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Research Note

Goal-setting, Competition and Performance: Some Singaporean and American Similarities

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ABSTRACT

Two studies manipulated goal level and competition in 3 x 2 factorial designs. American university students in Study 1 (N = 99) solved routine arithmetic problems. When competition was operationalized objectively, an ANCOVA analysis of task performance showed only a main effect for goal setting. However, when participants were reclassified according to their perceptions of competition, results demonstrated that both goals and perceived competition had a significant positive effect on task performance. Analyses of several potential explanatory variables indicated that participants who felt a greater degree of competition also saw the task as more interesting, and had higher self-efficacy for doing the task. A second study, using Singaporean primary school children (N = 60), confirmed the positive performance effects of goal setting and competition, and generally replicated Study 1's questionnaire findings. Discussion centered on integrating these results with the findings of earlier investigations, and on the implications for competitive performance management systems.

INTRODUCTION

While researchers have consistently demonstrated that specific, difficult goals enhance an individual's performance on routine tasks (Locke & Latham, 1990), little is known about the usefulness of combining goals with other motivational techniques used to enhance output. For example, some investigators have questioned the use of financial incentives within a goal setting program (i.e., Garland, 1983); while others (i.e., Locke & Latham, 1990: 139-143) have advised that both the payment system and payment amount must be carefully considered when combining a goal setting approach with incentives.

Similar issues surround the simultaneous use of competition and goal setting in a performance situation. Although competition, like goal setting, often acts as a motivational spur to enhance individual performance (Paulus, 1989), it is not at all clear that this would be the case if the two techniques were used together. While especially enhanced performance represents one potential outcome of such a combination, three other less positive outcomes are also possible. First, if the

individual's goal was already difficult and maximally motivating, the presence of a second motivational spur could be redundant and unnecessary. Since competition could not further increase motivation, it might have no impact on performance. This "ceiling effect" would presumably be limited to individuals whose difficult goals were maximally motivating. For those having easier goals, competition might still augment performance.

A second possiblity is that competition might actually decrease the performance of task-doers with difficult goals, by "overmotivating" (e.g., Short & Sorrentino, 1986) them. This notion can be traced to the classic work of Yerkes and Dodson (1908), which suggests that a curvilinear relationship exists between arousal and performance. In the specific case of competition, one might anticipate that increased stress and pressure, combined with the arousal of an already difficult goal, causes overmotivation and lower performance. A similar conclusion, albeit from a different theoretical perspective, results from a consideration of the work of Kanfer and Ackerman (1989) on "attentional resources." For tasks that require a person's full attention (e.g., because of a difficult goal), the addition of competition may itself draw attentional resources needed to do the task, consequently reducing performance.

Finally, a third altenative exists which is even worse than the "reversal" effect described above. This is the possibility that competition may be dysfunctional under *all* goal setting conditions. For example, because competition highlights the interpersonal nature of many performance situations, it can shift a person's emphasis from simply "performing well" to "winning." Such a shift can cause individuals to experience anxiety, reduced concentration, and increased distractability (Eysenck, 1982), harming task performance.

Other theoretical perspectives lead to similar conclusions. First is Deci and Ryan's (1980; 1985) concept of intrinsic motivation. The concern here is that competition (with its associated contingent rewards) may shift perceptions of control from an internal to an external locus. A shift of this type typically lowers a person's intrinsic interest in the task; and this could ultimately lead to attenuated performance. Second, for individuals who feel less confident in their ability to perform the specified task, the presence of competition might be especially discouraging. If this resulted in their "giving up" prematurely (Campbell, 1982), poorer performance would also be expected.

Given the popularity of goal setting programs in many organizations, and the ubiquity of competition in the business environment, these potentially negative consequences are a concern. Surprisingly, few empirical investigations have examined the two motivational techniques together. For the most part, inferences about their combined effectiveness must be drawn from goal setting investigations that have included constructs only superficially similar to competition, i.e., evaluation apprehension (e.g., Jackson & Zedeck, 1982) and social facilitation (e.g., Rakestraw & Weiss, 1981). Both of these constructs are at best only weak representations of competition, if "competition" is conceptualized traditionally (e.g., Deutsch, 1973; Johnson, Maruyama, Johnson, Nelson & Skon, 1981; Latham & Baldes, 1975; Steers & Porter, 1974) as a "zero-sum" game where an individual can attain his ends only at the expense of others not attaining theirs.

Further, results from these investigations have been contradictory and inconclusive. For example, studies by Shalley, Oldham and Porac (1987) and White, Mitchell and Bell (1977), examining goal setting and evaluation apprehension (i.e., telling participants that their performance would be evaluated and compared to others who had also worked on the task), found that this weak form of competition *increased* an individual's performance independent of goal level. In contrast, two other studies found that it either had *no effect* on performance (Jackson & Zedeck, 1982: peer evaluation; Shalley & Oldham, 1985); or that it decreased performance (Jackson & Zedeck, 1982: supervisor evaluation). No obvious explanation is available to reconcile these inconsistent findings.

For different reasons, inferences about zero-sum competition and goal setting are also hard to draw from the social facilitation literature. Social facilitation refers to the finding that the simple presence of other individuals (either as an audience or as co-actors) affects a person's task

performance. Considerable evidence exists showing that social facilitation enhances a task doer ' s dominant task response (Zajonc, 1965). Thus, if social facilitation is seen as a weak form of competition, it may seem reasonable to infer that zero - sum competition will also increase performance. However, the reality is more complicated.

First, while social facilitation increases a dominant response, it only increases performance if that response is the correct one. As Zajonc (1965) and others have noted, if the dominant response is incorrect, then this form of competition actually decreases performance. Second, the presence of co - actors may not only increase the drive or arousal of a task doer (the theoretical explanation underlying the dominant response findings discussed above); they may also provide him with cues as to what is an appropriate performance level. Thus, even when the task doer ' s dominant response is correct, social facilitation may result in decreased performance if the task doer decides to model the behavior of low - performing co - actors. Both Rakestraw and Weiss (1981) and White et al., (1977) have demonstrated that co - actors ' positive and negative social cues do, in fact, lead to significantly different performance levels in task doers. Thus, while the results are clear, their complexity precludes straightforward generalization to traditional, zero - sum forms of competition.

