were female and 48% (n = 480)

were males, with the mean age of students at Time 1 being 13.10 years, Time 2 being 14.20 years and at Time 3 15.2 years.

Measures

Academic Self-Description Questionnaire

Recent research on the multidimensionality of self-concept focuses on domain-specific self-concepts (Lau, Yeung, Jin & Low, 1999). Marsh's (1989) Self-Description Questionnaire (SDQ) measures students' self-concept in a variety of non-academic and academic domains. The SDQ comprises seven non-academic scales (e.g., physical appearance and physical ability) and three academic scales (e.g., maths, verbal and general school). Marsh and colleagues (Marsh, 1989; Marsh, Relich, & Smith, 1983) designed the Self-Description Questionnaire II in order to examine adolescents' multidimensional self-concept between the ages of 12 and 12 years (Gonzalez-Pienda et al., 2002). Based on the SDQ II, Marsh (1990) developed the Academic Self-Description Questionnaire II. The ASDQ II examines academic self-concepts in specific domains. Two scales from the ASDQ II were adopted for the purposes of this study. Five items measured English self-concept (eg. "I am good at English.") and 5 items measured math self-concept (eg. "I am good at maths."). These items, their numerical identifiers, and their alpha estimates of reliability at both Time 1 and Time 2, are recorded in Table 1. Students responded to the items in Table 1 on a five-point likert scale ranging from "strongly disagree" to "strongly agree".

Table 1

ASDQ II Items

English Self-concept Items	**(T1: α = . 87; T2: α = .88; T3: α = .89)**
ENGLSC1	I am good at English
ENGLSC2	I have always been good at English
ENGLSC3	Work in English is easy for me
ENGLSC4	I get good marks in English
ENGLSC5	I learn things quickly in English
Maths Self-concept Items	**(T1: α = .91; T2: α =.92; T3: α = .92)**
MATHSC6	I am good a mathematics
MATHSC7	I have always been good at mathematics
MATHSC8	Work in mathematics is easy for me
MATHSC9	I get good grades marks in mathematics
MATHSC10	I learn things quickly in mathematics

Note: Numbers in brackets refer to Cronbach's alpha reliability for each scale at Time 1 and Time 2.

General Achievement Goal Orientation Scale

The nature of students' motivation was evaluated using the General Achievement Goal Orientation Scale (GAGOS) developed by McInerney (1997). Constructed from McInerney's Inventory School Motivation (ISM) instrument (McInerney & Sinclair, 1991, 1992) and influenced by Maehr's Personal Investment Model (PIM) (Maehr, 1984; Maehr & Braskamp, 1986), the GAGOS has demonstrated sound psychometric properties (Barker, McInerney, & Dowson, 2002; Barker, McInerney, & Dowson, 2003; Barker, Dowson & McInerney, 2004).

The GAGOS measures three general goal orientations (General Mastery, General Performance and General Social). Each of the three general orientations subsume at least two components. General Mastery subsumes task involvement (e.g., I am most motivated when I am good at something), and effort (e.g., I am most motivated when I see my work improving). General Performance subsumes competitiveness (e.g.,. I am most motivated when I am doing better than others), power (e.g., I am most motivated when I am noticed by others), competition (e.g., I am most motivated when I am doing better than others) and extrinsic motivation (e.g., I am most motivated when I get a good mark). General Social subsumes affiliation (e.g., I am most motivated when I work with others), and social concern (e.g., I am most motivated when I am helping others). Rather than inferring motivation, as is the approach in the ISM, the GAGOS intentionally denotes the term "motivated" at the beginning of each item stem (i.e., I am most motivated when…). Respondents subsequently acknowledged whether they were most motivated in a mastery, performance or social goal situation.

The GAGOS comprises five items measuring General Mastery, eight items measuring General Performance, and five items measuring General Social orientation. These items, their numerical identifiers, and their alpha estimates of reliability at both Time 1 and Time 2 are recorded in Table 2. As with items from the ASDQ II, students responded to the items in Table 2 on a five-point likert scale ranging from "strongly disagree" to "strongly agree".

Table 2.

