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ABSTRACT

Motivation orientation research consistently finds two factors, Performance and Learning, that overlap substantially with other factors coming from different theoretical perspectives of motivation. Similar to related work in the Big-Five Theory of Personality, researchers posited a Big-Two-Factor Theory of motivation orientation and evaluated the implicit assumption that selected motivation constructs can be represented as higher-order Performance and Learning factors. They collected test-retest data (multi-item scales designed to measure eight motivational constructs) from elementary school students. Confirmatory factor analyses (CFAs) provided good support for each of the eight scales. Higher order CFA models fit the data reasonably well for each time considered separately and the well-defined, higher-order Learning and Performance factors. For combined pretest/posttest data, the substantial test-retest correlations for first-order factors were not adequately explained by higher order factors. A multi-cohort, multi-occasion analysis of mean differences showed strictly linear declines that were smaller for Learning-related scales than Performance-related scales. While results supported the Big-Two-Factor Theory, there was considerable variance in each of the eight scales that was reliable at any one time and stable over time but unexplained by the higher-order factors. (Contains 72 references.) (SM)

Evaluation of the Big-Two-Factor Theory of Motivation Orientations: An Evaluation of Jingle-Jangle Fallacies

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Abstract

Motivation orientation research has consistently found two factors, typically called Performance (or Ego) and Learning (or Mastery or Task), that appear to overlap substantially with other factors coming from different theoretical perspectives of motivation. Similar to related work in the Big-Five Theory of Personality, we posit a Big-Two-Factor Theory of motivation orientation and evaluate the implicit but largely untested assumption that selected motivation constructs can be represented as higher-order Performance and Learning factors. We collected test-retest data (multi-item scales designed to measure 8 motivational constructs – Ego, Competitive, Mastery, Intrinsic, Cooperation, Individual, Achieve Success, and Avoid Failure) from a diverse group (N = 606) of able students in grades 3-6 (M age = 9.7 years). Confirmatory factor analyses (CFAs) provided good support for each of the 8 scales. Higher-order CFA models fit the data reasonably well for each time considered separately and the well-defined, higher-order Learning and Performance factors. For the combined T1 and T2 data, however, the substantial test-retest correlations for first-order factors were not adequately explained by the higher-order factors. A multi-cohort-multi-occasion analysis of mean differences showed strictly linear declines that were smaller for Learning-related scales than for Performance-related scales. Whereas the results support the Big-Two-Factor Theory, there was considerable variance in each of the 8 scales that was reliable at any one time and stable over time but unexplained by the higher-order factors, suggesting further scrutiny of assumptions underlying Big-Two-Factor Theory is needed.

The purpose of the present investigation is to describe what we refer to as the Big-Two-Factor Theory of motivation orientations. More specifically, we posit that these two motivation orientation constructs overlap so substantially with apparently similar motivation constructs that are derived from different theoretical perspectives, that it should be possible to represent these different factors as two higher-order factors. The rationale for the proposed research comes from an evaluation of the different theoretical perspectives of motivation, but also by way of analogy with what has become known as the "big five" theory of personality. Following a long, interrupted history leading to the big-five theory of personality (John, 1990; McCrae & Costa, 1987; Wiggins & Trapnell, 1997), particularly factor analytical research over the past two decades, provides convergence on five superdimensions of personality. An important goal of big-five theory is to provide an integration of the proliferation of personality traits, measures, and theoretical perspectives that have come from personality research. Thus, big five theory provides organization and a taxonomy for a diverse array of subordinate constructs and measures from a wide range of theoretical and methodological perspectives. Not underestimating the importance of this cumulative convergence for personality structure research, Wiggins and Trapnell (1997) argued that "the ultimate contribution of the Big Five model will be the increased opportunities it affords for communication among investigators of different theoretical persuasions in personality, social, and clinical psychology (p. 758). Similarly, in order to test the convergence and divergence of motivational orientation constructs and to facilitate communication between investigators, we propose and evaluate empirical and theoretical support for what we refer to as the Big-Two-Factor Theory of motivation orientations.

The starting point for our study is research into academic motivational orientations stemming largely from the work by Nichols and colleagues (Duda & Nicholls, 1992; Nicholls, 1984; 1989; Thorkildsen & Nicholls, 1998; also see Roberts, Treasure and Kavussanu, 1997; Marsh, 1994). Consistent with theory and a priori predictions, these researchers have consistently found support for two overarching orientations that they called task orientation and ego orientation. A number of reviews (Ames, 1992; Bong, 1996; Dweck, 1986; Lepper, 1988; Murphy and Alexander, 2000; Pintrich, 1994; Snow, Corno & Jackson, 1996), however, have emphasized that more or less parallel constructs have been developed from different theoretical perspectives. Thus, task orientation is defined similarly to intrinsic motivation as proposed by Deci and Ryan (1985) and others and to learning goals as proposed by Dweck (1975, 1986; Ryan & Deci, 2000) and others. Likewise, ego orientation is defined similarly to extrinsic motivation, as proposed by Deci and Ryan (1985; Ryan & Deci, 2000) and others and to performance goals as proposed by Dweck (1975, 1986) and others. Thus, for example, Ryan and Deci (2000) noted that ego involvement is a classic example of one form of extrinsic motivation. Following from the theoretical analysis by Lepper (1988), Snow et al. (1996) emphasized this "rare convergence" of three current models of motivational orientations demonstrates "considerable conceptual and empirical convergence on the nature and role of achievement goal orientations, even though the terminology differs" (p. 270). More generally, motivation research is beset with a proliferation of instruments assessing orientations with different names that may or may not represent different constructs (Murphy & Alexander, 2000; Pintrich, 2000). This is particularly problematic given that authors of research overviews (e.g. Lepper, 1988;Murphy and Alexander, 2000; Snow et al., 1996) have concluded that a number of motivational orientations with apparently different labels seem to be actually measuring the same constructs. There is also confusion as to how these various constructs are related. Hence, there is need for research like that proposed here in order to help integrate a loosely organised field of research.

In the present investigation we pursue this theoretical proposal, testing empirically the hypothesis that selected scales derived from a variety achievement motivation theories can be explained by two higher-order factors that we call learning orientation and performance orientation. It is important to emphasize that we are not claiming that these two global motivation constructs are inclusive of all motivation constructs and that we recognize that there are other motivational constructs (e.g., Murphy & Alexander, 2000) that cannot be fully incorporated into these two higher-order constructs. Rather, our purpose is to develop the proposal that selected key constructs from a diversity of motivational perspectives can be represented by these two higher-order constructs, to operationalize this proposal, and to test empirically this proposal with hierarchical confirmatory factor analysis (HCFA). As has been the case with big five personality theory, a primary contribution of a Big-Two-Factor Theory of motivation orientations would be the theoretical and empirical parsimony that results from a convergence of different theoretical models. Furthermore, the methodological approach that we implement in the present investigation should be useful to other areas of personality and social psychology research – including further research into big-five theory – where there are clusters of seemingly similar constructs used by different research groups that may need to be integrated.

Big Two-Factor Theory of Motivation Orientations

Based on theory, intuition, practice, and conceptual understanding – but a surprising lack of empirical support – diverse research programs have converged on two contrasting dispositional motivational orientations. These have been variously called learning, task, mastery and intrinsic orientations vs. ego-enhancement, competitive, performance, ability, and extrinsic orientations. In comparisons of these constructs, Lepper (1988) and Snow et al. (1996) emphasize the convergence in definitions of intrinsic vs. extrinsic motivation, task vs. ego orientations, and learning vs. performance goals. For present purposes – following Dweck and Leggett (1988; Heyman & Dweck, 1992) – we refer to these two superordinate constructs as Performance and Learning orientations.

Central to a Learning orientation is attention to the processes of successfully completing or mastering tasks, development of increased competency and knowledge, the endorsement of the intrinsic value of learning as an end in itself, the belief that appropriate effort will result in better academic performance, aiming to improve over time new or existing skills in relation to self-referenced standards, and focusing on the quality of involvement, intrinsic value, and long-term commitment to academic excellence. Central to a Performance orientation is a focus on social comparison processes in which the individual "beats" other students or attains success based on little effort, a desire to gain positive judgments and avoid negative judgments of one's competence, external evaluations of self, endorsement of the extrinsic value of performance as a means to a desired goal, and beliefs that ability is a relatively fixed attribute that cannot be altered by effort. Consistent with most achievement goal theories (e.g., Urdan, 1997), these orientations are thought to be reasonably stable dispositions about the way individuals perceive the broad purposes of behavior even though they can also be influenced by situational cues and classroom climates and may vary in relation to specific school subjects (Pintrich, 2000). The central question of this study is whether these two categories of motivational orientations can be represented adequately by two higher-order factors.

In reviewing the distinction between motivational orientations, Ames (1992) suggested that learning goals are reinforced when tasks are diverse, interesting, personally meaningful, challenging, and give students a sense of control. In her discussion of evaluation practices, Ames (1984, 1992) noted in particular the need to reduce social comparisons that may lead to unfavorable evaluations of ability and self-concept, avoidance of risk, and superficial learning strategies. Social comparisons are encouraged by frequent grades that rank-order students along a single continuum based on performances on the same task, making results public, and competitive learning environments that emphasize outperforming other students (also see Marshall & Weinstein, 1984). Covington (1992) argued that competition, even in moderation, reduces levels of academic achievement and so should be minimized as much as possible. Consistent with self-worth theory, competition encourages students to avoid failure rather than encouraging intrinsic task involvement, and threatens achievement at all levels of student ability. Johnson and Johnson (1985; also see Owens & Barnes, 1992; Owens & Straton, 1980) compared and contrasted cooperative, competitive and individualistic learning motivational orientations and structures that support these orientations. They concluded that cooperative learning orientations – compared to competitive and individualistic learning orientations – led to greater expectations of success, commitment to learning, intrinsic motivation, and incentive for achievement. Similarly, Ames and Felkner (1979) found that experimentally manipulated competitive and individualistic structures led to similar patterns of attributions that were different from those associated with cooperative structures. Ames (1984) subsequently reported, however, that when individual structures were not coupled with an extrinsic reward, they led to more learning-oriented outcomes.

