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Author(s)	Wenshu Luo, Kerry Lee and Ian Chong Hua Koh
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**Running head: MULTIPLE GOALS and ACHIEVEMENT**

**Do competitive performance goals and cooperative social goals conflict? A latent  
interaction analysis**

Wenshu Luo\*, Kerry Lee, and Ian Chong Hua Koh

Nanyang Technological University

\*Correspondence should be addressed to Dr. Wenshu Luo, Policy and Leadership Studies  
Academic Group, National Institute of Education, 1 Nanyang Walk, Singapore 637616;  
Email: [wenshu.luo@nie.edu.sg](mailto:wenshu.luo@nie.edu.sg); Tel: (65) 6790-3235; Fax: (65) 6316-4787.

### **Abstract**

From a multiple goals perspective, this study examined the potential interaction between competitive performance goals and cooperative social goals in their relationship with math achievement. A group of 297 Singapore Primary 4 students completed a survey on achievement goals and a math achievement test. We conducted a latent interaction analysis and found that after controlling for gender and socio-economic status (SES), these two types of goals did not predict math achievement, but there was a negative interaction between them. More specifically, higher social/performance goals were associated with higher math achievement when the other goals were low, and higher social/performance goals were associated with lower math achievement when the other goals were high. These findings suggest that competitive performance and cooperative social goals are conflicting when they are combined to predict achievement. The findings enhance our understanding of the multiple goals perspective and the implications for teaching and learning are discussed.

**Keywords:** multiple goals, performance goals, social goals, math achievement

Over the last three decades, achievement goals have been one of the most prominent constructs for understanding student motivation and learning. The theory of achievement goals has also undergone significant development over time. Most motivation researchers now agree that achievement goals are a multidimensional construct, which comprises various types of goals, such as mastery goals (approach and avoidance), performance goals (approach and avoidance), and social goals (e.g., social affiliation and social approval goals). In addition, from a multiple goals perspective, students can hold several goals at the same time, which might combine with each other in an additive, synergistic or antagonistic way. Although some studies examined the combined effect of mastery and performance goals in learning (e.g., Daniels et al., 2008; Luo, Paris, Hogan, & Luo, 2011; Pintrich, 2000), little research has examined the interplay between social goals and other achievement goals. Given the importance of the social context in schooling, achievement motivation should not be studied independently of social goals. In this study, we examined the interaction between social goals and performance goals with Singapore elementary students using a latent interaction analysis.

### **Achievement Goals and Learning**

Early research of achievement goals generally supported the traditional normative goal perspective, in which mastery goals are regarded as adaptive and performance goals are maladaptive (for a review, see Ames, 1992). More recently, however, some studies reported that performance goals facilitated learning in some situations, such as academic performance of university students (e.g., Barron & Harackiewicz, 2001; Elliot, McGregor, & Gable, 1999; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000). This inconsistency has prompted numerous empirical studies in student achievement goals. Furthermore, in recent years this motivational construct has undergone significant theoretical development in three areas.

First, both mastery and performance goals have been bifurcated by the approach-avoidance distinction, which leads to the  $2 \times 2$  achievement goal framework (Elliot & McGregor, 2001). Recent studies have shown that in general mastery approach goals are associated with positive learning profiles (e.g., Luo, Aye, Hogan, Kaur, & Chan, 2013; Luo, Paris, et al., 2011; Murayama & Elliot, 2009; Yeung, Craven, & Kaur, 2012). However, mixed findings have been associated with performance approach goals and researchers have not come to a consensus about whether performance approach goals should be encouraged (see Elliot & Moller, 2003; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Midgley, Kaplan, & Middleton, 2001). A recent meta-analysis suggests that there should be finer distinctions within performance approach goals, such as between those that focus on competitive/normative comparison and competence appearance/demonstration (Hulleman, Schrage, Bodmann, & Harackiewicz, 2010). The finding of this meta-analysis suggests that performance goals with a focus on normative comparison might be more adaptive to academic performance than performance goals with a focus on competence demonstration, but more studies should be carried out to examine their relative impact on student learning. The two types of avoidance goals have been generally associated with maladaptive learning, such as high anxiety, low perceived competence and low grades (for a meta-analysis, see Hulleman, et al., 2010).