Achievement Motivation Items

Mastery Goal	**(T1: α = .77; T2: α = .75; T3: α = .76)**
A27MAG	I am most motivated when I see my work improve
A32MAG	I am most motivated when I am good at something
A37MAG	I am most motivated when I solve a problem
A42MAG	I am most motivated when I am becoming better at my work
A50MAG	I am most motivated when I am confident that I can do my schoolwork
Performance Goal	**(T1: α = .82; T2: α = .82; T3: α = .81)**
A58PERG	I am most motivated when get a reward
A62PERG	I am most motivated when I get good marks

A72PERG	I am most motivated when I am noticed by others
A78PERG	I am most motivated when I am competing with others
A83PERG	I am most motivated when I am in charge of a group
A90PERG	I am most motivated when I am praised
A95PERG	I am most motivated when I am doing better than others
A98PERG	I am most motivated when I become a leader
Social Goal	**(T1: α = .75; T2: α = .75; T3: α = .74)**
A35SOCG	I am most motivated when I work with others
A55SOCG	I am most motivated when I am in a group
A67SOCG	I am most motivated when I work with friends at school
A101SOCG	I am most motivated when I am helping others
A108SOCG	I am most motivated when I am showing concern for others

Note: Numbers in brackets refer to Cronbach's alpha reliability for each scale at Time 1 and Time 2.

Procedure

The items listed in Tables 1 and 2 were combined with additional items comprising the ISM, and randomly ordered among 114 items forming a single survey instrument. A standardised explanation of the purpose of the survey was provided for participants before each administration. The term motivated was defined for all participants to ensure their understanding of the term. The questionnaire was then read aloud to the students in order to (a) ensure that most participants completed the survey within the time allotted, (b) overcome reading and language difficulties of some students, (c) ensure consistency in administration procedures from school to school and (d) assist students with learning difficulties. At each session there were at least two research assistants present to assist students to complete the survey. The same questionnaire and procedure was followed for both waves of data collection. The first wave of data was collected in November 2001, and the second wave in November 2002.

Analyses

Confirmatory Factor Analyses (CFAs: e.g., Hau, Kong & Marsh, 2000; Kaplan, 2000) using LISREL and Reliability Analyses using SPSS (Pedhazur & Pedazur-Schmelkin, 1991) were used to determine the psychometric properties of the combined GAGOS and ASDQ II scales at Time 1, Time 2 and Time 3, for the full sample. The CFAs proceeded in two phases. Phase one used a quasi-confirmatory approach, explained below, to determine the best fitting model by deleting poorly fitting items. Phase two comprised combining best fitting items for the three goals (mastery, performance and social goals) and two academic self-concepts

(English and Maths) combined with English and maths ranks. Therefore a CFA was performed on a seven variable three-wave model (3W7V).

Phase 1 CFAs

Four first-order nested models were tested in a structured approach to determine the properties of the combined scales. These models were:

(a) Model 1 (M1): the null (no factor) model for the full set of 28 items at Time 1.

(b) Model 2 (M2): the hypothesised (five factor) model for the full set of 28 items at Time 1.

(c) Model 3 (M3): the null model with the six poorly fitting items from M2 deleted at Time 1.

(d) Model 4 (M4): the hypothesised (five factor) model with the revised set of 22 items at Time 1.

Phase 2 CFAs

The second phase was a large CFA that comprised seven variables (mastery goals, performance goals, social goals, English self-concept, maths self-concept, English ranks, and maths ranks) at three time waves. This was to determine the multidimensional structure of goals and self-concept and to assess the stability of the solutions over the three waves of data collection. The model examined was:

(a) Model 5 (M5): the null model with 3W7V.

(b) Model 6 (M6): the hypothesised model with 3W7V.

Strict Confirmability

Although CFAs are labelled "Confirmatory", typically CFA researchers do not test one model alone (a strictly confirmatory approach), but often make post-hoc adjustments to models in order to make models fit sample data better. Thus, many CFA studies are really quasi-confirmatory, or even outright exploratory (Byrne, 1998). In the present study we followed this quasi-confirmatory approach for the first wave of data. However, for the second and third waves of data we followed a strictly confirmatory approach. Thus, both the first-order model for Time 1 to Time 3 tested a 22 item model (albeit generated with the first wave of data) without modification. This strictly confirmatory approach is a feature of the present study, and represents a strong test of the factorial structure of the instrument.