Although there has been considerable conceptual convergence on Learning and Performance as the big-two factors in motivation orientation research, there has been considerable recent debate about the underlying meaning and implications of these two contrasting orientations (e.g., Duda & Nicholls, 1992; Harackiewicz, Barron, & Elliot, 1998; Maehr & Braskamp, 1986; McInerney, Roche, McInerney, & Marsh, 1997; Nicholls, 1984; 1989; Pintrich, 2000; Pintrich & Garcia, 1991; Thorkildsen & Nicholls, 1998; Urdan, 1997). At the basic measurement level, Urdan (1997) emphasized that whereas there was reasonable consistency in measures used by different researchers to infer a Learning orientation, there was considerable variation in the content of scales used to infer Performance orientations, some of which seemed to incorporate apparently distinct components into a single scale. Illustrating this concern in a sport context, Marsh (1994) factor analyzed responses to two different motivational instruments and found that whereas Mastery and Goal scales from the two instruments were highly related and reflected an underlying Learning orientation, the Competitive scale from one instrument reflected primarily a Performance orientation whereas the Competitive scale from the other instrument reflected more of a Learning orientation than a Performance ego orientation. Based on these results he warned researchers to beware of jingle (scales with the same name reflecting the same construct) and jangle (scales with different names reflecting different constructs) fallacies and to pursue construct validity studies more vigorously to test interpretations of the measures. Similarly, Heyman and Dweck (1992) warned researchers interested in relations between Learning and Performance motivation orientation and intrinsic and extrinsic motivation that they "need to take care that they are not measuring the same construct disguised in different scale names" (p. 243; i.e., a jangle fallacy). They suggested that a Learning or mastery orientation might actually reflect what is meant by intrinsic motivation in the broader sense, as shown by a content evaluation of several motivation instruments. Bong (1996) suggested that "many researchers are too quick to invent their own set of labels without carefully examining those found in the literature," indicating that "this cause what can be aptly called 'a conceptual mess' for those who try to draw a coherent whole out of the relevant literature" (p. 151). She arrgued that the appropriate application of structual equation modeling is needed evaluate the predictive, convergent, and discriminant validity of different motivation constructs and to use the results of such empirical tests to refine, revise, and reconstruct theoretical models of motivation.

Related to our concern about jingle-jangle fallacies, Murphy and Alexander (2000) suggested that "researchers in motivation may determine that similar terminology is being used to mark varied constructs or the same construct is being referenced by different language" (p. 5). In this review of terminology used in academic motivation research they argued, for example, that goal-orientation theorists use as more or less synonymous the terms mastery goal (Ames & Archer, 1988), learning goal (Dweck, 1986), and task or task-involved goal (Nicholls, 1984), as they do the terms performance goal (Dweck, 1986;) and ego or ego-involved goal (Nichols, 1984). Murphy and Alexander also distinguished between goal-orientation theorists who focus on reasons why individuals engage in a learning oriented activity that are the focus of the present investigation and those who focus on standards of performance (self-efficacy research). In their review, Murphy and Alexander emphasized the most motivation researchers defined any one motivation construct through reference to other motivation constructs so that "there is little true independence among achievement-motivation constructs. Instead, there is a great deal of interrelationship among them" (p. 40).

Initially, researchers had assumed that Learning and Performance factors were substantially negatively correlated (see Murphy & Alexander, 2000; Pintrich, 2000) or, even, that they represented bipolar opposites of a single underlying continuum (e.g., intrinsic vs. extrinsic motivation; mastery vs. performance goals). Thus, for example, in the intrinsic and extrinsic motivation literature, some measures (e.g., Harter, 1981b) were constructed to be ipsative. This forced respondents to select either an intrinsic or an extrinsic response to each item, so that the two constructs were bipolar opposites (i.e., perfectly negatively correlated) through the operationalization of her measure. Subsequently, Harter, Whitesell and Kowalski (1992, study 2; Harter, 1992) emphasized the potential problems in this approach and measured each construct independently. Reflecting this concern, Murphy and Alexander (2000; Pintrich, 2000) argued that it is unlikely that constructs such as intrinsic and extrinsic motivation and performance and learning orientations are dichotomies or bipolar opposites. In the motivational orientation and goal theory literatures, researchers have more recently argued that Learning and Performance orientations are essentially uncorrelated or even slightly positively correlated (see Elliot & Church, 1997; Harackiewicz et al., 1998; Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Kong & Hau, 1996; Nicholls, 1989).

Researchers have been very consistent in demonstrating the positive effects that come from a Learning orientation and environments that promote such orientations (e.g. Deci & Ryan, 1985; deCharms, 1968; Ryan and Deci, 2000). However, consistent with the findings of small positive correlations between the two orientations, recent research has also called into question the bipolar logic underlying the assumption that a Learning orientation is necessarily "good" whereas a Performance orientation is necessarily "bad." Urdan (1997), for example, concluded that whereas Learning orientations were consistently associated with desirable outcomes, there was not such a clear pattern for Performance orientations that are sometimes also associated with positive outcomes, albeit not as favorable as Learning orientations. He suggested that mixed results for Performance orientations may stem from measurement problems or may suggest that Performance orientations have different consequences for students who differ in academic ability, self-concept (also see Dweck, 1986), or, perhaps, age. Hence, these two motivational orientations need not be in conflict and particularly able or effective students may simultaneously hold both orientations and maximize their benefits by the strategic use of both orientations (Bouffard, Vezeau, & Bordeleau, 1998; Harackiewicz, et al. 1998; Heyman and Dweck, 1992; Pintrich, 2000; Pintrich & Garcia, 1991; Schunk & Swartz, 1993; also see Ainley, 1993; Dai, Moon, & Feldhusen, 1998). Research by Harackiewicz et al. and by Heyman and Dweck in particular indicates that successful students are able to coordinate Learning and Performance orientations in such a way that they complement each other. Hence, particularly for high-achieving students in our study, we anticipate that Learning and Performance orientations will be positively correlated.

A number of researchers (e.g., Elliot, 1997; Elliot & Harackiewicz, 1996; Harackiewicz et al., 1998; Skaalvik, 1997; also see Urdan, 1997) also argue that Performance orientations should be separately divided into approach (seeking to demonstrate more ability than others) and avoidance (fearful of being shown to be less able than others) strategies. Similarly, Skaalvik (1997) suggests that researchers need to distinguish between what he refers to as self-enhancing ego-orientations whereby students seek to demonstrate their academic ability and self-defeating ego-orientations whereby students seek to avoid demonstrating academic failure.

The growing support for the rationale underlying the Big-Two-Factor Theory of motivational orientation is based on an implicit, largely untested assumption that apparently similar constructs from different theoretical frameworks can be collapsed into two factors or, at least, represented as two higher-order (Learning and Performance) factors (e.g., Leeper, 1988; also see Snow, et al., 1996). Appropriate tests of this assumption require, for example, the construction of a well-defined set of different motivational scales to represent Learning and Performance orientations that are consistent with those used widely in motivational research. Confirmatory factor analysis (CFA) can then determine if the different scales posited to represent each of these broad motivational orientations can adequately be represented by two factors or, alternatively, whether relations among these factors can be explained in terms of two higher-order Learning and Performance factors. In pursuing this research we evaluate potential jingle-jangle fallacies and also heed calls for more careful attention to measurement, better definitions and operationalizations of motivational orientations, and a better understanding of the motivational orientations used in existing research. It is axiomatic that some potentially useful information in specific factors is lost when they are collapsed into a smaller number of factors or represented by a smaller number of higher-order factors. Balanced against this probable loss in specific information are likely gains in parsimony, increased understanding of the constructs comprising each of the more general constructs, and facilitation of communication among researchers through the use of a common terminology. Based on these potentially important outcomes, the overarching aim of this study is to pursue systematic tests of the fundamental assumption of the Big-Two-Factor Theory of motivational research. Importantly, either support or nonsupport of the Big-Two-Factor Theory will contribute to the understanding of the convergence and discrimination among widely used motivation constructs.

Despite the apparent convergence of constructs emphasized here, it can also be argued that these constructs come from such different theoretical perspectives that it might be inappropriate to combine them into two higher-order constructs. Thus, for example, theoretical perspectives on intrinsic and extrinsic motivation (Deci & Ryan, 1985; Harter, 1981b, 1992; Ryan & Deci, 2000) place more emphasis on underlying needs whereas motivational orientations and goal theory place more emphasis on what people are trying to do. Motivational orientation researchers ask participants about what makes people feel successful whereas those focusing on intrinsic/extrinsic motivation or learning/performance goals are more likely to ask about why participants undertake different activities. Also, items from the cooperative, competitive, and individualist orientations stem from a very different theoretical perspective that places more emphasis on preferences for different working or learning styles rather than motivational goals. From this counter-perspective, one could argue against the big-two-factor model posited here. Whereas we accept the legitimacy of these concerns, we argue that support for such an argument must be based on empirical research in which the responses to the various constructs are related to each other and to other constructs. To the extent that the various constructs have reliable variance that cannot be explained by the two higher-order factors and this reliable variance is systematically related to external criteria in a theoretically logical manner, then the Big-Two-Factor Theory should be rejected in favor of more specific constructs that are incorporated into the two higher-order factors. Our position is not that these apparent theoretical distinctions among the various constructs considered in our study should be ignored. Rather the importance of such distinctions needs to be evaluated by tests of their construct validity in empirical tests such as the present investigation

Age-related and Gender Differences in Motivational Orientations

Harter (1981b, 1992) was particularly concerned about developmental trends in which levels of intrinsic motivation declined during late primary and middle school. Eccles, Midgley, and Adler (1984) also reported a similar trend that they suggested was due to school environments becoming more impersonal, formal, evaluative and competitive. Wigfield and Eccles (2000), summarizing results from three large-scale, longitudinal studies, concluded that "children's ability-related beliefs and values became more negative in many ways as they grow older" (p. 77). Lepper, Sethi, Dialdin and Drake (1997) also reviewed early developmental research showing a systematic decline in intrinsic motivation and a corresponding increase in extrinsic motivation. They emphasized, however, that these two trends could not be differentiated when researchers used ipsative instruments in which intrinsic and extrinsic motivation are contrasted such that an increase in one necessarily resulted in a decrease in the other. When they evaluated independent measures of these constructs, they found a decline in intrinsic motivation that varied somewhat for different components of this construct and little systematic age-related differences in extrinsic motivation. Lepper et al. also emphasized that this decline in intrinsic motivation seemed to be specific to academic motivation since there was little evidence of a decline in intrinsic motivation for non-school-related activities. Furthermore, they suggested that there is a steady decline in intrinsic motivation with increasing age and year in school, but an additional, relatively larger decline that is associated with the transition from elementary to middle school (e.g., Eccles & Midgley, 1990). Harter (1992), Eccles and colleagues (e.g., Eccles, et al., 1984; also see Gottfried & Gottfried, 1996), and others also emphasized that intrinsic motivation does not decline for all students and suggested that declines in intrinsic motivation are less likely for students who are more academically able or perceive themselves to be more able.