Second, a multiple goals perspective has been proposed. Compared to the normative achievement goals perspective that regards mastery goals as the only adaptive type of goals, a multiple goals perspective points out that students may adopt multiple goals simultaneously, which leads to multiple pathways of learning (Barron & Harackiewicz, 2001; Harackiewicz, et al., 2002; Harackiewicz, et al., 2000; Pintrich, 2000). Using various methods, numerous studies have been conducted to examine the interplay between mastery and performance goals. Using

median splits to dichotomize mastery and performance approach goals, Pintrich (2000) found that eighth and ninth graders who endorsed high mastery and performance approach goals had an equally adaptive pattern of motivation, affect, cognition and achievement as those who just focused on mastery goals. Using K-means cluster analysis, Daniels et al. (2008) classified 1002 Canadian undergraduate students into four clusters, according to their mastery and performance approach goals. They found that the multiple goals, mastery goals, and performance goals clusters achieved significantly better than the low-motivation cluster, but performance-oriented students displayed a maladaptive emotional profile relative to the other three groups. More recently, using latent class cluster analysis, Luo, Paris, et al. (2011) identified four goal clusters: Diffuse (moderate multiple), Moderate Mastery (moderate mastery / low performance approach and avoidance), Success Oriented (moderate mastery / high performance approach and avoidance), and Approach (high mastery and performance approach / low performance avoidance). By examining cluster differences in a number of learning variables, they suggested that the goal profile with high mastery and performance approach goals combined with low performance avoidance goals is most beneficial for learning, whereas high performance approach goals, when associated with performance avoidance goals, have some negative effects on affective outcomes. Some other studies (e.g., Barron & Harackiewicz, 2001; Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Harackiewicz, et al., 2000) examined the two types of goals and their multiplicative term in multiple regression models and found that the two types of achievement goals were independently beneficial for different academic outcomes. With college students as participants, these studies reported that in general those adopting mastery goals were more interested in subject learning, but those adopting performance approach goals achieved higher performance.

Third, researchers have proposed that in addition to mastery and performance goals, students also hold social goals in academic achievement situations (Dowson & McInerney, 2003; Urdan & Maehr, 1995; Wentzel, 1999). We analyze social goals in the following sections.

### **Social Goals at School**

Schools are inherently social environments, and thus student achievement motivation cannot be studied in isolation of the social context of teaching and learning. There are different approaches towards student social goals. For example, a goal orientation approach distinguishes three achievement goal orientations towards achieving social competence in social domains that are analogous to mastery, performance approach and performance avoidance goals identified in academic domains (Ryan & Shim, 2006, 2008). A content approach defines goals (Wentzel, 1999, 2000) to be outcomes that direct individual behaviors, and students in school situations may try to achieve both academically (e.g., to do well in tasks) and socially (e.g., to please teachers, to gain approval from others, or to cooperate with classmates). To coordinate the pursuit of these goals effectively, students may prioritize goals and associate each other in hierarchical or causal fashion. For example, some students might pursue academic goals in order to achieve social goals (e.g., pleasing teachers or parents), while others might pursue social goals (e.g., pleasing teachers or adhering to classroom rules) in order to achieve academic goals (Wentzel, 1999, 2000). This former academic→social goal hierarchy is consistent with the definition of students' social goals to be the perceived social purposes for engaging or not engaging in academic study (Dowson & McInerney, 2003; Urdan & Maehr, 1995). We adopt this definition of social goals in this study. Based on interviews and classroom observations, Dowson and McInerney (2003) found various forms of social goals for engaging in academic study, including social affiliation goals (to work together with other students cooperatively in

academic study), social concern goals (to help others in academic study), social approval goals (to gain approval from parents, teachers, peers or others in academic study), social status goals (to promote present or future status through academic achievement), and social responsibility goals (to take the role expected or socially desirable in academic study).