Evaluating Model Fit

The indices used to assess the fit of models in this study were the Chi-square/degrees of freedom ratio, the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), the parsimony Relative Non-centrality Index (PRNI) and the Root Mean Square Error of Approximation (RMSEA) (Byrne, 1998).

The CFI, TLI and the PRNI both compare a null model with a hypothesised model. In a null model all variables are typically specified to be uncorrelated, that is, no relationship between the variables is specified (Kelloway, 1998). Null models serve as a valuable baseline for comparing alternative models that imply specified covariances between the observed variables (Byrne, 1998). The CFI, TLI and PRNI should ideally be greater than 0.95, although values greater than 0.90 indicate acceptable fit (Marsh, Balla, & Hau, 1996). In the present study, these indices were computed using formulae given in Marsh et al. (1996).

The RMSEA takes into account an error of approximation in the implied population covariance matrix, thus relaxing the stringent requirement in the Chi-square/degrees of freedom statistic that the model

holds exactly in the population. The RMSEA should ideally be less than 0.05. However, values between 0.05 and 0.08 indicate reasonable fit (Byrne, 1998; Diamantopoulos & Siguaw, 2000).

Testing Nested Models

Where CFA (and other types of) models are 'nested' i.e. one model (the 'child' model) contains a sub-set of variables in another model (the 'parent' model), a Chi-square difference test ($\Delta\chi^2$) between the two models may be computed (see Marsh, Dowson, Pietsch, & Walker, in press). This test is conducted by subtracting the Chi-square and associated degrees of freedom for the child model from the Chi-square and associated degrees of freedom for the parent model. The remaining Chi-square value (compared against the remaining degrees of freedom) acts as measure of how much better the child model fits to the parent model. Where this difference is significant, the child model can be said to fit the data better than the parent model. The $\Delta\chi^2$ test can be used to test models at the same level (e.g. nested first-order models).

Results

Reliability

Results from the reliability estimates are reported in Tables 1 and 2. Reliability estimates for the scales ranged from .77 to .91 for T1, .75 to .92 for T2 and .74 to .92 for T3. The analyses indicate the ASDQ items had generally higher reliability than the GAGOS scales (.87 to .92 for the ASDQ scales compared to .74 to .82 for the GAGOS scales). Nevertheless, the lowest reliability of any scale at any Time was .74, suggesting that the scales as a whole demonstrated substantial reliability.

Model Fit

Overall results for the goodness-of-fit of the first order models are presented in Tables 3 and 4. All hypothesised models considered in this study converged to proper solutions.

Table 3

First-Order Model Fit Statistics

Model	χ^2	df	χ^2/df	TLI	CFI	PRNI	RMSEA	Model Description
								First-Order Models
M1	21227.38	378	56.16					Null model T1 (28 items)
M2	2050.12	340	6.02	0.92	0.93	0.82	0.07	Hypothesised model T1
M3	11433.01	231	49.49					Null model T1 (1W5V 22 items)
M4	681.81	199	3.43	0.96	0.97	0.82	0.05	Hypothesised model T1 (1W5V 22 items)
M5	84809.27	2556	33.18					Null model 3W7V
M6	6696.23	2219	3.02	0.94	0.94	0.80	0.05	Hypothesised model 3W7V

Note:

For both Tables 3 and 4: TLI = Tucker-Lewis Index; CFI = Comparative non-centrality Index; PRNI = Parsimony Relative Non-centrality Index; RMSEA = Root Mean Square Error Approximation. A null model is a model that specifies no relationship between the variables composing the model. The null model is used as a baseline to compare the hypothesised model (a model in which the relationship between variables has been specified) in both the TLI and PRNI.