Researchers (e.g., Dweck, 1986; Farmer, 1987; Thorkildsen & Nicholls, 1998) have noted a lack of consistency in research-based reports of gender differences in motivational orientations. A reasonably consistent finding is that boys tend to be more competitively oriented whereas girls are more cooperatively oriented (e.g., Owens & Barnes, 1992; Owens & Straton, 1980). Also, males are more likely to attribute academic success to ability whereas girls are more likely to attribute success to effort (e.g., Ames, 1984). Consistent with this pattern of results, Thorkildsen and Nicholls (1998) found significant gender differences for fifth-graders such that boys scored higher in ego-orientation, alienation, and beliefs in extrinsic causes of success whereas girls scored higher in task-orientation and beliefs in interest and effort as the causes of success. Placing their findings in a broader context, however, Thorkildsen and Nicholls indicated that they had not found gender differences in motivational orientations in studies conducted with younger (2nd graders) or older (adolescents) students. They further speculated that girls in fifth grade, more often than boys, might be more oriented toward avoiding failure or pleasing the teacher. Owens and Straton (1980), however, indicated that gender differences in Cooperative, Individual, and Competitive orientations did not interact with year in school for a large group of students in grades 4-11. In contrast, Ablard and Lipschultz (1998) reported that for a group of high achieving, 7th grade students, girls had significantly higher Learning orientations than boys, whereas there were no significant differences for Performance orientations.

Hence, as noted by others, the research literature does not provide a clear picture about gender differences in motivational orientations and their development. Of particular relevance to the present investigation, support for a Big-Two-Factor Theory requires that these differences are reasonably consistent within different Learning-related factors and within different Performance-related factors.

The Present Investigation: Specific Aims, Hypotheses, and Related Research Questions

In order to pursue this research, we reviewed a wide range of motivation literature relevant to the Big-Two-Factor Theory of motivation orientation and selected eight motivation orientation constructs that have been used widely: Ego, Competitive, Mastery, Intrinsic, Cooperation, Individual, Achieve Success, and Avoid Failure. These motivation factors are not proposed to be representative of all motivation constructs but were selected from those that are important in a variety of motivation theories that we propose to be representative of higher-order Learning and Performance orientation factors. We then constructed a new measure of academic motivation orientations consisting of brief (4-6 items per scale), psychometrically sound measures of different motivational orientations that are suitable for primary school students. Based on this instrument, we collected test-retest data (interval of 8 months) from a large sample of able children (aged 7-12). We then pursue analyses in order to evaluate:

1. CFA models of each scale and the set of 8 scales (separately for T1, T2 and for T1/T2 combined), with emphasis on goodness of fit, unidimensionality, reliability, correlations among the factors, and test-retest stability over the 8-month interval.

2. Higher-order CFA models to test whether the relation among the 8 first-order motivation factors can be explained in terms of two higher-order Performance and Learning factors. Specifically, we first test an a priori hypothesis (separately for T1 and T2) that relations among the first-order Ego, Competition, Achieve Success, and Avoid Failure can be explained in terms of a higher-order Performance factor and that relations among first-order factors Mastery, Intrinsic, and Cooperation can be explained by a higher-order Learning factor (with Individual orientation predicted to load on both higher-order factors). Next, we test the a priori hypothesis (based on T1 and T2 data) that relations among all T1 first-order factors and T2 first-order factors can be explained in terms of the higher-order Learning and Performance factors (see Figure 2).

3. Age-related and gender differences in mean levels of Learning and Performance with a multi-cohort-multi-occasion (MCMO) design that simultaneously contrasts true longitudinal inferences (based on the multiple occasions) with cross-sectional inferences (based on the multiple cohorts).

Method

Measure, Sample, and Procedures

School Motivation Questionnaire. The School Motivation Questionnaire (SMQ) was designed to measure 8 motivational orientations identified as being important in previous motivational research. The Mastery and Ego scales were based on Roberts, Treasure and Kavussanu (1997; also see Marsh, 1994). Competition, Individual, and Cooperation scales were based on Owens and Barnes (1992; also see Owens & Straton, 1980). The Intrinsic, Achieve Success, and Avoid Failure scales were based on research by Harter (1978, 1981a, 1981b, 1992; Harter, Whitesell & Kowalski, 1992) and by Ryan and Connell (1989). Each scale consisted of 4 to 6 items, resulting in a total of 44 items (see Appendix 1). In the actual instrument, the items from different scales were randomly ordered. Participants were asked to respond to positively worded simple declarative sentences, using the same five-point response scale. Estimates of reliability, stability over time, and the factor structure are presented as preliminary results of the present investigation.

Sample. The sample consisted of 606 high-achieving students from 23 primary schools in the metropolitan South West region of Sydney Australia who completed the SMQ at T1 and T2. The sample of students were enrolled in grades 3 – 6, varied in age from 7.0 to 12.0 (mean = 9.64, SD = .99), and were balanced in terms of gender (47% females). Because of the diversity of educational programs available for high-achieving students, students were selected from specifically designated programs for gifted students, from the top stream in schools in which classes were streamed according to ability level, and high-achieving students (based on teacher nominations) from schools in which students were not streamed according to ability level.

Procedures. Classroom teachers administered the materials to their students near the start of the school year and again near the end of the school year. Teachers were trained to administer the materials by the authors. Teachers were provided with scripted directions detailing the administration procedures and were requested to follow these instructions so that testing administration was standardized for all classes. The authors explained how to administer each test, modelled the testing procedure, asked teachers to model the testing procedure with a partner, and then answered questions relating to testing administration procedure. In the actual administration, responses by students were placed in a sealed envelope that was returned directly to researchers to protect the confidentiality of the students.

Statistical Analyses

Confirmatory factor analyses were conducted with LISREL (Joreskog & Sorbom, 1993) using maximum likelihood estimation. Because analyses were conducted on responses to individual items based on a five-point Likert scale, these variables were treated as ordinal variables and normal scores based on these ordinal variables were constructed (Joreskog & Sorbom, 1993). A detailed presentation of the conduct of CFA is beyond the scope of the present investigation and is available elsewhere (e.g., Bollen, 1989; Byrne, 1998; Joreskog & Sorbom, 1993). Following Marsh, Balla, and Hau (1996), and Marsh, Balla, and McDonald (1988) we emphasize the Tucker-Lewis index (TLI) and relative noncentrality index (RNI) to evaluate goodness of fit, but also present the χ^2 test statistic and an evaluation of parameter estimates. The TLI and RNI vary along a 0-to-1 continuum in which values greater than .9 are typically taken to reflect an acceptable fit. The RNI contains no penalty for a lack of parsimony so that the addition of new parameters automatically leads to an improved fit that may reflect capitalization on chance, whereas the TLI contains a penalty for a lack of parsimony.

Model comparison is also facilitated by positing a nested ordering of models in which the parameter estimates for a more restrictive model are a proper subset of those in a more general model (for further discussion see Bentler, 1990). Thus, for example, a model positing that two factors can be collapsed into a single factor is nested under the corresponding two-factor model. Hence, the one-factor model cannot have a lower χ^2 than the two-factor model (the χ^2 s would be equal only if the correlation between the two factors was exactly equal to 1.0). Whereas nested models, tests of statistical significance, and indices of fit aid in the evaluation of the fit of a model, there is ultimately a degree of subjectivity and professional judgment in the selection of a "best" model and the evaluation of significance from a statistical and a practical perspective.

First-order models. A critical aim of this study is to evaluate whether the 8-factor model is able to fit data from T1, T2, and the combined T1/T2 data. In evaluating this model, important considerations are the fit of the overall model and the size of correlations. Of particular importance is the question of whether factors within the Performance-related factors or within the Learning-related factors are so highly correlated that they can be collapsed into a single factor.

Higher-order models. Whenever first-order factors are correlated, it may be reasonable to test models positing one or more higher-order factors (for further discussion see Bollen, 1989; Marsh, 1987; Marsh & Hocevar, 1985; Marsh & Jackson, 1999). In higher-order models, correlations between first-order factors are constrained to be zero and relations among these first-order factors are explained in terms of higher-order factors (see Figure 1, considering only the T1 responses for now). Because the number of higher-order factor loadings is typically much smaller than the number of correlations among first-order factors, the higher-order factors are more parsimonious. Here, for example, the 28 correlations among the 8 SMQ factors are explained in terms higher-order factor loadings relating the 8 first-order factors to the two second-order factor (higher-order Learning and Performance factors). The relative ability of first-order and second-order factor models to fit the data is a critical feature in the evaluation of higher-order models. However, Marsh (1987; Marsh & Hocevar, 1985) noted several other features that are also important. In particular, if correlations among first-order factors are small, then the hierarchy must necessarily be weak. If the hierarchy is weak, then most of the reliable variance in the first-order factors cannot be explained in terms of higher-order factors. This is an important consideration in the decision of whether to summarize responses based on one or a relatively few number of scores representing the higher-order factors, or to rely on a relatively larger number of scores reflecting the first-order factors. A particularly strong test of higher-order factor structures when there is test-retest data is whether relations among the T1 first-order factors and T2 first-order factors can be explained in terms of relation among the corresponding T1 and T2 higher-order factors (Figure 1; also see related research by Marsh & Jackson, 1999).

Multi-cohort-multi-occasion (MCMO) analyses. Here we used a multi-cohort-multi-occasion (MCMO) design (Marsh, Craven, & Debus, 1998) with two waves of data collected eight months apart with the same children in each of four age cohorts. Based on these data, we contrasted cross-sectional (multiple age cohort) comparisons with true longitudinal (multiple occasion) comparisons. This provides a much stronger basis for evaluating age-related differences than the typical cross-sectional study, the typical longitudinal study based on responses from a single cohort, or even studies that make separate comparisons of results based on cohort differences and longitudinal differences within the same study. By including gender in this analysis, we are able to evaluate gender effects in motivational orientations and the extent to which these interact with age-related differences.

Preliminary Analyses: Psychometric Properties of Responses to the Motivation Scales.

Because of the initial focus of this study on scale construction and the fact that we are using a new instrument, we began with a psychometric evaluation of responses to each of the 8 motivation scales. First we considered responses to each scale separately for T1 and T2 responses in order to evaluate the unidimensionality and reliability of each scale. Next we considered responses to each scale for both T1 and T2 responses to evaluate the stability of the construct over time. These preliminary results are then followed by CFAs of responses from all 8 scales that are a major focus of findings presented in the Results section.