Compared with mastery and performance goals, the role of social goals in student motivation and achievement is less clear. Some studies found the unique contribution of social goals in addition to other academic goals, while others revealed a less important role of social goals. For example, social goals to behave in prosocial and responsible ways have been related to student achievement and effort independently of academic goals (Wentzel, 1993, 1996). King, McInerney, and Watkins (2010) reported that social concern goals were associated with adaptive learning strategies and behaviors for Hong Kong students after controlling for mastery and performance goals. However, Ali, Craven, Yeung, McInerney, and King (2014) examined both performance and social goals and reported that only performance goals uniquely predicted the achievement of American high school students. In addition, researchers have suggested that social goals might have different meanings for achievement motivation across cultures, and in particular, social goals might be more salient in collectivistic than in individualistic cultures (Kumar & Maehr, 2007; Urda & Maehr, 1995; Watkins & Hattie, 2012).

### **Performance and Social Goals**

With the inclusion of social goals, a multiple goals perspective of achievement goals becomes more complex. Students may hold multiple academic and social goals simultaneously and these goals may work together in a complementing, conflicting or converging way (Dowson & McInerney, 2003; Urda & Maehr, 1995). For example, an early study reported that students' need for achievement and need for affiliation was in conflict because students high in both needs

were less able to maintain attention effectively and achieved lower than those high only in achievement need (Schneider & Green, 1977).

From a multiple goals perspective, many studies have examined how performance goals and mastery goals are combined to influence student learning and achievement. However, little research has been done to examine the potential interplay between performance goals and social goals. Although researchers usually regard performance goals as a type of academic goals that are distinct from social goals (Dowson & McInerney, 2003; Luo et al., 2014; Urdan & Maehr, 1995), the others-referenced performance goals also have a social component, where students want to do better than others in social comparison or demonstrate higher competence than others (Ali, et al., 2014; Elliot & Moller, 2003). According to Wentzel (1999, 2000), performance goal orientation reflects a type of academic→social goal hierarchy, where students engage in academic tasks in order to gain positive or avoid negative social judgments of the self. Because performance goals emphasize social comparison and competition, they are conflicting with some other social goals in theory, such as social affiliation and concern, which emphasize social relatedness or harmony with others. Therefore, it is intriguing to investigate how performance goals work in conjunction with other types of social goals. A recent study using median splits of raw scores, however, did not find interaction effects between social goals to work with others and mastery and performance goals on students' achievement, learning strategies and self-beliefs (Watkins & Hattie, 2012). Clearly, more studies are needed to examine the motivational role of social goals in student learning as well as the potential interaction between the various types of social and academic goals from a multiple goals perspective.

## **The Present Study**

In this study, we examined whether performance goals and social goals interact with each other in their relationship with math achievement. There are a variety of social goals. However, in this study we focused on social goals that are characterized by social affiliation and social concern, and thus these social goals had a cooperative nature. Performance goals in this study referred to performance approach goals focusing on normative comparison, where students pursue their study for outperforming others, and thus performance goals had a competitive nature. In this study, we hypothesized that performance goals and social goals would interact with each other in a conflicting manner in their relationship with math achievement. In other words, higher social goals would be associated with higher math achievement when students do not simultaneously endorse high performance goals. Similarly, higher performance goals would be associated with higher math achievement when students do not simultaneously endorse high social goals. In addition, regarding the general relationship between the two types of goals and achievement, due to the mixed findings in the literature and also relatively little research for elementary children, we left the question to be answered by the data. In addition, to partial out the variance that can be attributed to gender (Meece, Glienke, & Burg, 2006; Mendick, 2005) and SES differences (e.g., Cappella & Weinstein, 2001; Walker, Petrill, & Plomin, 2005), we examined the above hypotheses by controlling for these two demographic covariates.

This study was conducted in Singapore, a westernized East Asian country that combines elements of Confucian ethics with an overlay of Western cultural and institutional orientations (Luo, Hogan, & Paris, 2011; Tu, Hejtmanek, & Wachman, 1992). In addition, the education system in Singapore is very competitive. In a small country with few natural resources, educational success is very important for the future success of individuals as well as the nation.