One study (Campbell & Furrer, 1995) examined goal setting and zero - sum competition simultaneously. In this study, some groups of participants were given goals and competed for a limited number of additional extra - credit points. Other groups were just given goals. The investigators found that those participants who were given goals and competed for extra points performed significantly worse on sets of simple math problems than individuals given just goals alone. Thus, these findings indicate that competition, in combination with goal setting, decreases task performance and appears to be dysfunctional.

As noted above, the operationalization of competition in this study is substantially different from the evaluation cues and implicit comparisons examined by Shalley et al. (1987) and White et al. (1977); and this may help to explain the differences in findings. Interestingly, the operationalization of evaluation apprehesion most similar to zero sum competition is found in the Jackson and Zedeck (1982) study. In this study, the researchers created one form of evaluation apprehension by telling participants that, if their initial performance was not satisfactory, they would not be allowed to continue into the second part of the project; and, consequently, they would not get time credit for the second part. In this condition, similar to the Campbell and Furrer (1995) results, evaluation apprehension decreased performance.

While the findings of the Campbell and Furrer study (1995) are helpful, conclusions about simultaneous effects still have to be drawn cautiously, because the study was not able to identify the underlying causes of the performance decrease. Indirect evidence suggested that competition appeared to lower performance by interfering with a person ' s cognitive processes (presumably through decreased concentration or increased anxiety), but the questionnaire measures used in the study did not allow the researchers to test this speculation specifically.

Overall, it appears that the notion of " arousal " represents the best mechanism for integrating research results in this area. Depending on the *degree* of arousal generated, different combinations of goal setting and competition might inhibit a person ' s task performance, or might facilitate it. As noted, extreme arousal may cause individuals to experience anxiety, reduced concentration, and increased distractibility (Eysenck, 1982). It may " overmotivate " (Short & Sorrentino, 1986), resulting in feelings of stress and pressure. It may also take the form of discouragement, in individuals who feel less confident in their ability to perform the specified task (Campbell, 1982). For tasks requiring a person ' s full attention, high levels of arousal can draw away attentional resources needed to do the task (Kanfer & Ackerman, 1989).

At less extreme levels, arousal due to goals or competition might enhance performance, by increasing a person ' s interest in otherwise routine or unstimulating tasks. For example, Locke and Latharn (1990: 238) have cited evidence as far back as 1934 showing that factory workers used both interpersonal competition and goal setting to reduce boredom and generate work interest.

Later, in a series of laboratory studies, Locke and Bryan (1967) corroborated these accounts, consistently finding that specific goals resulted in increased task interest and less boredom. Other researchers examining competition (e.g., Epstein & Harackiewicz, 1992) have reached similar conclusions. Goals and competition can also facilitate performance by focusing and directing an individual's efforts, and by encouraging an individual to persist. These positive mechanisms – focus, increased concentration, and persistence – are the "mirror image" of several of the inhibiting mechanisms discussed above. These facilitating mechanisms presumably are characteristic of arousal levels closer to the individual's optimal level for performance.

Thus, we undertook the following research to examine the issues associated with goal-setting and competition in more depth. Specifically, we wanted to incorporate measures of the cognitive and affective variables thought responsible for increased or decreased performance; and we wanted to use disparate sets of research participants to insure that any findings were not an artifact of the population studied. Second, we wanted to compare performance results using both objective and subjective operationalizations of competition. Given the findings of Shalley et al. (1987) and White et al. (1977), it seemed possible that *subjective* perceptions of competition might result in outcomes different from those obtained using a zero-sum operationalization.

Based on the literature reviewed, and given the underlying logic of the "arousal" explanation, we hypothesized that the different combinations of goal setting and competition levels used in the present research would inhibit or facilitate task performance, depending on the degree of arousal generated. We were unable to specify in advance whether the combinations used would result in better or worse task performance (relative to goal setting alone), since this type of prediction requires a precise calibration of an individual's degree of arousal. Such precision is beyond the measurement capabilities of the current procedures. However, although we could not make directional predictions, we could reasonably anticipate that the combination of goal setting and competition would result in performance outcomes significantly *different from* goal setting alone. Thus, the following three hypotheses do not attempt to make directional predictions, but are simply framed in terms of performance differences:

> *H1: Individuals exposed to both goal setting and competition will have significantly higher (or lower) task performance than individuals exposed to goal setting alone.*
>
> *H2: Individuals exposed to both goal setting and competition will have significantly higher (or lower) scores on questionnaire measures of stress, distraction, and discouragement than individuals exposed to goal setting alone.*
>
> *H3: Individuals exposed to both goal setting and competition will have significantly higher (or lower) scores on questionnaire measures of self efficacy and intrinsic motivation than individuals exposed to goal setting alone.*
>
> *H4: Individuals with difficult goals will significantly outperform individuals with easier goals.*

The first three hypotheses are based on the logic of the arousal explanation described in the literature reviewed. The fourth hypothesis reflects the standard goal-setting performance effect (Locke & Latham, 1990). No hypotheses were proposed for differences between zero-sum competition and subjective perceptions of competition.

METHODOLOGY

Subjects

American university students (N = 102) were recruited from several undergraduate management courses and they all received extra credit for volunteering. Data from three individuals who mis-identified their assigned goal by more than 70% were discarded, reducing sample size to N = 99. Mean age of the participants was 22 years, with 95% falling between 20 to 24 years. Males comprised 63% of the sample.