$$\text{TLI} = \frac{[\text{Chi-square/degrees of freedom (null model)}] - [\text{Chi-square/degrees of freedom (hypothesised model)}]}{\text{Chi-square/(degrees of freedom} - 1)\text{ (null model)}}$$

$$\text{PRNI} = \frac{[\text{Chi-square} - \text{degrees of freedom (null model)}] - [\text{Chi-square} - \text{degrees of freedom (hypothesised model}]}{\text{Chi-square} - (\text{degrees of freedom} - 1\text{ (null model)}}$$

$$\text{RMSEA} = \text{Square Root}\ [\ (\text{Chi-square} - \text{degrees of freedom})\ (n - 1)\ \text{degrees of freedom}]$$

Table 4

First-Order Factor Solutions Time 1 to Time 3 for 3W7V

		Factor Loadings		
Variables	Items	Time 1	Time 2	Time 3
Mastery				
	MAG27	.51	.52	.53
	MAG32	.50	.50	.45
	MAG42	.50	.58	.60
	MAG50	.50	.48	.59
Performance				
	PERG72	.68	.69	.63
	PERG78	.70	.72	.84
	PERG83	.65	.63	.55
	PERG95	.82	.78	.78
Social				
	SOCG35	.67	.60	.80
	SOCG55	.89	.87	.90
	SOCG67	.76	.85	.85
	SOCG101	.37	.31	.29
English Self-concept				
	ENGSC1	.76	.81	.85
	ENGSC2	.74	.77	.82

	ENGSC3	.70	.67	.82
	ENGSC4	.77	.78	.82
	ENGSC5	.71	.70	.85
Math Self-concept				
	MATHSC1	.93	.90	.83
	MATHSC2	.91	.94	.87
	MATHSC3	.85	.87	.86
	MATHSC4	.87	.88	.87
	MATHSC5	.86	.88	.87
English Ranks				
	ENG	.91	.94	.95
Math Ranks				
	MATH	.78	.89	.95

Factor Structure of Achievement Goals and Academic Self-concept.

Model 2 (M2) tested the hypothesis that the 28 initial items loaded on five factors. The fit for this model did not reach criterion values. As a result, six poorly fitting items (i.e. items with low factor loadings, high uniquenesses, and relatively high modification indices) were removed from Model 2 (M2). These items were A37MAG, A58PERG, A62PERG, A90PERG, A98PERG, and A108SOCG.

It is important to provide potential theoretical explanations for why the items above were deleted. The fact that A37MAG proved problematic could be attributed to the fact that the remaining four items relate to competence and feelings associated with increasing competence i.e., improving, being good at something, becoming better and being confident. In contrast, A37MAG is a more negatively phrased item that relates to solving a problem. Three of the four deleted performance goal items (A58PERG, A62PERG, A90PERG) relate to the extrinsic component of the General Performance orientation. It appears that the extrinsic component in this study doesn't relate to power, performance and competition. The item A98PERG focuses on the importance of becoming a leader. This item may have been interpreted as a social reason for engaging in the task rather than a component related to power. The social concern item A108SOCG may have been misinterpreted by participants as they may not have understood the term, "showing concern for others". The item may, thus, be open to varying interpretations as to how one actually demonstrates "concern".

The resulting model (Model 4) was tested with the same constraints as M2 i.e. the remaining items loading on their same 'target' factors, with no cross-loadings allowed. M4 showed a better fit to the data than M2. Unlike M2, M4's RMSEA is substantially less than M2's. The TLI for M4 is above 0.95, and substantially higher than that for M2. Thus, removing the six poorly fitting items from the original hypothesised model led to improved overall model fit. In order to assess whether M4 was a *significantly* improved overall fit to the data than M2, $\Delta\chi^2$ for the difference between the two models was computed. $\Delta\chi^2$

for this comparison was 1436.24 with 141 degrees of freedom. This difference is significant, indicating that M4 represents a significant improvement in fit over M2.

The revised model (M4) was then tested to fit three waves of data with the addition of English and maths achievement (M6). M6 also fitted the data well, with fit indices being essentially comparable to that for M4. These results support the convergent and discriminant validity of the measures, and indicate support for the multidimensionality of both achievement goals and academic self-concept for three waves of data.

Discussion

This study aimed to unify two big theories in an attempt to provide for a comprehensive model of student motivation. Phase one determined the best fitting items. Phase two used the best fitting items for three waves of data concerning goals and self-concept to examine the multidimensional nature of achievement motivation and academic self-concept. The CFA for phase two also comprised achievement data in the domains of English and maths. Findings of the 3W7V model are discussed below.