Competition is intense even in primary schools due to the high-stakes examination at the end of primary school. This unique culture and education environment might lead to the salience of both performance and social goals in students.

## Method

### Participants and Procedure

This study is part of a larger project that examined students' cognitive development, motivation, and math achievement. The earlier publications based on this project mainly focused on cognitive variables, such as executive functioning (e.g., Lee, Bull, & Ho, 2013). In this study, the participants were 297 Grade 4 students from 5 primary schools (149 boys) located in middle- to lower-middle-class areas in western Singapore. These students were mostly 10 years old ( $SD = .08$ ). They completed a number of tasks that measured student motivation, intelligence, executive functioning, and math achievement. The present study focused on goal orientations and math achievement only. SES was reported by parents and indicated by family monthly income in six categories, ranging 1- 6 with higher value meaning higher SES.

### Measures

***Performance and social goals.*** The items used to measure performance and social goals were adopted from McInerney and Ali (2006). Four items from the competition subscale were employed to measure competitive performance goals. They are, "I am only happy when I am one of the best in class at school," "I want to do well at school to be better than my classmates at school," "I work hard if I'm trying to be better than others at school," and "Coming first is very important to me at school." Four items from the affiliation and social concern subscales were used to measure cooperative social goals. The items are, "I try to work with friends as much as possible at school," "I do my best work at school when I am working with others," "I like to help

other students do well at school,” and “I enjoy helping others with their schoolwork even if I don’t do so well myself.” The items were rated on a five-point Likert scale (1= strongly disagree; 5 = strongly agree).

Exploratory factor analysis (EFA) using Maximum Likelihood method was carried out with the 4 items on performance goals. Based on eigenvalue  $> 1$  and the scree plot of eigenvalues, one factor was identified, which explained 33.51% of the variance in the items. However, one of the four items had a factor loading of 0.35. This item is “I am only happy when I am one of the best in class at school.” Since this is the only item with emotion component among the four items, we removed this item for a clearer factor meaning. The other 3 items measure competitive performance goals based on normative comparison (see Hulleman, et al., 2010 for a meta-analysis of different types of achievement goals). We also conducted EFA with the four items on social concern and affiliation and found that there was clearly a single factor (based on eigenvalue  $> 1$  and the scree plot of eigenvalues), which explained 36.88% of the variance in the items. Confirmatory factor analysis (CFA) was then conducted in Mplus 7.3 with the seven items on performance and social goals and the results showed that the two-factor model had a good fit: Chi-square (13) = 20.86,  $p = .08$ ; Comparative Fit Index (CFI) = .97; Root Mean Square Error of Approximation (RMSEA) = .04; Standardized Root Mean Square Residual (SRMR) = .04. The standardized factor loadings ranged .46 - .77.

***Math achievement.*** The Mathematical Reasoning task of the Wechsler Individual Achievement Test-Edition 2 (WIAT-II, Wechsler, 2001) was used to assess math achievement. The test has been validated to apply to people ranging from 4 to 85 years old. Participants answered single- and multi-step word problems during this task, and the published standardized administration procedure was observed. Participants were awarded one point for each correct

response, with a possible total score range of 0 - 67. We did intra-class correlation (ICC) to decompose the variance in math achievement at the school and student level and found an ICC of .03, indicating that only 3 percent of the variance in math achievement was due to variation across the five schools. Thus, we did the statistical analysis only at the student level.

### **Statistical Analysis**

We employed structural equation modeling (SEM) to examine the relations of performance and social goals and their interaction term to students' math achievement. Rather than using composite raw scores, we formed an interaction term between the two latent factors of performance and social goals in Mplus 7.3 to predict math achievement. Latent interaction analysis has only recently been accessible to applied researchers and used to examine moderation effects (Marsh, Wen, & Hau, 2004; Trautwein, Marsh, Nagengast, & Ludtke, 2012). Due to its correction for measurement errors using latent factors, latent interaction analysis is superior to traditional regression analysis using raw scores for examining interaction effects.