Reliability and unidimensionality for motivation constructs at T1 and T2. We began by conducting one-factor congeneric models separately for each of the 8 motivation constructs at T1 and at T2. In addition to providing a test of the unidimensionality of each scale, these analyses provided coefficient omega (ω) estimates of reliability. These differ from the traditional coefficient alpha estimates in that alpha is based on the assumption of a parallel model in which all items load equally onto the latent factor, whereas coefficient omega (McDonald, 1985) only assumes a congeneric model in which factor loadings are allowed to differ. Coefficient alpha is a logical lower bound estimate of coefficient omega and provides a negatively biased estimate of reliability unless the assumption of parallel measures is met. In the present investigation, because factor loadings for all items are uniformly high, the coefficient omega estimates of reliability reported are only slightly larger than the (slightly) negatively biased coefficient alpha estimates of reliability (estimates differed by no more than .02).

All 8 T1 one-factor models and all 8 T2 one-factor models provide an acceptable fit to the data (minimum RNI = .924, median = .97). Similarly, the estimates of reliability are all consistently high. Only Cooperation has reliability estimates below .85 (.800 at T1 and .844 at T2), whereas most of the rest of the reliability estimates are .90 or higher. Factor loadings for all these models were consistently high (median = .81). (In order to conserve space, these are not presented. They are, however, approximately the same as those presented in Appendix 2 for a solution based on all T1 and T2 items when combined into a single model.)

Particularly given that the 8 motivation scales consist of only 4 or 6 items each, the psychometric properties are very encouraging and provide a good basis for analyses that follow.

Estimates of stability over T1 and T2. Because data were collected on two occasions (test-retest interval of 8 months within the same school year), we next tested two-factor models in which responses to the same items at T1 and T2 were posited to represent two factors. Thus, for example, responses to the T1 Ego items and the T2 Ego items were posited to represent two separate factors. The focus of these analyses was the extent to which these two factors could explain the data and the test-retest (stability) of the construct over time.

In CFA, a priori models typically assume that the residual variance associated with each measured variable (uniqueness plus random error, hereafter referred to as uniquenesses) is independent of uniquenesses associated with other measured variables. However, when the same items are administered to the same participants on multiple occasions, uniquenesses associated with the matching measured variables are likely to be correlated. If there are substantial correlated uniquenesses that are not included in the model, then the estimated test-retest correlations between the corresponding latent constructs will be positively biased. However, the inclusion of correlated uniquenesses in CFAs provides a test for these correlated uniquenesses and a control for what would otherwise be a positive bias. Marsh and Hau (1996) recommend that a priori models of stability over time should always include such correlated uniquenesses. In preliminary analyses, the inclusion of these correlated uniquenesses was supported by modestly better fits to the data and, in particular, because their exclusion would positively bias the test-retest stability coefficients. Whereas stability coefficients were only marginally smaller when correlated uniquenesses were included, the differences were typically small, suggesting that their inclusion was not a critical issue. In order to facilitate the substantive import of the results, only the models with correlated uniquenesses are presented for models of T1/T2 data (no correlated uniquenesses are included for separate analyses of T1 data or of T2 data).

The fit of each of the 8 two-factor models – representing T1 and T2 responses for each of the 8 motivation scales (models for T1/T2 responses presented in Table 1) – is very good (minimum RNI = .940, median = .97). Also of particular interest in these models, the (test-retest) stability correlations between the T1 and T2 factors are consistently about .6 (.530 to .686, median = .61). Hence, motivational orientations for these young students from the start of the school year to near the end of the same school year (an 8-month interval) are reasonably stable.

Insert Table 1 About Here

Results

First-order Factor Models of Responses to the Motivation Scales

The intent of these initial analyses is to determine the extent to which responses to the 8 motivational factors can be adequately explained by the theoretical model upon which they are based. Preliminary analyses indicated that responses to each of the factors are relatively unidimensional and have adequate reliability when each scale is considered separately (see Table 1). Although these results provide a strong initial basis of support, the critical issue is how well a priori models are able to fit when responses to all 8 scales are considered within a single model. In order to evaluate the a priori 8-factor structure, we considered separate 8-factor models of the T1 data and of the T2 data, and a 16-factor model for the combined T1/T2 data (see Table 1). All three models provided acceptable goodness of fit (RNIs of .915 to .923). For all three models, factor loadings for each factor are approximately the same as those for the combined T1 and T2 data (Appendix 2) and approximately the same as those for each factor considered separately that have already been discussed. Hence, the factor loadings are generally very good.

A critical new feature is the correlations among the 8 T1 factors, among the 8 T2 factors, and between the 8 T1 and 8 T2 factors (Table 2). For both T1 and T2 responses, correlations among all the scales are positive with a single exception – the negative correlation between individual and cooperative orientations. Because these are latent correlations that have been corrected for measurement error (and correlated uniquenesses associated with individual items), this can be thought of as a multi-trait-multi-occasion matrix in which the 8 motivation scales are the multiple traits and the two times are the multiple occasions. In evaluating the relative size of the correlations, however, it is important to emphasize that three of the factors (Mastery, Intrinsic, and to a lesser extent, Cooperative) are posited to reflect a higher-order Learning factor whereas four of the factors (Ego, Competitive, Achieve Success, Avoid Failure) are posited to reflect a higher-order Performance factor. Hence, we posit that correlations among the three Learning factors and among the three Performance factors should be higher than correlations between these two sets of factors. Also, correlations between matching T1 and T2 factors (stability coefficients; convergence over time) should be higher than correlations between non-matching T1 and T2 factors – particularly correlations between the 3 Learning and 4 Performance factors.

Insert Table 2 About Here

We begin by evaluating correlations among T1 factors and among T2 factors. At both times, correlations among the factors posited to reflect a Learning orientation (Mastery, Intrinsic, and, to a lesser extent, Cooperative) are substantially correlated with each other and less correlated with the four factors posited to reflect a Performance orientation. Correlations between the Ego and Competition factors are consistently very high. Whereas Cooperation tends to be only moderately correlated with Mastery and Intrinsic orientations (.29 to .43), these correlations tend to be larger than those between Cooperation and the four Performance factors (.13 to .29). Similarly, correlations among the four factors posited to reflect a Performance orientation tend to be substantially correlated with each other and less correlated with the three Learning factors. However, the correlations between Ego and Competitive and between Achieve Success and Avoid Failure are substantially higher than correlations between these two pairs of factors. Furthermore, the Achieve Success factor tends to be moderately correlated with the three Learning factors, suggesting that it may reflect both Learning and Performance orientations. The Individual factor that is posited to be associated with both higher-order Learning and Performance orientations tends to be moderately correlated with all other factors (except Cooperative). This is consistent with the hypothesis that it reflects both higher-order Learning and Performance orientations.

It is also interesting to evaluate the correlations between T1 and T2 factors (Table 2). The highest correlations are between the same factor at T1 and T2. These stability coefficients are approximately the same as those previously considered in separate analyses of T1 and T2 responses to each construct (Table 1). As noted for correlations among T1 factors and among T2 factors, correlations among the three Learning factors and among the four Performance factors tend to be higher than correlations between these two sets of factors.

In summary, separate analyses of T1 and T2 responses as well as the combined analyses of T1 and T2 responses all support the construct validity of interpretations of the SMQ instrument. Not only was the a priori model able to fit the data, but the pattern of correlations among factors was consistent with a priori predictions based on the design of the instrument. We now pursue this issue further with the evaluation of higher-order factor models positing second-order Learning and Performance factors.

Higher-order Factor Models of Responses to the Motivation Scales

Separate higher-order factor models for T1 and T2 responses. We begin with an evaluation of strictly a priori models fitted separately to T1 and T2 responses (see Figure 1, ignoring relations between T1 and T2 responses for now). For both T1 and T2 responses, the fit of the higher-order factor model was reasonably good but not completely acceptable (e.g., RNIs approached but were smaller than .90; see Table 1). Because each of these higher-order models is nested under the corresponding first-order factor structure, comparisons between the corresponding first and second-order models provide an important basis of comparison. From a strict statistical significance perspective, the fit of the higher-order models is significantly poorer than that of the corresponding first-order model (i.e., the difference in χ^2s is statistically significant in relation to the difference in df). This difference is also reflected in differences in the RNIs as well as the TLIs that provide a control for model parsimony (the higher-order factor is more parsimonious). Whereas the parameter estimates were clearly in line with a priori predictions, LISREL's modification indices indicated the need to free three additional parameters that follow logically from our earlier discussions in order to achieve a better fit: the Achieve Success factor was allowed to load on the higher-order Learning factor as well as the higher-order Performance factor that it was posited to reflect (consistent with earlier discussion based on correlations among the first-order factors); the residual variances associated with the Achieve Success and Avoid Failure were allowed to be correlated (reflecting the very high correlation between these two factors); and the residual variances associated with the Individual and Cooperative factors were allowed to be correlated (reflecting the negative correlation between these two factors when all other factors were positive). With these a posteriori corrections, higher-order factor models for T1 and T2 data provided a reasonable goodness of fit, approximating those of the corresponding first-order models (and marginally better according to the TLI that controls for model parsimony).

Parameter estimates for the separate (a posteriori) models of T1 and T2 responses are approximately the same as those presented in Table 3 (based on the combined T1 and T2 responses). The higher-order Learning and Performance factors are well defined, in that at least two first-order factors load substantially (.8 or higher) on each higher-order factor. Consistent with a priori predictions: (a) the first-order Mastery, Intrinsic and, to a lesser extent, Cooperative factors load substantially on the higher-order Learning factor; (b) the first-order Ego, Competitive, Achieve Success, and Avoid Failure factors load substantially on the higher-order Performance factor; and (c) the first-order Individual factor loads moderately on both higher-order Learning and Performance factors. Although not predicted a priori, a posteriori modifications indicate that the Achieve Success has a small factor loading on the higher-order Learning factor as well as a much more substantial loading on the higher-order Performance factor. With the exception of the (a posteriori) Achieve Success, all these higher-order factor loadings in the a posteriori model were nearly the same as those in the corresponding a priori models. These results provide preliminary support for the Big-Two-Factor Theory and its generality across T1 and T2 data.

Insert Table 3 About Here

It is also important to evaluate the residual variance components for the first-order factors. Because error variance has already been purged from the first-order factors, these residual error variances represent the proportion of true score variance in the first-order factor that cannot be explained in terms of the higher-order factors. To the extent that any of these are substantial, there is a substantial amount of reliable variance in the first-order factor that will be lost if researchers rely on only the second-order factors. (If there is significant reliable – but unexplained – variance, a critical question is whether this residual variance is useful in terms of being systematically related to other constructs or to interventions that researchers might want to include in additional studies.) Inspection of the first-order residual variances indicates that for both T1 and T2 responses, the higher-order factors are able to explain about 90% of the (true score) variance in Ego and Competitive factors and about 70% of the variance in the Mastery and Intrinsic factors (see residual variances in Table 3). For the remaining four first-order factors, however, the second-order factors are able to explain no more than half of the true score variance. Hence, even though the fit of the higher-order factor models is reasonable and the higher-order factors are well defined, there is considerable true score variance in most of the first-order factors that is potentially useful and may be related to other variables that might be included in applied motivation studies. Although the systematic pursuit of this possibility would require an entire research program that is clearly beyond the scope of the present investigation, we address this problem in the next section.