First-Order Models and the Multidimensionality of Goals and Self-Concept

The first-order modelling process for the sample as a whole demonstrated that the modified 22-item model was a good fit for the data at Time 1 (M4). Achievement data (English and maths ranks) were then added to the best 22-items from the GAGOS and ASDQII to determine the models fit over three waves. The 3W7V model also demonstrated a good fit to the data (M6). This demonstrated that the achievement data along with the combined GAGOS and ASDQ II reliably and validly measured student's multiple mastery, performance & social goals, English & mathematics self-concept, and English and maths achievement (ie. 3W7V) in the context of the one instrument for Time 1, Time 2 and Time 3 therefore providing support for stability. In summary, the results suggests that that the multidimensional model was a good representation of the data at all three waves.

The findings lend support to the theoretical argument that goals and self-concept should be viewed as multi- rather than uni-dimensional constructs. Results of this study are, thus, congruent with other theoretical (e.g. Urdan and Maehr, 1995) qualitative (e.g. Dowson & McInerney, 2001, 2003) and quantitative studies (e.g. McInerney et al., 2003; McInerney et al., 1997), which also support the multidimensionality of students' goals. In particular, the models in this study worked well with the inclusion of social goals as a first-order construct and with the inclusion of achievement data. This, consistent with other studies (e.g. Dowson & McInerney, 2003), suggests that social goals in addition to academic (mastery and performance) goals are important for students in educational settings. For these reasons, the study provides a measurement framework within which the interaction of multiple goal orientations and self-concept variables may be examined further.

Conclusion

Findings from this research provides support for the combined first-order model of academic achievement motivation and academic self-concept and demonstrates its stability over three time points. Future researchers may consider developing a more unified model of students' motivation by acknowledging the academic self-concept- goal theory linkage.

About the Authors:

Ms Katrina L. Barker is interested in researching student achievement motivation and completed an Honours thesis that examined the effects of motivational approaches on the recall of verbal information processed at deep and shallow levels. Her PhD extends on current research as academic achievement motivation is added to academic self-concept and academic achievement to explore the vexing question of the causal relations between variables.
Email: k.barker@uws.edu.au

Associate Professor Martin Dowson has a major research interest in the causal relations between students' strategy use, motivational orientations, and cognitive processes and, in particular, the effects of these relations on students' academic achievement outcomes. He is experienced in both qualitative and quantitative research methods.
Email: mdowson@unisurf.com.au

Professor Dennis M. McInerney has a major research interest in student motivation from a cross-cultural perspective. In particular, Dennis validates methodologies and instruments for use in multiethnic settings. His work can be found in reputable national and international journals.
Email: d.mcinerney@uws.edu.au

Contact Details

Katrina Barker
Associate Lecturer
School of Education and Early Childhood Studies
University of Sydney
Locked Bag 1797
Penrith South D.C. 1797
Sydney NSW
Australia
Email: k.barker@uws.edu.au
Phone: 9772 6243
Fax: 9772 6738

References

Ames, C. (1992). Classrooms: Goals, structures and student motivation. Journal of Educational Psychology, 84, 261-271.

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Student learning strategies and achievement motivation. Journal of Educational Psychology, 18, 261-271.

Anderman, E.M., Anderman, L.H., & Griesinger, T. (1999). The relation of present and possible academic selves during early adolescence to grade point average and achievement goals. The Elementary School Journal, 100, (1), 3-17.

Barker, K.L, McInerney, D.M., & Dowson, M. (2002). Toward a model of achievement motivation and self-concept. Paper presented at the 2nd International Biennial Conference, University of Western Sydney, Sydney, Australia, 6-8 August.

Barker, K.L., McInerney, D.M., & Dowson, M. (2003). Toward a model of achievement motivation and academic achievement self-concept: Longitudinal analysis. Paper presented at the annual meeting of the American Educational Research Association, Chicago.