To examine the unique contribution of each predictor, we specified a series of 5 models. In baseline Model 0, we included only gender and SES to predict math achievement. Based on Model 0, we added the factor of performance goals in Model 1 to examine its contribution to math achievement after controlling for the two covariates. Based on Model 0, we added the factor of social goals in Model 2 to examine the contribution of social goals to math achievement after controlling for the two covariates. Based on Model 0, we then added both factors in Model 3 to examine whether they uniquely predict math achievement after controlling for each other and the two covariates. In Model 4, we further included the interaction term between the two latent factors (using the XWITH command in Mplus 7.3) to examine whether they interact with each other when predicting math achievement. For the latent interaction model (Model 4), we

specified type = random and algorithm = integration under the analysis command to estimate parameters (L. Muthen & Muthen, 2010).

To facilitate interpretation of the results, before running the SEM analysis we standardized all the indicators for performance and social goals as well as SES and total scores of math achievement, which was used as a manifest variable in the analysis (see also Trautwein, et al., 2012). The indicators were treated as continuous data in the analysis, and we used the MLR estimator in Mplus to correct test statistics and standard errors for non-normality of the observations (L. Muthen & Muthen, 2010). In SEM analysis, the factors were scaled by constraining the factor loading of the first item to be 1. The unstandardized regression coefficients are reported in this study. Since total scores of math achievement were standardized before running the analysis (with the variance = 1), the reduction in its residual variance indicated the explained variance by the predictors.

## Results

The descriptive statistics are shown in Table 1. It can be seen that students reported higher social goals ( $M = 4.10$ ) than performance goals ( $M = 3.66$ ). The correlations among the six variables based on raw scores are also shown in Table 1. Girls tended to report higher social goals than boys ( $p < .01$ ). There was no significant zero-order correlation between gender and math achievement. SES was found to be positively correlated with math achievement. In addition, performance goals showed a modest positive correlation with social goals. Neither performance nor social goals were significantly correlated with math achievement.

The results of SEM analyses of the five models are shown in Table 2. In Model 0, there were only two covariates as predictors. Gender showed a marginally significant negative relationship and SES showed a significant positive relationship with math achievement. The total

variance explained by the two covariates was 11.2%. Based on Model 0, Model 1 included one more predictor, performance goals, and it did not significantly predict math achievement. Based on Model 0, Model 2 included another predictor, social goals, and it did not significantly predict math achievement. Based on Model 0, Model 3 included both performance and social goals. Neither performance goals nor social goals significantly predicted math achievement.

Based on Model 3, in Model 4 we further added the latent interaction term between the two factors of performance and social goals. For this nonlinear interaction model, Mplus 7.3 did not produce the conventional chi-square and related fit statistics because they are insensitive to incorrectly leaving out latent variable interactions (Mooijaart & Satorra, 2009; B. Muthen, 2012). Since Model 3 with the interaction term constrained to be zero was a special case of (nested in) Model 4, we could do a log likelihood-ratio test to compare the two models (B. Muthen, 2012). Based on the log likelihood values for the two models in Table 2, the log likelihood-ratio =  $-2 (-3772.01 - 3767.67) = 8.68$ , with degree of freedom = 1, which was statistically significant ( $p < .01$ ) based on the approximate chi-square test. Consistently, as shown in Table 2, the interaction term was statistically significant ( $p < .01$ ). In addition, we could also compare the Akaike (AIC) and Bayesian Information Criteria (BIC) for the two models since they had the same endogenous variables (personal communication with Linda Muthen, 2014). As shown in Table 2, Model 4 with the interaction term showed smaller values in these two indexes, indicating that it had a better fit than Model 3. Thus, the more complex Model 4 was preferred over the more constrained Model 3. After controlling for gender and SES, performance and social goals did not significantly predict math achievement, but there was a significant negative interaction between them. Compared with Model 3, the unique variance in math achievement explained by the interaction term was 5.2% (17.8% - 12.6%).