Higher-order factor models for the combined T1 and T2 responses. We now evaluate higher-order factor models fit to the combined T1 and T2 responses that largely parallel those considered separately for T1 responses and for T2 responses. Not surprisingly, the strictly a priori model (Figure 1) is not able to provide an adequate fit to the data. It is important to emphasize that the fit of this a priori model is not only substantially poorer than the corresponding first order model (under which it is nested), but is poorer than the fit of the a priori higher-order models for T1 and T2 data. Although this second comparison is complicated by the fact these are not nested models, this pattern for results is quite different from all of the first-order models that we have considered where the fit of the model of combined T1 and T2 data typically is similar to (and falls somewhere between) the fit of the corresponding models which fit separately to T1 and T2 responses. This implies that there is a problem in the fit of the higher-order factor of T1 and T2 responses beyond that already identified in models of responses to each time considered separately. This suggests, perhaps, that relations between T1 and T2 factors cannot be explained in terms of the higher-order Learning and Performance factors.

In the next higher-order model (model 11C in Table 1), we added the a posteriori parameters that were included in the corresponding models applied separately to T1 and T2 responses. Whereas this addition of these parameter estimates substantially improved the fit of the data, the fit was still not fully adequate (TLIs and RNIs were less than .9) and, more importantly, was still poorer than the fit of the first-order model based on the combined T1 and T2 responses and the fit of the corresponding a posteriori models applied separately to T1 and T2 responses. Inspection of the modification indices revealed that each of the T1 first-order factors was substantially related to the corresponding T2 first-order factor beyond what could be explained in terms of the higher-order Learning and Performance factors. In the final a posteriori model (Model 11D in Table 1), these correlations between first-order factor residual (true score) variances were added to the model. Inspection of these eight parameter estimates indicates that there are substantial relations between matching factors collected at T1 and T2 that cannot be explained in terms of the higher-order factors. Furthermore, even the fit of this a posteriori model is only minimally adequate and still not as good as the corresponding first-order model or the higher-order models applied separately to T1 and T2 data. Consistent with earlier speculations, these results imply that there is a lot of potentially useful variance in the first-order factors that cannot be explained in terms of the higher-order factors. Inspection of the residual variances (Table 3) indicates that there is wide variation in the amount of variance in first order factors that is unexplained by the higher-order factors, varying from Cooperation, Individual, and Avoid Failure where a majority of the variance in first-order factors is unexplained to Ego and Competition where only about 10% of the variance is unexplained. These findings, however, extend conclusions based on separate higher-order models of T1 and T2 data by showing that this potentially useful, unexplained data is stable over the 8-month test-retest period. In summary, even though there is reasonable support for the higher-order factor model with two higher-order factors, there is also a lot of reliable and stable variance in first-order motivation orientation factors that is unexplained by the higher order factors.

The Effects of Gender, Age Cohort, and Time on Each Motivation Scale

Here we simultaneously evaluated age differences with cross-sectional comparisons of different age cohorts and longitudinal comparisons of the same age cohort on different occasions based on a MCMO design. The critical comparisons involved cross-sectional comparisons based on the multiple age cohorts, longitudinal comparisons based on responses by the same cohort on the multiple occasions (T1 and T2), and age cohort x occasion interactions that tested the consistency of longitudinal comparisons over the different age cohorts. This MCMO design was operationalized as a 4 (age cohort) x 2 (gender) x 2 (time) design in which time was a within-subjects (repeated measures) effect whereas age cohort and gender were between-subjects effects (see Table 4). The main effects of age cohort and time provided alternative (cross-sectional and longitudinal) tests of the effect of age. If no effect of age is present, then the main effects of age cohort, time, and their interaction should all be nonsignificant. If the effect of age is linear, then the effects of both age and time should both be significant, but the age cohort x time interaction should be nonsignificant. However, if the effect of age is non-linear, there should be main and interaction effects that require a careful evaluation. The construct validity of interpretations of age differences are strengthened if these tests provided internally consistent results about age-related differences based on the cross-sectional and longitudinal comparisons. The main effect of gender provided a test of gender differences averaged across age cohorts and time. However, the gender x age cohort interaction and the gender x time interaction each provided alternative tests of the consistency of the gender effects over age.

Insert Table 4 About Here

Time and age-cohort differences. The main effects of age cohort (a cross-sectional measure of age effects), time (a longitudinal measure of age effects), and their interactions provide a remarkably consistent picture of age-related differences in motivational orientations. For Mastery all three effects were nonsignificant (there was a consistent lack of age-related differences for both cross-sectional and longitudinal comparisons). For each of the seven other motivation scales, there was a significant linear decline in motivation with the different age cohorts (older students had lower motivation scores than younger students), a significant decline over time for the same age cohorts (motivation scores were lower at T2 than T1 for the longitudinal comparisons), and no significant interactions between the age-cohort (cross-sectional) and time (longitudinal comparisons). These results provide clear support for the hypothesis that motivation scores – except for Mastery — decline during the late-primary school years for these students.

There are, however, systematic differences in the size of these declines for the different scales as indicated by the size of the coefficients associated with the linear effects of age cohort (year in school) and the effect of time (Table 4). Because the effect of time (longitudinal age effects) reflects changes over less than one academic school year and the effect age cohort (cross-sectional age effects, year in school) reflects changes in children over the 3-year interval, the coefficients associated with age cohort should be substantially larger than those associated with time. There is support for this expectation, indicating a reasonable consistency in the size of declines based on cross-sectional (year in school, age cohort) comparisons across the four school-year groups and longitudinal comparisons across responses by the same students over an 8-month interval. The sizes of the coefficients reflecting the linear decline in motivation, however, vary systematically for the different orientation scales; ranging from nonsignificantly negative (Mastery), to moderately negative (Intrinsic, Cooperative, Individual, Ego, Competitive), substantially negative (Achieve Success, Avoid Failure). Whereas there is a clear trend for the declines to be less negative for the Learning-related scales than the Performance related scales, this difference is not entirely consistent across the different scales (e.g., the Intrinsic decline is similar to the Ego and Competitive declines). Furthermore, there are systematic differences in the sizes of the declines within the Learning-related scales and within the Performance-related scales. Hence, in relation to our evaluation of the Big-Two-Factor Theory , age-related differences – those based on both longitudinal and cross-sectional comparisons – in specific scales are not all that well represented by the two higher-order Learning and Performance factors.

Gender differences. There were significant main effects ($p < .05$) of gender for only Ego and Competitive scales. In both cases, girls had slightly lower scores (i.e., were less ego- and competitive-oriented). All other gender differences are substantially smaller (based on the coefficients presented in parentheses in Table 4) and not statistically significant. Furthermore, there was only one marginally significant interaction between gender and time for one scale (within each year Mastery, on average, went up slightly for girls and went down slightly for boys) and no significant gender x year-in-school interactions. Whereas the lower mean Ego and Competitive scores for girls are in the expected direction, it is surprising that there are so few main or interaction effects involving gender. There is a tendency for differences in the Learning-related scales to favor girls (coefficients of .00 to .09) and for differences in the Performance-related scales to favor boys (coefficients of .00 to -.24). However, because there are so few significant gender differences, they do not provide a particularly good basis for evaluating the Big-Two-Factor Theory .

Summary and Implications

Motivation researchers place considerable emphasis on the Learning vs. Performance distinction that is at the heart of the Big-Two-Factor Theory of motivation orientations. Although it is clear that not all motivation constructs can be incorporated into these two higher-order factors, we posited that they can represent selected constructs from diverse theoretical perspectives. In the present investigation, we tested this hypothesis by first constructing a new motivational orientation instrument that contains many of the motivational constructs emphasized by other researchers. Because this is a new instrument, we critically evaluated its psychometric properties, showing that psychometric support – reliability, stability, unidimensionality, and factor structure – was very strong. Hence, the instrument (or selected scales from it) may provide a useful addition to those that are used in motivational research.

The first focus of the study was to evaluate the Big-Two-Factor Theory of motivation orientations by determining the extent to which relations among the eight first-order factors could be explained in terms of higher-order Learning and Performance factors. When data for each time were considered separately, the fit of the higher-order factor model was good and provided reasonable support for the Big-Two-Factor Theory . Whereas covariation among the first-order motivation factors was reasonably well explained by the two higher-order factors, most of the first-order factors had considerable reliable variance that could not be explained by the higher-order factors. Although this residual variance in each first-order factor is reliable (i.e., true-score variance) it is a moot point as to whether the variance that was idiosyncratic to each scale is useful variance in terms of theory or practice. Because of this problem of residual variance, however, the higher-order factor models that tried to explain both T1 and T2 responses in the same model were not nearly as successful. Whereas the two higher-order factors were able to explain covariation among the eight motivation factors at any one time, the substantial correlations between the eight T1 factors and the eight T2 factors could not be fully explained in terms of two higher-order T1 factors and two higher-order T2 factors. In particular, much of the residual variance in each first-order factor was not only reliable at any one time – it was also stable over time. Thus, for example, the majority of the variance in Cooperation was unexplained by the two higher-order factors at either T1 or T2. Importantly, the residual variance in T1 Cooperation was substantially correlated with the residual variance in T2 Cooperation (see residual variances and residual covariances in Table 3). Thus, not only was there reliable variance in Cooperation that was unexplained by the two higher-order factors, but this unexplained variance was stable over time. Hence, if researchers were particularly interested in Cooperation as an outcome variable or in the relations between Cooperation and other constructs, then they will probably lose valuable information by relying solely on the two higher-order factors. A similar situation exists with many of the factors. As is the case with any compromise, there is an inevitable loss of specific information in particular motivation scales that must be balanced in relation to the potential gains associated with using higher-order factors. In summary, even though our research does provide support for the Big-Two-Factor Theory , we still believe that it is useful for researchers to continue to collect different motivation scales – particularly ones that are most relevant to the aims of a particular study or intervention. An important area for further research is to determine in a wide variety of applied research the extent to which specific motivation scales provide useful information that is not fully captured by the big-two factors.