Barker, K.L., Dowson, M. & McInerney, D.M. (2004). Evolvement of students' goals and academic self-concept: A multidimensional and hierarchical conceptualisation. Paper presented at The Australian Association for Research in Education, Melbourne, 28-2 December.

Barron, K. E., & Harackiewicz, J.M. (2001). Achievement goals and optimal motivation: Testing multiple goal models. Journal of Personality and Social Psychology, 80, 706-722.

Bempechat, J., & Boulay, B.A. (2001). Beyond dichotomous characterisations of student learning: New directions in achievement motivation research. In D.M. McInerney & S. Van Etten (Eds.), Research on sociocultural influences on motivation and learning (pp. 17-36). Greenwich, CT: Information Age Press.

Bong, M. (1996). Problems in academic motivation research and advantages and disadvantages of their solutions. Contemporary Educational Psychology, 21, 149-165.

Bouffard T., Vezeau, C., & Bordeleau, L. (1998). A development study of the relation between combined learning and performance goals and students' self-regulated learning. British Journal of Educational Psychology, 68, 309-318.

Byrne, B.M. (1996). Measuring self-concept across the lifespan: Issues and instrumentation. Washington DC: American Psychological Association.

Byrne, B.M. (1998). Structural equation modeling with LISREL, PRELIS, and SIMPLIS: Basic concepts, applications, and programming. Mahwah, New Jersey:Lawrence Erlbaum Associates, Publishers

Delugach, R.R., Bracken, B.A., Bracken, M.J., & Schicke, M.C. Self-concept: Multidimensional construct exploration. Psychology in the Schools, 28, 213-223.

Diamantopoulos, A., & Siguaw, J.A. (2000). Introducing LISREL. London: SAGE Publications.

Dowson, M., & McInerney, D.M. (2001). Psychological parameters of students' social and work avoidance goals: A qualitative investigation. Journal of Educational Psychology, 93(1), 35-42.

Dowson, M., & McInerney, D.M. (2003). What do students say about their motivational goals?: Towards a more complex and dynamic perspective on student motivation. Contemporary Educational Psychology, 28, 91-113.

Dweck, C.S, & Bempechat, J. (1983). Children's theories of intelligence: Consequences for learning. In S.G., Paris, G., Olsen, & H., Stevenson (Eds.). Learning and motivation in the classroom. Hillsdale, NJ: Erlbaum.

Dweck, C.S., & Leggett, E.L., (1988). A social-cognitive approach to motivation and personality. Psychological Review, 95, 256-273.

D'Ydewalle, G. (1987). Is it still worthwhile to investigate the impact of motivation on learning? In E.De Corte, H. Lodewijks, R. Parmentier, & P. Span (Eds.). Learning and instruction: European research in an international context. Oxford: Pergamon Press.

Elliot, A.J., & Church, M.A. (1997). A hierarchical model of approach and avoidance achievement motivation. Journal of Personality and Social Psychology, 72, 212-232.

Elliot, E.S., & Dweck, C.S. (1988). Goal: An approach to motivation and achievement. Journal of Personality and Social Psychology, 54, 5-12.

Gonzalez-Pienda, J.A., Nunez, J.C., Gonzalez-Pumariega, S., Alvarez, L., Roces, C., & Garcia, M. (2002). A structural equation model of parental involvement, motivational and aptitudinal characteristics, and academic achievement. (measurement, statistics, and research design). The Journal of Experimental Education, 70, (3), 257-288.

Harackiewicz, J.M., Barron, K.E., & Elliot, A.J. (1998). Rethinking achievement goals: When are they adaptive for college students and why? Educational Psychologist, 33, 1-21.

Harackiewicz, J. M., Barron, K.E., Tauer, J.M., Carter, S.M. & Elliot, A.J. (2000). Revision of achievement goal theory: Necessary and illuminating. Journal of Educational Psychology, 92, 316-330.

Harackiewicz, J.M., Barron, K.E., Pintrich, P.R., Elliot, A.J. & Thrash, T.M. (2002). Revision of achievement goal theory: Necessary and illuminating. Journal of Educational Psychology, 94, 638-645.

Hau, K.T., Kong, C.K., & Marsh, H.W. (2000). Extension of the internal/external frame of reference model of self-concept formation: Importance of native and normative languages for Chinese students. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans.