The interaction effect between performance and social goal orientations is illustrated in Figure 1. The factor scores of both performance and social goals from CFA (with indicators standardized) were split into two categories at the mean of 0: low ( $\leq 0$ ) and high ( $> 0$ ). As shown in Figure 1(a), when performance goals were low, higher social goals were associated with higher math achievement. However, when performance goals were high, higher social goals were associated with lower math achievement. Similarly, as shown in Figure 1(b), when social goals were low, higher performance goals were associated with higher math achievement. However, when social goals were high, higher performance goals were associated with lower math achievement.

### **Discussion**

In this study, we examined the potential interaction between performance and social goals in relation to students' math achievement. Performance goals were measured as competitive normative-referenced goals, while social goals were operationalized to be cooperative in nature characterized by working with and helping other students. We found that neither performance goals nor social goals were significantly associated with math achievement. However, consistent with our hypothesis, these two types of achievement goals interacted with each other in a conflicting manner in their relationship with math achievement. We discuss the theoretical and practical implications of these findings in the following sections.

In this study, we found a modest positive correlation between performance and social goals. This is consistent with the positive correlation between these two types of goals reported in previous studies (e.g., Ali, et al., 2014; McInerney & Ali, 2006; Watkins & Hattie, 2012). Consistent with a multiple goals perspective (Wentzel, 1999, 2000), this finding suggests that students may take both competitive performance goals and cooperative social goals

simultaneously in their study. However, the significant negative interaction between these two types of goals indicates that they did not relate to student achievement independently. Higher social goals were associated with higher math achievement only when performance goals were low. When performance goals were high, higher social goals were associated with lower math achievement. This was also the case for performance goals. These findings suggest that when the other type of goals was lacking, endorsing either high performance goals or high social goals can motivate students to learn and perform better. The negative interactive effect between performance and social goals may be explained by the conflicting nature of the two types of goals. When pursuing performance goals, students want to compete and outperform their classmates so as to be one of the best in the class. Based on their theoretical analysis, Elliot and Moller (2003) pointed out that the use of others as a reference point when pursuing performance approach goals entails striving against others, which “may cause direct relational difficulties, as when it turns friends into rivals, or causes jealousy, envy, or hostile feelings” (p. 345). However, when pursuing social affiliation and concern goals, students want to study together with other students in a cooperative way and help others to do well. For those who hold high social and performance goals simultaneously, the intention to compete with others and the emotions experienced in competition might inhibit them from engaging in both individual and cooperative learning activities. This finding corroborated some early studies which reported that the strong need for achievement and the strong need for affiliation might be in conflict (for a review, see Urdan & Maehr, 1995).

The study contributes to our understanding of the multiple goals perspective. Previous studies mainly examined the multiple goals perspective based on mastery and performance goals (e.g., Barron & Harackiewicz, 2001; Daniels, et al., 2008; Harackiewicz, et al., 1997; Luo, Paris,

et al., 2011; Pintrich, 2000). Although some achievement goals authors have argued that the various social goals and academic goals can work together in various manners, little empirical evidence has been obtained about these theoretical speculations. This study provides an empirical demonstration of the conflicting relationship between competitive performance and cooperative social goals in predicting academic achievement. These findings add to our understanding of the multiple goals perspective that at least these two specific types of achievement goals are antagonistic when predicting student achievement.

The findings of this study might be related to the unique cultural and educational context of Singapore. In Singapore, the traditional collectivistic culture emphasizes the role of important others in one's self-definition and values harmonious relationship with each other (Luo, Hogan, et al., 2011; Luo, et al., 2014). In addition, in recent years, collaborative learning and problem solving has gained increasing emphasis in Singapore education in view of its value in cultivating 21st century competencies in students and preparing them to meet the demands of future workplace. On the other hand, the meritocratic education system in Singapore encourages competition based on ability and effort. High-stakes examinations and streaming practices lead to intense competition in Singapore education. In recent years, due to the increased concern that students are driven externally by an excessive focus on national examinations and may not be adequately engaged in learning process, the strategic direction of Singapore education system is to transform learning from quantity to quality (Ng, 2008). Teachers are urged to teach less to the test, apply more formative assessment, encourage less rote learning but more active, collaborative and inquiry-based learning. However, the assessment practice in Singapore is still dominated by high-stakes examinations (Tan, 2011). This unique cultural and educational environment may promote both competitive performance and cooperative social goals. Although