The second major emphasis of our research was to apply a sophisticated multi-cohort-multi-occasion design and analysis to evaluate age-related differences in motivational orientations. Our results also have important developmental implications for understanding the development of motivational orientations in young children. Although there is considerable evidence suggesting that Learning orientations decline with age whereas Performance orientations increase, at least some of the early research in the intrinsic and extrinsic motivation literatures (e.g., Harter, 1981b) is confounded by the use of ipsative-like measures that force the two orientations to be negatively related. In contrast to most other research, we found declines in both Learning-related and Performance-related factors. To the extent that there were differences, the declines were larger for the Performance-related factors. Furthermore, these differences were consistent across both longitudinal and cross-sectional comparisons. We did not, however, include students who had moved from primary school to high school, a transition that other researchers have found to contribute substantially to the decline in Learning orientations and an increase in Performance orientations. However, there were systematic differences in the age effects (that were also consistent across cross-sectional and longitudinal comparisons) for the Learning-related scales and for the Performance-related scales. Hence, this pattern of age-related differences in specific scales is not all that well represented by the higher-order Learning and Performance factors. Thus, the age-related differences observed in the specific scales provide only weak support for the Big-Two-Factor Theory of motivation orientations.

Although our results showed small gender differences for two of eight scales (girls had lower Ego and Competition scores) there was a surprising lack of gender differences in the other six motivation scales. Also, these gender differences (or lack thereof) were very stable over both the cross-sectional and longitudinal comparisons. Whereas we anticipated that girls would be less ego and competitively oriented, we were surprised that there were no gender differences in the Learning-related orientations. The results also seem to provide a direct test of speculations by Thorkildsen and Nicholls (1998) about the development of gender differences in motivation for young children and particularly their suggestion that 5th grade girls are more oriented than boys towards avoiding failure and a desire to please their teacher. In contrast to their suggestions, the small gender differences that we observed did not vary with age across the middle-to-late primary school years and there were no significant gender differences at all in the Avoid Failure and Achieve Success scales that seem to reflect orientations like those highlighted by Thorkildsen and Nicholls. We are left, however, with the question of why the gender differences in our study were smaller than might be anticipated from previous research. It may be that gender differences found more generally do not generalize to our sample of able students, but we suspect that previous research has not provided a particularly strong basis for predicting and understanding gender differences in motivational orientations.

In summary, the Big-Two-Factor Theory of motivational orientation implicitly assumes that two broad categories of orientations can be explained in terms of higher-order Performance and Learning orientations. In this, apparently one of the first empirical tests of this theory to actually use higher-order CFAs, there was reasonable support for the two-factor theory, but some limitations as well. Two-factor theory represents an inevitable compromise between the theoretical parsimony and the advantages of working with two broad constructs that has the potential of unifying research within this area, but these benefits must be balanced against the demonstrated loss of specific information in particular orientation factors that cannot be fully explained in terms of the two higher-order factors.

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Table 1

Goodness of Fit For Models Of Each Separate Motivation Scale And Of All Eight Motivation Scales

Model	Scale	Factors	Time	χ^2	DF	RNI	TLI	Reli	Stab	HO Corr T1	HO Corr T2
Analysis of Each Scale Separately (T1, T2, T1+T2)											
1A	Mastery	1	T1	41.01	9	.976	.960	.85			
1B		1	T2	136.02	9	.935	.891	.90			
1C		2	T1/2	205.06	47	.959	.943		.58		
2A	Intrinsic	1	T1	50.03	9	.982	.970	.92			
2B		1	T2	48.67	9	.982	.970	.92			
2C		2	T1/2	138.47	47	.981	.973		.61		
3A	Cooperation	1	T1	46.79	9	.956	.927	.80			
3B		1	T2	97.63	9	.924	.873	.84			
3C		2	T1/2	186.83	47	.940	.916		.59		
4A	Individual	1	T1	90.57	9	.962	.937	.92			
4B		1	T2	151.23	9	.947	.911	.93			
4C		2	T1/2	279.35	47	.954	.935		.53		
5A	Ego	1	T1	40.23	9	.988	.979	.93			
5B		1	T2	57.12	9	.982	.970	.94			
5C		2	T1/2	137.41	47	.984	.977		.65		
6A	Competition	1	T1	24.82	9	.994	.990	.94			
6B		1	T2	71.99	9	.980	.967	.95			
6C		2	T1/2	180.51	47	.979	.970		.66		
7A	Achiv Success	1	T1	36.35	2	.972	.915	.89			
7B		1	T2	46.32	2	.968	.904	.90			
7C		2	T1/2	112.46	15	.967	.938		.66		
8A	Avoid Failure	1	T1	23.58	2	.987	.962	.92			
8B		1	T2	62.54	2	.963	.889	.93			
8C		2	T1/2	111.23	15	.973	.950		.61		
Analysis of All Eight Scales (T1, T2, T1/2)											
First-Order Models											
9A	All	8	T1	2125.07	874	.930	.925				
9B	All	8	T2	2604.63	874	.915	.908				
9C	All	16	T1/2	6959.51	3576	.916	.910				
Higher-Order Model(A Priori)											
10A	All	8+2	T1	2784.85	892	.895	.888			.46	
10B	All	8+2	T2	3252.25	892	.884	.877				.45
10C	All	16+4	T1/2	9446.98	3716	.857	.853			.46	.46
Higher-Order Model(A Posteriori)											
11A	All	8+2	T1	2206.03	889	.927	.922			.44	
11B	All	8+2	T2	2650.86	889	.913	.908				.42
11C	All	16+4	T1/2	8241.39	3710	.887	.884			.43	.42
11D	All	16+4	T1/2	7792.98	3702	.898	.895			.44	.42

Note. T1 = time 1, T2 = time 2, T1/2 = T1 and T2 combined. Factors = number of factors in model; RNI = relative noncentrality index, TLI = Tucker-Lewis index; Reli = reliability estimate (for one-factor models), Stabil = test-retest correlation (for two-factor models of T1/2 responses for each scale); HO Corr = correlations between the two higher-order factors for T1 or T2 responses.. Models 1-8 are based on separate analyses of each of the 8 motivation scales. Separate analyses were conducted for T1 (the "A" models), T2 (the "B" models), and T1/2 responses (the "C" models). Model 9 posits first-order factor models for responses to all 8 (16 for T1/2) scales. Models 10 and 11 examine relations among the 8 (16 for T1/2 data) first-order factors explained in terms of two (4 for T1/2 responses) higher-order factors.

Table 2

Latent Factor Correlations Between Eight Motivation Constructs Collected at Time 1 and Time 2

	Time 1								Time 2							
	Mast	Ego	Comp	Indi	Coop	Intr	AchS	AvdF	Mast	Ego	Comp	Indi	Coop	Intr	AchS	AvdF
Time 1																
Mast	1.00															
Ego	.38	1.00														
Comp	.41	.91	1.00													
Indi	.37	.33	.40	1.00												
Coop	.43	.13	.23	-.05	1.00											
Intr	.71	.29	.34	.43	.37	1.00										
AchS	.38	.64	.60	.36	.25	.42	1.00									
AvdF	.23	.54	.53	.29	.23	.27	.93	1.00								
Time 2																
Mast	**.58**	.15	.22	.13	.31	.46	.20	.11	1.00							
Ego	.20	**.65**	.59	.18	.08	.13	.43	.37	.31	1.00						
Comp	.24	.63	**.66**	.20	.14	.23	.45	.40	.36	.90	1.00					
Indi	.22	.18	.21	**.53**	-.09	.30	.25	.20	.36	.28	.32	1.00				
Coop	.20	.05	.14	-.14	**.58**	.15	.12	.11	.35	.17	.20	-.23	1.00			
Intr	.43	.20	.28	.25	.26	**.61**	.29	.18	.67	.26	.33	.42	.29	1.00		
AchS	.16	.42	.43	.16	.18	.24	**.65**	.59	.35	.66	.67	.32	.29	.43	1.00	
AvdF	.11	.41	.39	.13	.13	.16	.61	**.61**	.24	.62	.62	.25	.25	.28	.95	1.00

Note. Mast = Mastery; Comp = Competition; Indi = Individual; Coop = Cooperative; Intr = Intrinsic Motivation; AchS = Achieve Success; AvdF = Avoid Failure. Correlations in bold are test-retest (T1/T2) correlations.

Table 3

Higher-order (HO) Learning and Performance Motivation Factors For the Combined T1 and T2 Responses

	HO Factor Loadings				Residual Variances and Covariances		
	Time 1		Time 2		Resid	Residual	Residual
Factors	Learn	Perf	Learn	Perf	Var	Cov (Cor)	Cov12_(Cor12)
Time 1							
Mastery	.84	0	0	0	.29		.17[b] (.54)
Intrinsic	.85	0	0	0	.28		.13[b] (.45)
Cooperative	.47	0	0	0	.78	-.09[a] (-.12)	.42[b] (.52)
Individual	.37	.23	0	0	.74		.34[b] (.46)
Ego	0	.96	0	0	.08		.06[b] (.61)
Competition	0	.94	0	0	.11		.05[b] (.53)
Ach Success	.20[a]	.59	0	0	.50		.04[b] (.09)
Avd Failure	0	.58	0	0	.66	.52[a] (.91)	.03[b] (.05)
Time 2							
Mastery	0	0	.81	0	.34		
Intrinsic	0	0	.83	0	.31		
Cooperative	0	0	.39	0	.85	-.26[a] (-.33)	
Individual	0	0	.41	.19	.73		
Ego	0	0	0	.94	.12		
Competition	0	0	0	.96	.08		
Ach Success	0	0	.19[a]	.65	.44		
Avd Failure	0	0	0	.67	.55	.45[a] (.91)	

HO Factor Correlations

T1 Learning	1.00			
T1 Perform	.44	1.00		
T2 Learning	.63	.27	1.00	
T2 Perform	.25	.67	.42	1.00

Note. Higher-order factor loadings, residual variances and covariances, and higher-order factor correlations are all completely standardized (Joreskog & Sorbom, 1989). Higher-order factor loadings relate each of the four higher-order factors to the corresponding first-order factors. Residual variance is the proportion of true-score variance in each first-order factor that cannot be explained in terms of higher-order factors. Residual Cov12s are the residual covariances relating matching T1 and T2 first-order factors (residual cor12s – in parentheses – are the same values in a correlation metric). Resid covs are relations between Cooperative and Individual and between Achieve Success and Avoid Failure that was not otherwise explained by the model at T1 and at T2 (residual cors – in parentheses – are the same values in a correlation metric).

[a] a posteriori parameters added to higher-order factors for T1, T2, and T1/2 data. [b] a posteriori parameters added to higher-order factors for T1/2 data.