Research Design

The experiment employed a 3 x 2 factorial design with 13 to 20 participants per cell. Three levels of goals (Easy; Moderate; and Difficult) and two levels of competition (Competitive; Non-competitive) were used. Performance on a set of simple math problems represented the major dependent variable. In actuality, participants worked on two sets of math problems. The first set established an ability level for each individual; and scores on this set were used as a covariate. The second set of problems were distributed after the experimental manipulations had occurred, and gauged the effects of these manipulations.

In addition to performance, the research also examined a set of questionnaire measures that focused on potential explanatory variables that could be related to a participant's task performance. These measures are described below.

Explanatory Variables

The research questionnaire collected three types of information: 1) typical demographic variables pertaining to each subject's background; 2) various manipulation checks; and 3) measures of five possible explanatory variables. Since we report the demographic information and manipulation checks elsewhere in the paper, only the potential explanatory variables are discussed here. These variables included measures of: a) stress; b) concentration; c) discouragement; d) intrinsic motivation; and e) self - efficicacy. Unless otherwise noted, participants rated all individual items using five-point, "strongly agree" (1) to "strongly disagree" (5) scales.

Stress. To measure this variable, the following three items were used: "I felt 'overloaded' while working on the math problems;" "I felt tense while working on the math problems;" and, "Participating in this study was a stressful experience." Coefficient α equalled .73. This scale was included in the research as an attempt to detect the increased stress and pressure presumably associated with overmotivation (Short & Sorrentino, 1986).

Distraction. For this variable, these three items were used: "I had no trouble keeping focused on the task;" "I could not keep my mind on the task during the study;" and, "I felt distracted while working on the arithmetic problems;" The first item was reversed scored, and Coefficient α equalled .76. This scale tapped the possibility of reduced concentration (Eysenck, 1982), as individuals presumably shifted focus from performing well to winning.

Discouragement. We attempted to measure feelings of discouragement using two items tapping loss of confidence (e.g., Campbell, 1982). Coefficient α was unacceptably low (.52), however, and this scale was not used.

Intrinsic Motivation. Three items on the questionnaire attempted to gauge how intrinsically motivating the task was: "I thought the task was interesting enough that I'd be willing to work on it again;" "Working on the arithmetic problems was interesting and enjoyable;" and "I liked this experiment because I personally had to find solutions to problems;" This scale attempted to detect the possibility that competition might influence intrinsic interest and motivation in the task, as suggested by Deci and Ryan (1985). Coefficient α equalled .74.

Self-Efficacy. For this scale, we used the following three items: "I felt I was capable of performing at the specified level;" "I felt that I would not do well on this task;" and, "I felt that I was capable of performing the task (calculating math problems)." The second item was reversed scored. This scale was an indirect attempt to detect discouragement (Campbell, 1982). Coefficient α was .70. Table 1 contains the means, standard deviations, and intercorrelations of the various questionnaire measures.

Table 1
Means, Standard Deviations, and Intercorrelations of Perceived Competition and the Explanatory Variables
(Study 1)

Variable	M	SD	Competition	Stress	Distraction	Intrinsic Motivation	Self Efficacy
Competition	13.89	4.08	(.88)	.01	-.07	.21	.19
Stress	9.11	2.76		(.73)	.20	-.21	-.10
Distracion	9.77	1.45			(.76)	-.14	.09
Intrinsic Motivation	8.82	2.78				(.74)	.23
Self Efficacy	7.53	1.72					(.70)

N = 97, due to missing data.

Diagonal entries contain Coefficient Alpha reliability.

Procedure

Participants signed up for one of six time periods, which were then randomly assigned to experimental conditions. Except for the experimental manipulations, identical procedures were followed in all conditions. In brief, after all scheduled individuals arrived at the conference room, the experimenter explained the general requirements of the task, and informed participants that they would be working on simple arithmetic problems similar to those used in some personnel selection test batteries.

The problems were a mix of four-digit addition, subtraction, multiplication and division problems, and were similar to those used in earlier research (i.e., Campbell & Furrer, 1995). After a brief demonstration of the task, the experimenter answered whatever questions participants raised. After all questions were answered, the first set of problems was distributed, and individuals had 15 minutes to work on the problem set. Individuals were not permitted to use calculators; and pilot work had determined that the set contained more problems than could be completed in the allotted time. At the end of the 15 minute period, the experimenter collected these problem sheets. Individuals were then given a short break.

Goal Level Manipulation. After the break, the researcher distributed a second set of problems, and added the following instructions: " I would like you to set a production level for your efforts. You should try to complete at least 28 (or 51; or 63) problems. Please continue working the entire 15 minutes. " These goal levels were identical to those used in earlier research (i.e., Campbell & Furrer, 1995); and seemed appropriate for this investigation since subjects were comparable. This earlier research had established that these specific levels represented goals of suitable difficulty through pilot testing. These difficulty levels also appeared broad enough to capture ceiling effects.

Objective Competition Manipulation. In the competition conditions, competition was achieved by awarding additional points to the top 33% of the participants. Thus, the experimenter included the following statement: " The top five (or six or seven) performing individuals will receive an additional 50% increase in bonus points. " No mention of additional points was made in the non-competitive condition.

Subjective Competition. In addition to this experimental manipulation of competition, we also included a six - item scale measuring perceived competition. Sample items were, " 1 felt a sense of competition with the other participants when working on the arithmetic problems; " and, " While doing this task, I wanted my performance to put me at the top of the group, ahead of others. " Five of the items used the study ' s standard rating scale, while the sixth item (" How much competition was present in your group? ") was rated on a five point, reversed scored " little competition present " to " a great deal present " scale. As noted earlier, a perceptual measure of competition is in line with the operationalizations of Shelley et al. (1987) and White et al. (1977); further, the experimental situation itself might also stimulate feeling of competition (i.e., competing to reach the assigned goal or to do better on the second set of problems). Coefficient α equalled .88 for the six items.