normative performance approach goals might be adaptive to academic performance especially when the education environment is competitive (e.g., Chan, Wong, & Lo, 2012; Harackiewicz, et al., 2000), the findings in this study suggest that it may not be helpful to endorse both competitive performance and cooperative social goals simultaneously, at least for young children. Research on classroom goal structure has associated students' endorsement of performance goals with a controlling classroom climate with a comparative evaluation focus (e.g., Anderman & Midgley, 1997; Church, Elliot, & Gable, 2001; Luo, Hogan, et al., 2011; Roeser, Midgley, & Urdan, 1996). In a competitive education environment where students need to compete in high-stakes examinations, teachers may tend to promote comparative performance goals in the classroom. Therefore, the important implication for classroom teaching is that when encouraging students to collaborate with each other, teachers should not stress the importance of "winning" in academic competition at the same time, especially in students' immediate classroom environment. Furthermore, it might also be important to enhance students' goals coordination skills, such as goals prioritizing and selective attention, so that they won't become distracted or overwhelmed when pursuing multiple goals (Wentzel, 1999). This might be particularly important in an educational environment which values both collaboration and competition, and for elementary students who might not be well attuned to competitive and comparative evaluation (Elliot & Moller, 2003; Midgley, et al., 2001).

### **Limitations and Future Directions**

In this study, we examined the interactivity of performance and social goals in predicting student math achievement with Singapore primary school children. Due to the correlational nature of the study, we cannot decide the causal order of goal orientations and achievement. It is possible that there are reciprocal relationships between performance and social goals and

achievement (e.g., Seaton, Parker, Marsh, Craven, & Yeung, 2014). In addition, we only examined two specific types of achievement goals, normative-referenced performance approach goals and cooperative social goals characterized by social concern and affiliation. There are other types of performance goals, such as competence demonstration performance goals (Hulleman, et al., 2010; Senko, Hulleman, & Harackiewicz, 2011) and also other types of social goals, such as social approval goals and social status goals, which were not measured in this study. These different types of goals may combine to affect student learning in different ways. Future studies should investigate how different types of social and academic goals work together to influence learning.

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*Table 1**Descriptive Statistics and Correlations based on Raw Scores*

	Range	<i>M</i>	<i>SD</i>	SES	Performance goals	Social goals	Math achievement
Gender	(0, 1)	.50	.50	.02	-.08	.19**	-.09
SES	(1, 6)	3.83	1.63	--	-.05	-.04	.33**
Performance goals	(1, 5)	3.66	0.94		--	.12*	-.06
Social goals	(1.5, 5)	4.10	.74			--	.02
Math achievement	(24, 63)	45.52	6.97				--

*Note.* Gender: 0 = male, and 1 = female.

\* $p < .05$ , \*\* $p < .01$ .