Table 4

Effects of Gender (G), Year in School (y), and Time (T) on Eight Motivational Orientations

		Year 3 N=49				Year 4 N=123				Year 5 N=245				Year 6 N=189				p-values for tests of significance								
		Time 1		Time 2		Time 1		Time 2		Time 1		Time 2		Time 1		Time 2										
Scale	G	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	Gend	Y	YLin	Yqud	GxY	Time	TxG	TxY	TxGxY
Mast	M	4.63	.37	4.48	.69	4.45	.64	4.51	.67	4.59	.53	4.53	.64	4.51	.63	4.37	.80	.14	.95	.68	.84	.36	.80	.03	.05	.53
	F	4.47	.52	4.63	.46	4.57	.49	4.67	.51	4.50	.59	4.56	.66	4.65	.60	4.56	.61	(.05)		(-.03)			(-.01)			
	T	4.57	.44	4.54	.61	4.51	.57	4.59	.60	4.55	.56	4.54	.65	4.57	.62	4.46	.72									
Intr	M	4.45	.57	4.02	1.11	4.17	.85	3.98	.87	4.12	.87	3.81	1.01	4.09	.86	3.66	.99	.09	.00	.00	.25	.57	.00	.07	.18	.30
	F	4.57	.51	4.61	.36	4.26	.86	4.11	.82	4.18	.82	3.84	.86	4.03	.95	3.74	.89	(.09)		(-.55)			(-.19)			
	T	4.49	.54	4.25	.94	4.21	.85	4.04	.85	4.14	.84	3.82	.94	4.06	.90	3.70	.94									
Coop	M	4.07	.77	4.10	.69	3.89	.75	3.93	.76	4.01	.74	3.95	.79	3.83	.75	3.73	.88	.98	.03	.02	.90	.77	.04	.15	.77	.56
	F	4.08	.66	4.01	.88	4.07	.67	3.86	.76	3.95	.66	3.87	.71	3.90	.71	3.75	.73	(.00)		(-.25)			(-.05)			
	T	4.07	.72	4.07	.76	3.98	.72	3.90	.76	3.98	.70	3.92	.75	3.87	.73	3.74	.81									
Indi	M	4.48	.43	4.22	.73	4.19	.93	4.18	.91	4.22	.79	4.01	.97	4.11	.84	3.89	.94	.09	.01	.00	.53	.98	.00	.82	.11	.97
	F	4.62	.45	4.34	.77	4.31	.84	4.31	.74	4.29	.74	4.08	.87	4.21	.70	4.06	.86	(.08)		(-.36)			(-.12)			
	T	4.54	.44	4.27	.74	4.25	.89	4.24	.83	4.25	.77	4.04	.92	4.16	.78	3.97	.91									
Ego	M	4.43	.59	4.18	.93	3.83	1.01	3.73	1.15	3.81	1.02	3.65	1.11	3.84	1.01	3.75	.96	.00	.01	.00	.19	.31	.00	.59	.59	.99
	F	3.89	.86	3.57	.99	3.80	.95	3.67	1.07	3.48	1.22	3.24	1.24	3.49	1.19	3.37	1.15	(-.24)		(-.45)			(-.13)			
	T	4.22	.75	3.94	.99	3.82	.98	3.70	1.10	3.65	1.12	3.46	1.19	3.67	1.11	3.56	1.07									
Comp	M	4.36	.60	4.22	.88	3.96	1.08	3.77	1.11	3.91	1.00	3.63	1.16	3.87	1.02	3.69	1.00	.00	.00	.00	.12	.36	.00	.10	.51	.94
	F	4.12	.97	3.71	.92	3.98	.94	3.70	1.15	3.58	1.05	3.16	1.24	3.58	1.13	3.31	1.09	(-.20)		(-.55)			(-.19)			
	T	4.27	.76	4.02	.92	3.97	1.01	3.74	1.13	3.75	1.04	3.41	1.22	3.73	1.08	3.50	1.06									
AchS	M	4.58	.48	4.14	1.07	4.16	.98	3.96	.99	3.89	1.12	3.50	1.26	3.76	.96	3.33	1.11	.95	.00	.00	.18	.61	.00	.49	.20	.27
	F	4.62	.51	4.53	.58	4.25	.85	3.96	1.04	3.82	.99	3.29	1.15	3.58	1.11	3.30	1.14	(.00)		(-1.07)			(-.23)			
	T	4.60	.49	4.29	.92	4.20	.92	3.96	1.01	3.86	1.06	3.40	1.21	3.67	1.04	3.31	1.12									
AvdF	M	4.60	.65	4.63	.37	4.09	1.14	4.07	1.00	3.87	1.28	3.65	1.31	3.67	1.18	3.49	1.20	.22	.00	.00	.34	.59	.00	.37	.25	.47
	F	4.57	.95	4.29	.88	4.22	1.18	3.95	1.18	3.71	1.23	3.24	1.25	3.42	1.38	3.29	1.23	(-.09)		(-1.06)			(-.17)			
	T	4.59	.77	4.28	1.06	4.15	1.16	4.01	1.09	3.80	1.25	3.46	1.29	3.54	1.28	3.39	1.21									

Note. For each motivation scale a 2 (time) x 4 (year in school) x 2 (gender) analysis of variance was conducted in which time was a repeated measures (within-subject) variable and gender and year in school were between subject variables. For year in school, linear (Ylin) and quadratic (Yqud) were also evaluated. The p-values for each effect are presented. The values in parentheses under p-values for gender, the linear effect of year, and time are coefficients reflecting the mean differences associated with each of these one degree of freedom contrasts (see Norusis, 1994, for further detail).

Appendix 1

Motivation Orientation Items

MASTERY ORIENTATION

1. I feel most successful in school when I reach personal goals
2. I feel most successful in school when I really improve.
3. I feel most successful in school when I reach a goal or target.
4. I feel most successful in school when I work to the best of my ability.
5. I feel most successful in school when I do something I could not do before.
6. I feel most successful in school when I do my best work.

EGO ORIENTATION

1. I feel most successful in school when I am the best.
2. I feel most successful in school when I do better than other students.
3. I feel most successful in school when I show other students that I am the best.
4. I feel most successful in school when I do something others cannot do.
5. I feel most successful in school when I know more than other students.
6. I feel most successful in school when I get more answers right than my friends.

COMPETITIVE ORIENTATION

1. I like trying to do better than other students.
2. I learn the most when I try to do better than other students.
3. I do my best work when I try to do better than other students.
4. I work harder when I try to do better than other students.
5. Trying to do better than others makes me work well.
6. I do well when I try to be the best student in my class.

INDIVIDUAL ORIENTATION -

1. I like to work on my own.
2. I learn the most when I work on my own.
3. I do my best work when I work on my own.
4. I work best when nobody bothers me.
5. When I work on my own I get more done.
6. I work best by myself.

COOPERATIVE ORIENTATION

1. I like to work with other students.
2. I learn the most when I work with other students.
3. I do my best work when I work with other students.
4. I like to help other people do well in a group.
5. It is helpful to put together everyone's ideas when working on a project.
6. I feel most successful when my friends and I help each other figure things out.

INTRINSIC ORIENTATION

1. I do my school work because I like learning new things.
2. I do my school work because I enjoy figuring things out.
3. I do my school work because I enjoy thinking hard.
4. I do my school work because I like to solve hard problems.
5. I do my school work because I enjoy trying to understand new things.
6. I do my school work because what we learn is really interesting.

ORIENTATION TO ACHIEVE SUCCESS

1. I do my school work because I want my teacher to be pleased with me.
2. I do my school work because I want to get good marks from my teacher.
3. I do my school work because I want my teacher to think that I am smart.
4. I do my school work because I want my teacher to say nice things about me.

ORIENTATION TO AVOID FAILURE

1. I do my school work because I DO NOT want to get into trouble with my teacher.
2. I do my school work because I DO NOT want my teacher to give me bad marks.
3. I do my school work because I DO NOT want my teacher to think that I am dumb.
4. I do my school work because I DO NOT want my teacher to say bad things about me.

Appendix 2

Factor Loadings Relating 88 items to Eight Motivation Factors at Time 1 and Time 2.