At the end of the allotted time, the experimenter collected the completed problem sheets; and then distributed the questionnaire used to gather information about the explanatory variables, and to check the effectiveness of the manipulations. After all questionnaires were completed, participants were thanked for their participation, given a general debriefing, and dismissed. For the sake of equity, students who did not earn (or did not have a chance to earn) additional points were given alternative extra-credit opportunities later in the semester.

RESULTS

Manipulation Checks

We conducted several checks to see if the procedures had their intended effects.

Goal Knowledge. A single item on the post-experimental questionnaire asked subjects to identify the performance level they were asked to achieve. An examination of this item showed that 91 of the 102 participants could identify the goal level they had been assigned. Of the remaining 11 subjects, eight participants reported an assigned goal within three problems of the actual assignment (e.g., reporting 25 when the assigned goal was 28; or 65 when it was 63, etc.) Three participants identified a goal that was substantially different from the goal that was actually assigned (i.e., by at least 20 problems or more.) Data from these three individuals were eliminated as unreliable.

Goal Acceptance. A second item on the questionnaire asked subjects to identify the goal they actually tried to achieve. A majority (i.e., 51) of the 99 subjects reported trying for a goal different from the one assigned. In these cases, we placed individuals into the goal category closest to their self - set goal. This resulted in re-classifying 32 individuals relative to their original, assigned goal: eight subjects moved from the Easy or Moderately Difficult Goal conditions to the Difficult Goal condition; 13 subjects moved from the Easy or Difficult Goal conditions to the Moderately Difficult condition; and 11 subjects moved from the Moderately Difficult or Difficult conditions to the Easy Goal condition. No pattern was apparent in this re-classification, and movement occurred proportionally across the experimental conditions. This procedure slotted all individuals either into an accepted assigned goal or into a goal condition representative of their personal goal, thus accomplishing acceptance.

Goal Difficulty. The questionnaire also contained four items ($\alpha = .75$) that asked participants to rate the difficulty of their assigned goal (e.g., " How hard was the goal [level] you were asked to achieve? " with 1 = " not at all hard " through 5 = " very hard; " and " How difficult was the goal [level] you were asked to achieve? " with 1 = " very difficult " through 5 = " very easy, " reversed scored, etc.). An ANCOVA (using initial ability as a covariate) was conducted on these data to determine if subjects as originally classified perceived a difference in the three goal levels. As expected, the analysis indicated that participants saw the goal levels as significantly different ($F = 5.66$, $p < .01$). No difference in perceived difficulty was anticipated in the Competition condition, and none was found ($F < 1.00$; p = ns). Given these results, and the findings of earlier research using identical levels (i.e., Campbell & Furrer, 1995), we concluded that different goal difficulty levels were created across the different goal conditions.

Competition. A six item scale measured perceived competition; and also served to gauge the effectiveness of the experimental manipulation. A 3 x 2 ANOVA was conducted on the summed items. Results indicated that individuals in the Competitive condition perceived more competition ($M = 12.18$, $SD = 2.89$) than individuals in the Non - competitive condition ($M = 15.26$, $SD = 4.37$, $F = 15.56$, $p < .001$). The analysis also revealed a significant main effect for goal setting ($F = 3.75$, $p < .05$), suggesting that perceptions of competition also varied with goal difficulty level. Follow up analyses indicated that those with Easy Goals saw less competition than those with either Moderately Difficult or Difficult Goals. This finding implies that goal setting situations may elicit competitive perceptions, as individuals attempt to better their previous standing.

Task Performance Analyses

Initial Ability. To check random assignment, we examined task performance (defined as the number of problems solved correctly) on the first set of arithmetic problems, using a 3 x 2 ANOVA. Since these problems were completed before the experimental manipulations occurred, no significant differences were expected. However, the analysis uncovered a significant main effect for goal setting ($F = 4.96$, $p < .01$). Since an examination of the data as originally classified showed no ability differences ($F < 1.00$, p = ns), this significant goal setting effect is likely attributable to the re-classification of participants according to their personal goals. The correlation between personal goals and ability equalled .44, suggesting that individuals set personal goals in line with their ability. Consequently. the primary analyses used initial performance as a covariate. This procedure effectively adjusts for these initial differences in ability, and provides a more precise test of the hypotheses (Winer, 1971: 752-753).

Performance. We conducted two ANCOVAs to test Hypothesis One. The first examined the effects of personal goals and zero - sum competition on performance. The second ANCOVA was identical, except it operationalized competition subjectively, in terms of high and low perceptions as measured on the perceived competition scale.

The results of the first ANCOVA are summarized in Table 2. As that table shows, there was a significant effect for the covariate ($F = 236.51$, $p < .001$), adjusting for initial ability. In addition, goal level ($F = 10.20$, $p < .001$.) had a significant effect on the number ofproblems an individual solved correctly. However, competition did not have a significant effect on performance ($F < 1.00$, p = ns); nor was there a significant interaction ($F = 1.20$, p = ns).

Table 2
Analysis of Co-Variance Summary Table of the Effects of Goals and Zero - Sum Competition on Number of Problems Solved Correctly (Set 2) Adjusted for Initial Ability (Set 1) (Study 1)

Source of Variance	df	SS	F	p
Covariate	1	9147.94	236.51	.00
(A) Goal Level	2	788.90	10.20	.00
(B) Competition	1	23.80	<1.00	ns
(A) x (B)	2	92.73	1.20	ns
Model	6	10051.93	43.31	.00
Residual	92	3558.40		
Total	98	13610.32		

N = 99

An examination of the relevant means showed that the significant goal setting effect was due to participants having difficult goals ($M = 45.92$, $SD = 13.08$) outperforming individuals with both moderately difficult goals ($M = 35.22$, $SD = 9.17$) and with easy goals ($M = 31.84$, $SD = 9.71$). These results replicate the usual goal setting performance effect, and support Hypothesis Four.