Johnsson-Smaragdi, U., & Josson, A. (1995). Self-evaluation in an exolgoical perspective: Neighbourhood, family and peers, schooling and media use. In K.E. Rosengren (Eds.). Media effects and beyond: Culture, socialisation and lifestyles. London: Routledge.

Kaplan, D. (2000). Structural equation modeling. In J. Leeuw, & R. Berk (Eds.). Advances quantitative techniques in the social sciences. Thousand Oaks: Sage Publications.

Kaplan, A., & Maehr, M. (1999). Achievement goals and student wellbeing. Contemporary Educational Psychology, 24, 330-358.

Kelloway, K.E. (1998). Using LISREL for structural equation modeling. Thousand Oaks: SAGE Publications.

Lepper, M., & Greene, D. (1978). The hidden costs of reward. Hillsdale, NJ: Erlbaum.

Linnenbrink, E. A., & Pintrich, P.R. (2000). Multiple pathways to learning and achievement: The role of goal orientation in fostering adaptive motivation, affect, and cognition. In S.C. Sansone. & J. M. Harackiewicz (Eds.), Intrinsic and extrinsic motivation: The search for optimal motivation and performance. New York: Academic Press.

Loehlin, J.C. (1998). Latent variable models. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.

Maehr, M.L. (1984). Meaning and motivation. Toward a theory of personal investment. In R. Ames & C. Ames (Eds.), Research on motivation in education: Student motivation. (pp. 115-144). Orlando: Academic Press

Maehr, M.L., & Braskamp, L.A (1986). The motivation factor: A theory of personal investment. Lexington MA: Lexington

Marsh, H.W. (1989). Age and sex effects in multiple dimensions of self-concept: Preadolescence to early childhood. Journal of Educational Psychology, 81, 417-430.

Marsh, H. W. (1990). The structure of academic self-concept: The Marsh/Shavelson model. Journal of Educational Psychology, 82, 623-636.

Marsh, H.W. (1992). Content specificity of relations between academic achievement and academic self-concept. Journal of Educational Psychology, 84, (1), 35-42.

Marsh, H. W. (1994). Using the National Educational Longitudinal Study of 1988 to evaluate theoretical models of self-concept: The Self-Description Questionnaire. Journal of Educational Psychology, 86, 439-456.

Marsh, H. W. (1996). Positive and negative global self-esteem: A substantively meaningful distinction or artifactors? Journal of Personality & Social Psychology, 70,810-819.

Marsh, H.W., Balla, J.R., & Hau, K. (1996). An evaluation of incremental fit indices: A clarification of mathematical and empirical properties. In G.A. Marcoulides, & R.E. Schumacker (Eds.). Advanced structural equation modelling: Issues and techniques. Mahwah, NJ: Lawrence Erlbaum

Marsh, H.W., & Craven, R. (1997). Academic self-concept: Beyond the dustbowl. Handbook of classroom assessment: Learning, achievement, and adjustment. Orlando, FL: Academic Press.

Marsh, H.W., Relich, J.D., & Smith, I.D. (1983). Self-concept: The construct validity of interpretations based upon the SDQ. Journal of Personality and Social Psychology, 45, 173-127.

Marsh, H. W., & Yeung, A. S. (1998). Longitudinal structural equation models of academic self-concept and achievement: Gender differences in the development of math and English constructs. American Journal of Educational Research, 35, (4), 705-738.

Martin, A.J. & Debus, R.L. (1998). Self-reports of mathematics self-concept and educational outcomes: the roles of ego-dimensions and self-consciousness. British Journal of Educational Psychology, 68, 517-535.

McInerney, D. M. (1997). Relationship between motivational goals, sense of self, self-concept and academic achievement for Aboriginal students. 10th Annual Aboriginal Studies Association Conference, University of Western Sydney, Bankstown Campus, Milperra, 12-14 July, 2000.

McInerney, D. M., Marsh, H.W., & Yeung, A.S. (2003). Toward a hierarchical goal theory model of school motivation. Journal of Applied Measurement, 4, 26-51.