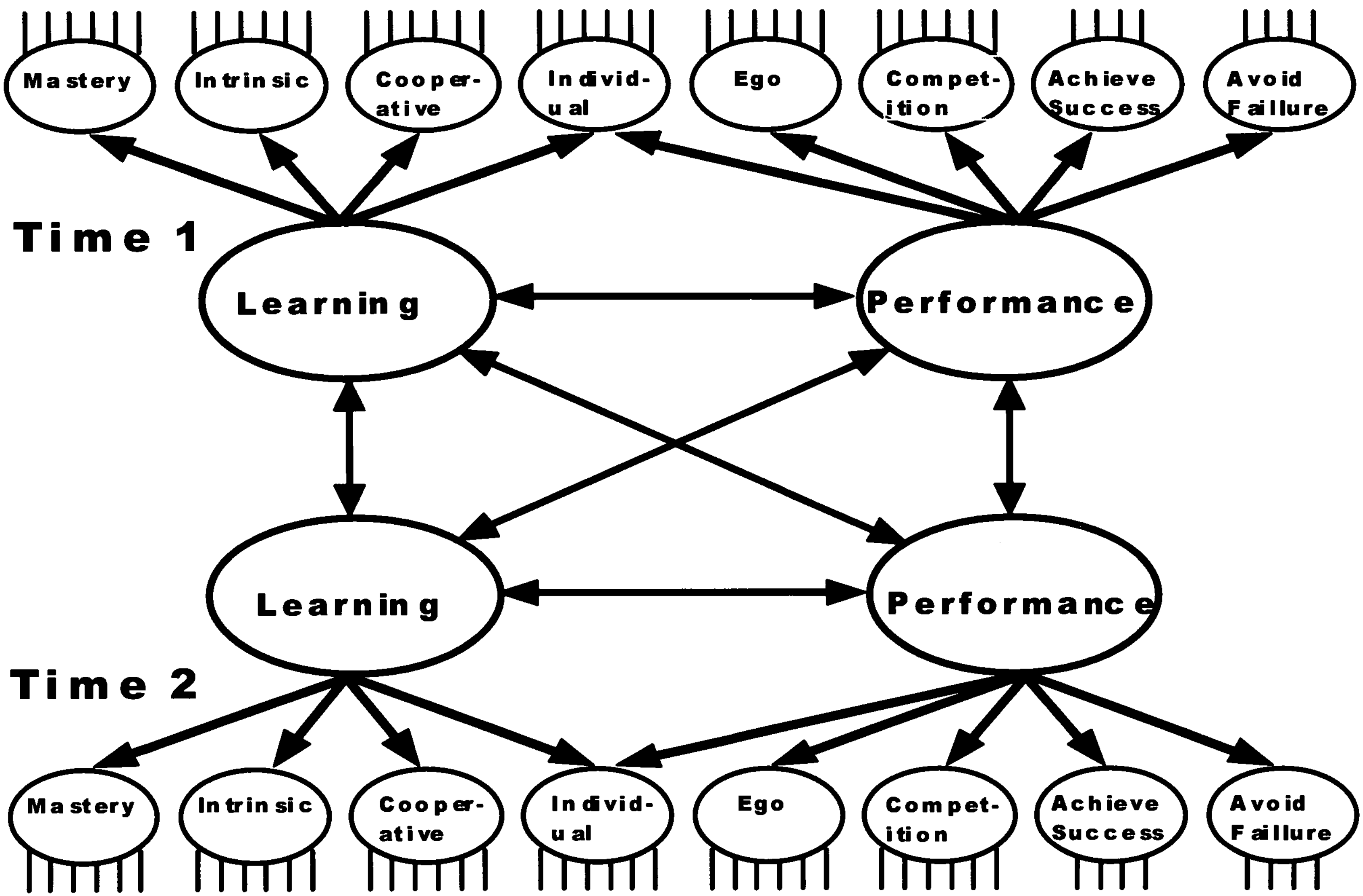
		Factor Loadings																Residuals	
		Time 1								Time 2									Corr
		Mas	Ego	Com	Ind	Cop	Int	AS	AF	Mas	Ego	Com	Ind	Cop	Int	AS	AF	Uniq	Uniq
Time 1																			
Mas	1	.61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.62	
	2	.72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.47	
	3	.72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.48	
	4	.71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.49	
	5	.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.56	
	6	.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.43	
Ego	1	0	.72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.47	
	2	0	.78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.39	
	3	0	.86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.26	
	4	0	.84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.30	
	5	0	.88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.23	
	6	0	.83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.31	
Com	1	0	0	.72	0	0	0	0	0	0	0	0	0	0	0	0	0	.47	
	2	0	0	.83	0	0	0	0	0	0	0	0	0	0	0	0	0	.31	
	3	0	0	.87	0	0	0	0	0	0	0	0	0	0	0	0	0	.24	
	4	0	0	.88	0	0	0	0	0	0	0	0	0	0	0	0	0	.23	
	5	0	0	.84	0	0	0	0	0	0	0	0	0	0	0	0	0	.29	
	6	0	0	.83	0	0	0	0	0	0	0	0	0	0	0	0	0	.31	
Ind	1	0	0	0	.53	0	0	0	0	0	0	0	0	0	0	0	0	.72	
	2	0	0	0	.74	0	0	0	0	0	0	0	0	0	0	0	0	.45	
	3	0	0	0	.84	0	0	0	0	0	0	0	0	0	0	0	0	.29	
	4	0	0	0	.78	0	0	0	0	0	0	0	0	0	0	0	0	.39	
	5	0	0	0	.85	0	0	0	0	0	0	0	0	0	0	0	0	.27	
	6	0	0	0	.86	0	0	0	0	0	0	0	0	0	0	0	0	.26	
Cop	1	0	0	0	0	.58	0	0	0	0	0	0	0	0	0	0	0	.65	
	2	0	0	0	0	.70	0	0	0	0	0	0	0	0	0	0	0	.51	
	3	0	0	0	0	.56	0	0	0	0	0	0	0	0	0	0	0	.70	
	4	0	0	0	0	.68	0	0	0	0	0	0	0	0	0	0	0	.55	
	5	0	0	0	0	.66	0	0	0	0	0	0	0	0	0	0	0	.56	
	6	0	0	0	0	.53	0	0	0	0	0	0	0	0	0	0	0	.71	
Int	1	0	0	0	0	0	.79	0	0	0	0	0	0	0	0	0	0	.36	
	2	0	0	0	0	0	.81	0	0	0	0	0	0	0	0	0	0	.34	
	3	0	0	0	0	0	.80	0	0	0	0	0	0	0	0	0	0	.36	
	4	0	0	0	0	0	.79	0	0	0	0	0	0	0	0	0	0	.39	
	5	0	0	0	0	0	.84	0	0	0	0	0	0	0	0	0	0	.30	
	6	0	0	0	0	0	.78	0	0	0	0	0	0	0	0	0	0	.39	
AS	1	0	0	0	0	0	0	.70	0	0	0	0	0	0	0	0	0	.49	
	2	0	0	0	0	0	0	.74	0	0	0	0	0	0	0	0	0	.45	
	3	0	0	0	0	0	0	.83	0	0	0	0	0	0	0	0	0	.31	
	4	0	0	0	0	0	0	.88	0	0	0	0	0	0	0	0	0	.23	
AF	1	0	0	0	0	0	0	0	.78	0	0	0	0	0	0	0	0	.38	
	2	0	0	0	0	0	0	0	.82	0	0	0	0	0	0	0	0	.32	
	3	0	0	0	0	0	0	0	.90	0	0	0	0	0	0	0	0	.20	
	4	0	0	0	0	0	0	0	.89	0	0	0	0	0	0	0	0	.20	

Appendix 2 Continued on next page

	Factor Loadings																Residuals	
	Time 1								Time 2									Corr
	Mas	Ego	Com	Ind	Cop	Int	AS	AF	Mas	Ego	Com	Ind	Cop	Int	AS	AF	Uniq	Uniq
Time 2																		
Mas 1	0	0	0	0	0	0	0	0	.71	0	0	0	0	0	0	0	.49	.08
2	0	0	0	0	0	0	0	0	.74	0	0	0	0	0	0	0	.45	.05
3	0	0	0	0	0	0	0	0	.78	0	0	0	0	0	0	0	.39	.04
5	0	0	0	0	0	0	0	0	.78	0	0	0	0	0	0	0	.39	.01
6	0	0	0	0	0	0	0	0	.78	0	0	0	0	0	0	0	.39	.06
7	0	0	0	0	0	0	0	0	.79	0	0	0	0	0	0	0	.38	.04
Ego 1	0	0	0	0	0	0	0	0	0	.77	0	0	0	0	0	0	.40	.08
2	0	0	0	0	0	0	0	0	0	.79	0	0	0	0	0	0	.39	.02
3	0	0	0	0	0	0	0	0	0	.86	0	0	0	0	0	0	.27	.00
4	0	0	0	0	0	0	0	0	0	.86	0	0	0	0	0	0	.26	.04
5	0	0	0	0	0	0	0	0	0	.89	0	0	0	0	0	0	.21	.01
6	0	0	0	0	0	0	0	0	0	.82	0	0	0	0	0	0	.32	.06
Com 1	0	0	0	0	0	0	0	0	0	0	.79	0	0	0	0	0	.38	.06
2	0	0	0	0	0	0	0	0	0	0	.86	0	0	0	0	0	.26	.00
3	0	0	0	0	0	0	0	0	0	0	.87	0	0	0	0	0	.24	.01
4	0	0	0	0	0	0	0	0	0	0	.90	0	0	0	0	0	.19	.02
5	0	0	0	0	0	0	0	0	0	0	.85	0	0	0	0	0	.26	.04
6	0	0	0	0	0	0	0	0	0	0	.86	0	0	0	0	0	.26	.02
Ind 1	0	0	0	0	0	0	0	0	0	0	0	.64	0	0	0	0	.59	.13
2	0	0	0	0	0	0	0	0	0	0	0	.80	0	0	0	0	.36	.03
3	0	0	0	0	0	0	0	0	0	0	0	.85	0	0	0	0	.27	.02
4	0	0	0	0	0	0	0	0	0	0	0	.82	0	0	0	0	.32	.03
5	0	0	0	0	0	0	0	0	0	0	0	.85	0	0	0	0	.28	-.03
6	0	0	0	0	0	0	0	0	0	0	0	.90	0	0	0	0	.19	-.01
Cop 1	0	0	0	0	0	0	0	0	0	0	0	0	.60	0	0	0	.63	.14
2	0	0	0	0	0	0	0	0	0	0	0	0	.80	0	0	0	.36	.07
3	0	0	0	0	0	0	0	0	0	0	0	0	.67	0	0	0	.56	.17
5	0	0	0	0	0	0	0	0	0	0	0	0	.72	0	0	0	.47	.06
6	0	0	0	0	0	0	0	0	0	0	0	0	.65	0	0	0	.60	.14
7	0	0	0	0	0	0	0	0	0	0	0	0	.53	0	0	0	.73	.11
Int 1	0	0	0	0	0	0	0	0	0	0	0	0	0	.80	0	0	.35	.05
2	0	0	0	0	0	0	0	0	0	0	0	0	0	.83	0	0	.31	-.02
3	0	0	0	0	0	0	0	0	0	0	0	0	0	.81	0	0	.34	.05
4	0	0	0	0	0	0	0	0	0	0	0	0	0	.80	0	0	.36	.05
5	0	0	0	0	0	0	0	0	0	0	0	0	0	.84	0	0	.30	.01
6	0	0	0	0	0	0	0	0	0	0	0	0	0	.70	0	0	.51	.07
AS 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.76	0	.42	.10
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.79	0	.38	.05
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.82	0	.33	.04
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.89	0	.20	.04
AF 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.75	.43	.08
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.83	.32	.03
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.87	.25	.03
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.92	.16	-.01

Note. Mas = Mastery, Ego = Ego, Com = Competitive, Ind = Individual, Cop = Cooperative, Int = Intrinsic, AS = Achieve Success, AF = Avoid Failure. All parameter estimates presented are completely standardized (Joreskog & Sorbom, 1989). Parameters with a value of 0 are fixed (not estimated) according to a priori hypotheses. Uniqueness (uniq) is residual variance in each measured variable and correlated uniquenesses are residual covariances relating the uniquenesses of the same item administered at Time 1 and T2. Factor correlations based on this solution are presented in Table 3.

Figure 1. A priori predictions about the relations between first-order (smaller circles) and higher-order (larger circles) motivation orientation factors, and relations between motivation orientations at T1 and T2. Critical predictions are that all the relations among first-order factors can be explained in terms of the two higher-order factors at each time separately, and that all relations between T1 first-order factors and T2 first-order factors can be explained in terms of relations between the T1 higher-order factors and the T2 higher-order factors. Single headed arrows represent higher-order factor loadings and double-headed arrows represent factor correlations. Each of the first-order factors is assessed with either 4 or 6 items. (Correlated between uniquenesses associated with matching items at T1 and T2 are not presented in order to avoid cluttering the diagram.



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