Because the objective manipulation of competition had no effect on task performance, we checked the motivating value of additional bonus points. Participants in both the Competitive condition and in the Non - competitive condition rated additional points, on average, as “ attractive ” or “ very attractive. ” Thus, the lack of a performance effect does not appear attributable to a weak competition manipulation. The earlier results of the manipulation check on competition suggest one potential explanation: feelings of competition may have been generated by the goal setting process itself. Such feelings would dilute the impact of the objective competition manipulation. If so, then the subjective measure of perceived competition should be a more sensitive gauge of the effects of competition than the objective indicator. The second ANCOVA tested this possibility.

Performance and Subjective Competition. For this analysis, participants were classified into two groups based on their " perceived competition " score. Those scoring above the mean on this variable comprised the Low Perceived Competition group (N = 39), while the remainder comprised the High Perceived Competition group (N = 59). Using this operationalization of competition, a 3 x 2 ANCOVA was then undertaken to examine the effects of personal goals and perceived competition on performance. The results of this analysis are summarized in Table 3.

Table 3
Analysis of Co-Variance Summary Table of the Effects of Goals and Perceived Competition on Number of Problems Solved Correctly (Set 2) Adjusted for Initial Ability (Set 1) (Study 1)

Source of Variance	df	SS	F	p
Covariate	1	8921.84	264.92	.00
(A) Goal Level	2	935.76	13.89	.00
(B) Competition	1	196.01	5.82	<.02
(A)x(B)	2	113.64	1.69	ns
Model	6	10194.00	50.45	.00
Residual	91	3064.71		
Total	98	13258.70		

N = 98, due to missing data.

As the table shows, the covariate controlling for initial ability was significant ($F = 264.92$, $p < .001$), as expected. The main effect for goal setting was also significant ($F = 13.89$, $p < .001$), as expected. Lastly, the main effect for perceived competition was also significant ($F = 5.82$, $p < .02$). No interaction was detected ($F = 1.69$, p = ns).

Follow - up analyses of the goal setting effect confirmed that the results were identical to those noted in the earlier ANCOVA. For perceived competition, follow - up probes revealed that individuals who perceived more competition outperformed ($M = 39.75$, $SD = 11.71$) individuals who perceived less ($M = 32.46$, $SD = 10.34$). We then examined the potential explanatory variables to determine the effects of perceived competition on feelings of stress and concentration, and on intrinsic motivation and self efficacy.

Potential Explanatory Variables

For each potential explanatory variable, a 3 x 2 ANOVA probed the impact of goal setting and perceived competition on the construct of interest. As might be expected given the performance results above, the first ANOVA revealed no relationship between goal setting or perceived competition and feelings of stiess. Further, no relationship was detected between goal setting or perceived competition and feelings of distraction. Since the cognitive processes associated with these variables imply that competition would *depress* performance rather than *enhance* it, these results are not surprising.

Hypothesis Three implies that any increased task performance due to competition would also reflect increased intrinsic motivation and self efficacy. Thus, another 3 x 2 ANOVA was conducted, using the measure of intrinsic motivation as the dependent variable. While this analysis revealed no main effect for goal setting, it did reveal a significant main effect for perceived competition, ($F = 5.50$, $p < .03$), as well as a significant interaction ($F = 3.80$, $p < .03$). Table 4 summarizes the ANOVA results.

Table 4
Analysis of Variance Summary Table of the Effects of Goals and Perceived

Competition on Intrinsic Motivation
(Study 1)

Source of Variance	df	SS	F	p
(A) Goal Level	2	12.45	<1.00	ns
(B) Competition	1	37.65	5.50	<.03
(A) x (B)	2	52.02	3.80	<.03
Model	5	116.51	3.40	<.01
Residual	91	623.52		
Total	96	740.02		

N = 97, due to missing data.

An examination of the relevant means suggested that participants who perceived more competition saw the task as generally more interesting (M = 8.22, SD = 2.81) than those who perceived less competition (M = 9.72, SD = 2.47, t = - 2.64, p <.01); and that this effect was primarily attributable to those individuals who had easy goals but perceived more competition (M = 7.63, SD = 2.50) relative to those participants who had easy goals but perceived less competition (M = 10.76, SD = 2.28, F = 3.37, p < .01). Overall, these results support the logic of the arousal hypothesis (perceived competition enhanced performance by making the arithmetic task appear more interesting), and are in line with findings by Epstein and Harackiewicz (1992).

The final analysis examined self - efficacy perceptions This 3 x 2 ANOVA, summarized in Table 5, showed no main effect for goal setting, but it did indicate a significant effect for perceived competition (F = 5.99, p < .02). An examination of the relevant means revealed that those individuals who perceived more competition also reported higher self - efficacy (M = 7.24, SD = 1.76) than the other participants (M = 7.97, SD = 1.56). In light of their better performance on the task, this finding may simply indicate that these individuals felt confident that they had done well. However, participants with difficult goals also performed well, but their self - efficacy scores were not significantly different. Thus, a better explanation may be that individuals who are confident in their ability are more likely to strive to improve their performance, and to see a competitive element in these efforts.

Table 5
Analysis of Variance Summary Table of the Effects of Goals and Perceived Competition on Self – Efficacy
(Study 1)

Source of Variance	df	SS	F	p
(A) Goal Level	2	8.06	1.42	ns
(B) Competition	1	17.01	5.99	<.02
(A) x (B)	2	2.51	<1.00	ns
Model	5	23.32	1.64	ns
Residual	92	261.09		
Total	97	284.41		

N = 98, due to missing data.

Discussion

The results of this study suggest that competition, in conjunction with goal setting, enhances task performance. Although contrary to the findings of Campbell and Furrer (1995), they are in line with the conclusions of Shalley, Oldham and Porac (1987) and White, Mitchell and Bell (1977). These studies also found that competition enhanced performance. Thus, the current study provides further evidence that researchers need to carefully consider the boundary conditions

surrounding the original Campbell and Furrer (1995) results, particularly recognizing that the performance decrement found in that research may simply reflect the particular combination of goal setting and competition that was used.