Table 2

## Results of SEM Analyses

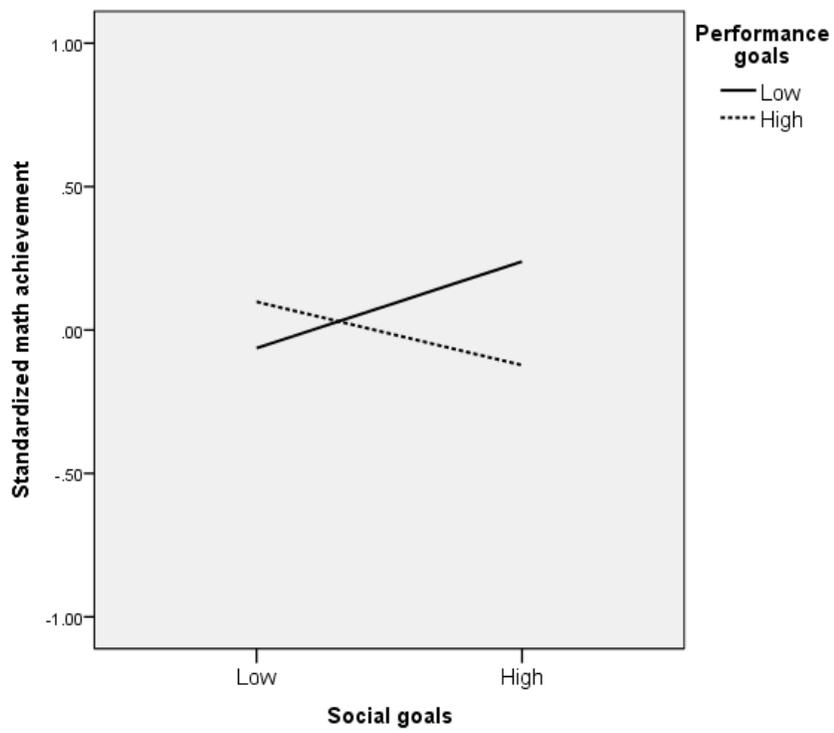
	Model 0	Model 1	Model 2	Model 3	Model 4
<b>Regression coefficients</b>					
Gender	-.20 <sup>^</sup>	-.19 <sup>^</sup>	-.21 <sup>^</sup>	-.23*	-.25*
SES	.34**	.33**	.33**	.33**	.32**
Performance goals		-.07		-.08	-.07
Social goals			.09	.11	.08
Performance*social goals					-.53**
<b>Residual and explained variance</b>					
Residual variance	0.888	0.877	0.877	0.874	0.822
Explained variance (%)	11.2%	12.3%	12.3%	12.6%	17.8%
<b>Model fit indexes</b>					
Chi-square	.00	3.96	19.85*	42.72*	
df	0	6	11	28	
CFI	1.00	1.00	.96	.96	
RMSEA	.000	.00	.05	.04	
SRMR	.000	.02	.03	.04	
Log-Likelihood				-3772.01	-3767.67
AIC				7618.02	7611.34
BIC				7754.69	7751.70

Note. Gender: 0 = male, and 1 = female.

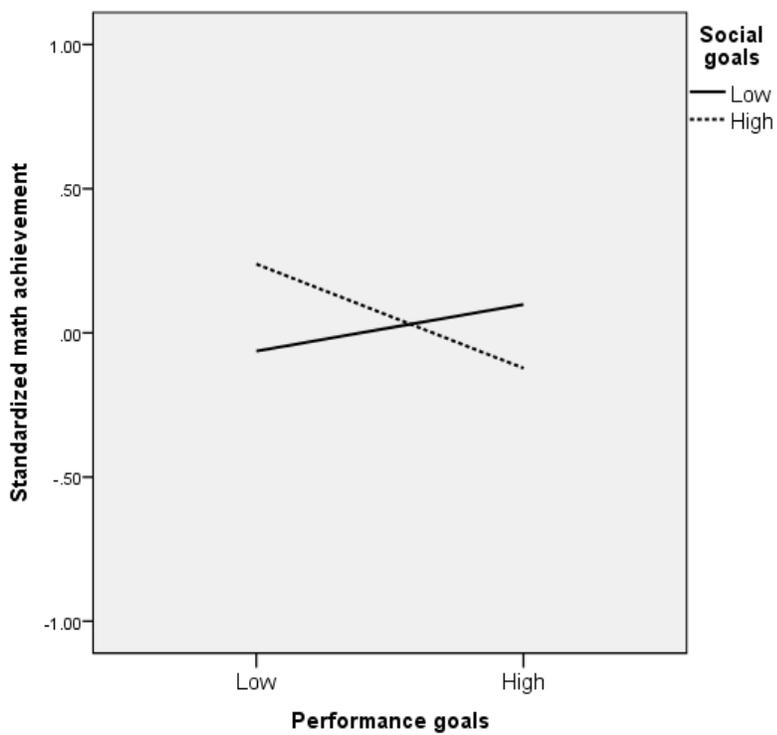
<sup>^</sup>  $p < .10$ , \* $p < .05$ , \*\* $p < .01$ .

**Figure caption**

*Figure 1. The interaction between performance and social goals.*



(a)



(b)