McInerney, D. M., Roche, L.A., McInerney, V., & Marsh, H.W. (1997). Cultural perspectives on school motivation: The relevance and application of goal theory. American Educational Research Journal, 34(1), 207-236.

McInerney, D.M. & Sinclair, K.E. (1991). Cross-cultural model testing: Inventory of School Motivation. Educational and Psychological Measurement, 51, 123-133.

Middleton, M., & Midgley, C. (1997). Avoiding the demonstration of lack of ability: An under-explored aspect of goal theory. Journal of Educational Psychology, 89, 710-118.

Mueller, R. O. (1996). Basic principles of structural equation modelling. New York: Springer-Verlag.

Nicholls, J. (1984). Conceptions of ability and achievement motivation. In R. Ames & C. Ames (Eds.). Research on motivation in education. New York: Academic Press.

Pedhazur, E.J., & Pedazur-Schmelkin, L. (1991). Measurement, design, and analysis: An integrated approach. Hillsdale, NJ: Lawrence Erlbaum.

Pintrich, P. R. (2000). Multiple goals, multiple pathways: The role of goal orientation in learning and achievement. Journal of Educational Psychology, 92, 544-555.

Pintrich, P.R., & De Groot, E. (1990). Motivational and self-regulated learning components of classroom academic performance. Journal of Educational Psychology, 82, 33-40.

Pintrich, P.R., & Schrauben, (1992). Student's motivational beliefs and their cognitive engagement in classroom academic tasks. In D.H., Schunk, & J.L. Meece (Eds.). Student perceptions in the classroom : Cause or consequence. Hillsdale, NJ: Lawrence Erlbaum.

Purkey, W.W. (1970). Self-concept and school achievement. New York: Prentice Hall.

Rose, S.C, & Thornburg, K.R. (1984). Mastery motivation and need for approval in young children: Effects of age, sex, and reinforcement condition. Educational Research Quarterly, 9, 34-42.

Shavelson, R.J., Hubner, J.J., & Stanton, G.C. (1976). Self-concept: Validation of construct interpretations. Review of Educational Research, 46, 3, 407-441.

Skaalvik, E.M. (1990). Gender differences in general academic self-esteem and in success expectations on defined academic problems. Journal of Educational Psychology, 82, 593-598.

Skaalvik, E.M. (1997a). Issues in research on self-concept, In M. Maehr & P. Pintrich (Eds.), Advances in motivation and achievement (Vol. 10, pp. 51-97). Greenwich, CT: JAI Press.

Skaalvik, E.M. (1997b). Self-enhancing and self-defeating ego orientation: Relations with task and avoidance orientation, achievement, self-perceptions, and anxiety. Journal of Educational Psychology, 89, 408-422.

Skaalvik, E. M., & Valas, H. (1999). Relations among achievement, self-concept, and motivation in mathematics and language arts: A longitudinal study. The Journal of Experimental Education, 67, 135-146.

Skaalvik, E. M., Valas, H., & Sletta, O. (1994). Task involvement and ego involvement: Relations with academic achievement, academic self-concept and self-esteem. Scandinavian Journal of Educational Research, 38, 231-243.

Urdan, T. C. (1997). Achievement goal theory: Past results, future directions (Vol. 10). Greenwich CT: JAI Press Inc.

Urdan, T. C., & Maehr, M. L.(1995). Beyond a two-goal theory of motivation and achievement: a case for social goals. Review of Educational Research, 65, 213-244.

Weiner, B. (1986). An attributional theory of motivation and emotion. New York: Pringer-Verlag.

Weiner, B. (1990). History of motivational research in education. Journal of Educational Psycholgoy, 82, 616-622.

Wigfield, A., & Karpathian, M. (1991). Who am I and what can I do? Children's self-concepts and motivation in achievement situations. Educational Psychologist, 26, 233-261.

Yeung, A. S., Chui, H.S., & Lau, I.C. (1999). Hierarchical and multidimensional academic self-concept of commercial students. Contemporary Educational Psychology, 24, 376-389.

Zusho, A., & Pintrich, P. (2001). Motivation in the second decade of life. In T.C. Urdan, & F, Pajares (Eds.), Adolescence and education. USA: Information Age Publishing.