Additionally, the results of the current study also parallel the findings of Shalley and Oldham (1985), who noted that individuals having easy goals and expecting an evaluation had high intrinsic motivation. They argued that, since individuals with easy goals are likely to attain their goal, they are also likely to feel good about their competence, and may anticipate positive feedback from an external evaluator. All this leads to high intrinsic motivation. In the current study, individuals with easy goals and high perceived competition similarly found the task more interesting. The easy goal may have led individuals into thinking that winning the competition would be easy; and they may have anticipated positive self (and experimenter) evaluation.

The above interpretation focuses only on perceived competition, and leaves unresolved the question of why the zero - sum manipulation of competition had no impact on performance. One possibility, argued by Locke and Latham (1990), is that the effects of competition are mediated through the goal setting process. Competition may cause people to set higher goals than they would otherwise. If this were the case here, then the personal goals of participants in the Competitive condition should he higher than the personal goals in the Non - Competitive condition. To check this, we used a t-test to examine personal goals. This analysis showed that, while participants in the Competitive condition had slightly higher goal levels ($M = 49.50$, $SD = 16.44$) than other individuals ($M = 46.53$, $SD = 14.56$), this difference was not significant ($t < 1.00$, $p = ns$). Thus, these results do not support the argument that higher goals, per se, accounts for competition ' s lack of impact. A more likely explanation may be that the process of setting goals (i.e., adopting or setting standards which both the individual and the experimenter can use to judge performance) created a generally competitive environment. As noted earlier, we think that these subjective feelings may have been strong enough to dilute the impact of the objective manipulation.

STUDY TWO

Subjects

The participants were 60 Singaporean school children, ranging in age from 10 - 12 years, recruited from a local English language, Singaporean primary school. Females comprised 53% of the sample. Ethnically, 80% of the students were Chinese; 15% Malay; and the remaining 5% Indian, Eurasian, or other. All participants were fluent in both spoken and written English.

Research Design and Task

The experiment employed the same 3 x 2 factorial design as Study 1. Three levels of goals (Easy, Moderate; and Difficult) and two levels of competition (Competitive; Non - competitive) were used. The task involved simple arithmetic sets similar to the sets used in the first study, but goals were made less difficult for this younger population. Performance was again measured by the number of correct answers to the second set of math problems.

Procedure

Participants consisted of two classes of 30 schoolchildren each. The researcher conducted the study on a normal school day, after obtaining the necessary consent. As in the earlier study, the experimenter informed the students that they would be working for 15 minutes on simple arithmetic problems. She gave a brief demonstration of the task, answered any questions, and then distributed envelopes containing the first set of problems. At the end of the 15 minute period, she collected the problem sheets and gave the students a short break.

After the break, a second set of problems were distributed in envelopes. Each envelope contained an instruction sheet; the math problems sheets; and the research questionnaire. These 30

envelopes were each individually coded according to experimental condition. The envelopes were randomly distributed to the students.

Competition manipulation: Half the envelopes contained the following written instructions: " The top five performers will be given storybooks as rewards. " Thus, competition was achieved by awarding storybooks to the top 33% of the participants in the Competitive condition. No mention of storybooks was made in the instructions to the 15 students in the Non-competitive condition. Prior interviews with the teacher in charge had established that storybooks motivated these school children, since storybooks were often used as prizes for good academic performance.

Goal level manipulation: The envelopes also divided the class into three goal conditions. Five students each received written instructions indicating that they should try to complete at least 11 (Easy goal) or 31 (Moderate goal) or 41 (Difficult goal) problems respectively. An earlier pilot study using comparable subjects had established that these specific levels were appropriate, with difficulty levels pegged at one standard deviation (SD) below, one SD above, and two SDs above the mean performance of the pilot group (M = 21.00, SD = 9.77).

After reading their individual instructions, the students worked on the problems for the next 15 minutes. The experimenter then collected the problem sheets back; and the students then completed the questionnaire. The completed questionnaires were put into the envelopes and returned to the experimenter. After thanking the students for their participation, the researcher left the class. The above procedure was repeated with another class of 30 students immediately afterwards.

Questionnaire Measures. As in the first study, a set of measures examined potential explanatory variables that might be linked to task performance. Four variables were examined, with items similar to those used in Study 1. Two items (α = .96) gauged intrinsic motivation: e.g., " I thought the math problems were interesting enough that I ' d be willing to work on them again; " and " Working on the arithmetic problems was interesting and enjoyable; " Three items (α = .94) gauged the level of self efficacy: " I felt I was capable of performing at the specified level; " " I felt that I would not do well on this task; " and " I felt that I was capable of performing this task; " Three items (α = .93) measured concentration: " I could not keep my mind on the task; " " I felt distracted while doing the math problems; " and " I can concentrate on doing the math problems; " For stress (α = .76), the following three items were used: " I felt tense when working on the math problems; " " I felt anxious while working on the math problems; " " Participating in this study was a stressful experience. " Participants rated all items on five-point scales from " strongly agree " (1) to " strongly disagree " (5).

RESULTS

Manipulation Checks

Goal Knowledge. A single item on the questionnaire asked subjects to identify the performance level they were asked to achieve. An examination of this item confirmed that all 60 individuals could identify the goal level they had been assigned.

Goal Acceptance. We obtained two measures of goal acceptance. The first was a single item asking subjects to identify the goal they actually tried to achieve. For a majority of individuals (i.e., 70%), this goal and their assigned goal were identical. For the other 18 individuals, the reported personal goal was higher than the assigned goal in all cases. However, the discrepancy between assigned and personal goals would have warranted reclassification (using the criteria of Study 1) for only two individuals. Thus, reclassification was not necessary.

Additionally, three other items (α = .74). also measured the participants ' degree of goal acceptance: e.g., " How seriously did you take the goal given to you by the experimenter? " with 1 indicating " very seriously " through 5 " not serious at all. " A 3 X 2 ANOVA showed no significant effect of goal level, competition or interaction on goal acceptance, indicating that

individuals in different goal and competition conditions accepted the assigned goals about equally.

Goal difficulty. Three items (α = .93), similar to those used in Study 1, measured the students ' perceptions of goal difficulty. The 3 X 2 ANOVA of the summed items showed that participants saw the goal levels as significantly different (F = 178.57, p <0.001). No difference was expected in the competitive condition and none was found. The interaction was not significant.

Competition. Six questions (α = .88), similar to those used in Study 1, gauged the level of perceived competition. The 3 X 2 ANOVA conducted on the summed items indicated a significant effect for both goal setting (F = 3.58, p < 0.05) and competition (F = 149.85, p < 0.01). There was no significant interaction. Follow - up analyses showed that, as expected, participants in Competitive conditions (M = 9.63, SD = 2.54) perceived more competition than those in Non-competitive conditions (M = 18.43, SD= 2.88). Also, individuals with difficult goals (M = 12.90, SD = 2.81) felt more competition than those with moderate (M = 13.95, SD= 3.06) or easy (M = 15.25, SD = 2.26) goals. These results replicate the equivalent analyses conducted for the first study.

In terms of subjective feelings of competition, an examination of individuals scoring above and below the mean on the summed scale revealed that only four individuals experienced a level of felt competition different from their experimental category. This high correspondence between zero - sum and perceived competition suggests that Singaporean culture (with its strong emphasis on individual class standing to determine the distribution of valued academic rewards) may have enhanced the impact of the competition manipulation. Since such high correspondence between the two types of competition made separate analyses redundant, they were not performed.

Task Performance Analysis

Initial Ability. A 3 X 2 ANOVA examined task performance on the first set of math problems. This analysis showed no significant interaction or main effect for competition; however, it did reveal a significant main effect for goal level (F = 3.27, p = 0.05), suggesting that, in spite of randomization, ability differences existed among subjects in the different goal conditions even before the manipulations occurred. We therefore used ability as a covariate in later analyses.

Primary Analyses

We examined task performance on the second set of math problems using a 3 X 2 ANCOVA, with performance on the first set as the ability covariate. Table 6 shows the results. The covariate (F = 27.69, p < 0.01), goal level (F = 52.45, p < 0.01), and competition (F = 12.84, p < 0.01) all had significant effects on the number of problems solved correctly. No significant interaction was detected. Follow - up analyses showed that participants with difficult goals (M = 30.45, SD = 4.25) significantly outperformed participants having moderate goals (M = 22.45, SD = 4.71) or easy goals (M = 18.05, SD = 3.22). In addition, individuals in the competitive environment (M = 24.97, SD = 3.99) had significantly higher performance than those in the non-competitive environment (M = 22.33, SD = 4.12).

Table 6
Analysis of Co-Variance Summary Table
of the Effects of Goals and Competition
on Number of Problems Solved Correctly
(Set 2)
Adjusted for Initial Ability (Set 1)
(Study 2)

Source of Variance	df	SS	F	p
Covariate	1	362.37	27.69	.00
(A) Goal Level	2	1372.83	52.45	.00
(B) Competition	1	168.03	12.84	.00
(A)x(B)	2	3.14	<1.00	ns

Model	6	1929.98	24.58	.00
Residual	53	693.67		
Total	59	2623.65		

N = 60

Potential Explanatory Variables

Intrinsic Motivation. A 3 X 2 ANOVA was conducted on intrinsic motivation to determine if individuals under different conditions possessed different levels of intrinsic motivation. Although there was no significant interaction or main effect for goal setting, the analysis revealed a significant main effect for competition ($F = 205.32$, $p < 0.01$). Similar to the results of Study 1, participants in the Competitive environment had higher levels of intrinsic interest ($M = 2.67$, $SD = 0.72$) than those in the Non - competitive environment ($M = 6.90$, $SD = 1.43$).

Self Efficacy. The 3 X 2 ANOVA examining self efficacy also revealed a significant main effect for competition ($F = 106.83$, $p = 0.00$), but none for goal setting or for the interaction. Individuals in the Competitive environment reported higher levels of self efficacy ($M = 4.53$, $SD = 1.23$) than those in the Non - competitive environment ($M = 9.67$, $SD= 2.35$). These results also parallel the findings of the first study.

Concentration. This analysis revealed a significant main effect for competition ($F = 67.80$, $p < 0.01$), but no significant main effect for goal setting and no significant interaction. Individuals under Competitive conditions reported higher concentration levels ($M = 5.40$, $SD= 2.23$) than individuals under Non - competitive conditions ($M = 10.53$, $SD= 2.46$). While these findings do not correspond to the findings of Study 1 (the equivalent analysis was not significant), they are consistent with the pattern of the results described above; and suggest that, at least in this study, competition did not distract individuals (as originally hypothesized) but *focused* them.

Stress. The last analysis examined if individuals under different conditions perceived different levels of stress. No significant main effects for goal setting or competition were uncovered. However, the analysis revealed a significant interaction ($F = 3.$ $p < 0.05$). Analysis of the interaction indicated that, for the Non - competitive condition, perceived stress decreased as goal difficulty increased. Participants with difficult goals ($M = 12.40$, $SD = 1.58$) perceived less stress compared to those with moderate goals ($M = 11.70$, $SD= 1.89$) or easy goals ($M = 10.40$, $SD = 2.12$). For the Competitive condition, the result was exactly the opposite individuals with easy goals ($M = 12.30$, $SD= 2.45$) reported less stress than individuals with moderate goals ($M = 11.00$, $SD = 2.31$) or difficult goals ($M = 11.10$, $SD= 1.60$). Interpretation of this interaction is not entirely clear, although the results in the Competitive condition seem fairly commonsensical.

Discussion

The results of this study parallel the findings of Study 1, in that competition and goals enhanced rather than depressed performance. Specific, difficult goals resulted in higher levels of performance than easy or moderate goals; and individuals in the Competitive situation significantly outperformed individuals in the Non competitive condition across all goal conditions. Further, in terms of accounting for the results, the questionnaire findings also replicated Study 1. Individuals in the Competitive condition had higher levels of intrinsic motivation; their self efficacy was higher; and they reported higher levels of concentration than those in the Non competitive environment. Finally, individuals with difficult or moderate goals in the presence of competition perceived more anxiety than those with easy goals, which appears to make intuitive sense.

General Discussion

The original goal of this research was an attempt to examine potential explanatory variables that might illuminate the psychological processes underlying the performance effects associated with using goal setting and competition simultaneously. Additionally, the study wanted to explore

potential differences between zero - sum and more subjective operationalizations of competition; and, finally it wanted to insure that findings were not limited to specific populations. Each of these areas warrants consideration. However, we initially should note the limitations of the current studies, to put the ensuing discussion in context.

First, because Study 1 has methodological limitations, and Study 2 used school children, both investigations as *single* studies have weaknesses that hamper their usefulness. However, given the general similarity in the *pattern* of performance and questionnaire findings across the two investigations, we would argue that these individual limitations are less significant than they would be otherwise. The similar patterns mean that it is unlikely that the results are artifactual: different limitations would not lead to identical *artifactual* outcomes. Thus, while the individual studies have specific limitations, taken together the two investigations can offer insight into the original research questions.

Performance Results. Both zero - sum and perceived competition *enhanced* performance. While these results do not conform with the findings of some earlier research (i.e., Campbell & Furrer, 1995; Jackson & Zedeck, 1982: supervisor evaluation), the results are consistent with the findings of investigators using weak forms of competition. Overall, the data suggest that the four "competing" hypotheses presented in Campbell and Furrer (1995) do not represent competing possibilities, but complementary possibilities. The most straightforward way of accounting for the accumulated research evidence is to assume that each of the four hypotheses defines a specific set of points on a general performance curve, similar to the curvilinear form described by Yerkes and Dodson (1908). Assuming an individual's explicit goal and felt competition generates a combined, overall arousal level, this total arousal level presumably determines whether competition enhances or depresses performance (relative to the arousal created by the goal alone). For example, competitive arousal combined with that generated by a moderate goal may increase a person's overall arousal to the equivalent of a difficult goal, and *enhance* performance. However, if the person's goal level had already generated an optimal arousal level, the additional arousal created by feelings of competition may *decrease* performance.

This explanation assumes that the heightened arousal created by goal setting and by competition is functionally equivalent and interchangeable. Such an assumption appears defensible. Although the two constructs are not identical, they share enough characteristics that early investigators in this area (e.g., Latham & Baldes, 1975; Steers & Porter, 1974) took pains to show how goal setting performance effects were truly the result of goal setting and not competition. This close relationship between the two constructs supports the assumption of arousal equivalence.

This interpretation implies that investigators need to look more carefully at the specific goals and competition levels present in a given study. Although zero - sum competition appears to suggest that competition is either present or not, both Study 1 and the earlier investigations of Jackson and Zedeck (1982), Shalley et al. (1987) and White et al. (1977) imply that arousal due to perceived or felt competition may vary in intensity. In addition, wide latitude exists in the operationalizations of goal difficulty levels (Wright, 1990). Thus, the arousal generated by a "moderate" or "difficult" goal may also vary greatly from study to study, in spite of identical verbal labels. Finally, differences exist among individuals regarding the level of arousal they prefer or can tolerate before performance is affected, which also varies with task type. All this suggests that predicting the effects of goal setting and competition on performance requires precise calibrations of the two independent variables, as well as a thoughtful consideration of task and person characteristics.

The results of these studies also suggest that researchers need to explore the influence of the goal - setting process on how individuals "see" tasks or "frame" situations. Past research has generally concentrated on the performance implications of goal - setting. It now appears that the simple act of setting or accepting a specific goal may have consequences that are interesting in their own right. Study 1 suggests that goal - setting per se can create a competitive atmosphere. Examining goal - setting as an end in itself may prompt additional implications.

Explanatory Processes. Inferences regarding the questionnaire findings of the current investigations have to be drawn carefully. All the measures were collected after individuals had performed the task. Although they did not receive performance feedback, it is possible that their responses were influenced by how they thought they had performed. Further, while it makes intuitive sense to suggest that competition enhanced performance by making the task more intrinsically interesting (e.g., Epstein & Harackiewicz, 1992), this interpretation is only suggestive. Other interpretations are possible. Individuals who saw the task as more interesting may have been more predisposed to feel competition. Or, some unexamined third factor may be linking the two. On the other hand, the idea that competition makes mundane activities seem more interesting is a bit of conventional wisdom. New research should examine the effects of competition using a task high in intrinsic interest. If competition "worked" in the current studies by creating more task interest, then effects should be blunted with extremely interesting tasks.

Caution is also needed when considering the self-efficacy findings. Although the results show that self-efficacy is associated with perceived competition, it seems unlikely that felt competition increased a person's self-efficacy beliefs. One possibility, based on the findings of Study 1, is that individuals with high self-efficacy for a task enjoy "proving" their mastery by outperforming others. Hence, they tend to "see" competition which may exist only in their own orientation. A related possibility, suggested earlier, is that high self-efficacy individuals may compete with themselves, feeling competition as they attempt to better their own standing.

On a practical level, the current results mean that the jury is still out on whether firms should attempt to minimize the simultaneous use of goal-setting and competition. The present investigations indicate that, under a broad range of conditions (i.e., American adults and Singapore children) combining goals and competition can prove beneficial. Nonetheless, given the suspected complexity of the relationship, we think deliberately creating such situations may be organizationally risky. As more evidence accumulates, and as researchers develop full-fledged models, a definitive conclusions will undoubtedly be possible. Until then, firms interested in motivating individuals with goals and competition still should tread carefully.

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