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EFFECTS OF SOCIAL COHESIVENESS AND COOPERATIVE INCENTIVES ON SMALL GROUP LEARNING OUTCOMES

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ABSTRACT

Research into the effects of cooperative learning on academic performance has produced conflicting results. This study aimed to assess whether these effects varied with the incentive structure under which groups worked and with the level of social cohesiveness between group members. Eighty-nine 5th and 6th grade students were assigned randomly to one of four conditions in a 2 (incentive) by 2 (cohesiveness) factorial design. Results indicated that students who received rewards based on their individual contributions to an overall group product outperformed those who received rewards based on an overall group product alone. Students in the former condition also made significantly greater pre-post increases on a sociometric scale. In contrast, students who worked in groups that were high in social cohesiveness performed marginally worse than those who worked in low cohesive groups. Implications of these results for theory and practice in the area are discussed.

Cooperative learning strategies are now widely advocated as a means by which schools can improve students' social integration (e.g., Pettigrew, 1998). Despite this, recent surveys suggest that structured small group methods have not found widespread application in classroom settings (Autil, et al., 1998). Despite their positive effects on social and personal outcomes, research into the effects of these methods on academic performance has produced conflicting results (Slavin, 1996). Reduced effects of cooperative learning have often been ascribed to motivational losses that occur in the group process. Examples of such losses include "free-rider" effects, in which some members allow other members to do all the work (e.g., Kerr & Brunn, 1983), and "sucker" effects, where high-achieving members reduce their efforts to avoid having to do all the work (Kerr, 1983).

Slavin (1996) has argued that in order to have positive effects on student achievement, cooperative learning should incorporate two key components: Group rewards and individual accountability. In this view, members of cooperative groups should receive rewards based on the performance of their groups as a whole. Slavin argued that without this component, students would not be motivated to interact effectively on their assigned tasks. Slavin further stipulated, however, that group rewards would not be effective in motivating *all* students unless the performance of groups was explicitly determined by the *individual* achievements of group members. Slavin posed that without the latter component, the positive effects of the group reward system on member motivation would be lost through diffusion of responsibility amongst group members and resulting "free rider" and "sucker" effects.

These propositions have been supported through a recent meta-analysis of cooperative learning evaluations. Slavin (1996) cumulated the effects of 99 studies that compared the achievement effects of cooperative learning and more traditional individualistic or competitive instructional approaches. When the approaches were classified by the criteria outlined above (i.e., inclusion or non-inclusion of group reward and individual accountability components), the median effect size for approaches that used both group rewards and individual accountability was 0.32, as compared with a median effect size of 0.07 for methods that used group rewards only or individual accountability only. The median effect size for methods that did not incorporate either of these components was 0.16.

Other researchers in the field (e.g., Cohen, 1994; Kohn, 1991; Schaps & Lewis, 1991), however, have expressed concerns about the use of incentives based on individual group member performance. For example, Cohen (1986) states that "if the task is challenging and interesting, and if students are sufficiently prepared for skills in group process, students will experience the process of groupwork itself as highly rewarding...[N]ever grade or evaluate students on their individual contributions to the group product" (pp. 69-70). Although these researchers do not explicitly reject the notion that providing group rewards for individual performance will have positive effects on learning in cooperative groups, they argue that the same effects can be achieved in other, more desirable ways.

Advocates of the social cohesion perspective (e.g., Johnson & Johnson, 1992; Cohen, 1986; Sharan & Sharan, 1976) argue that the extent to which cooperative group members suffer from the motivational losses described above will depend largely on the cohesiveness of the group. For example, Johnson & Johnson (1994) assert that "...the higher the cohesiveness of a group, the more productive it tends to be," where group cohesiveness is based on "members liking each other, desiring to continue to be part of the group, and being satisfied with their group membership" (p.26). Although the concept of group cohesiveness is broad and multifaceted, this view (i.e., that it is primarily a function of the level of interpersonal attraction between group members) has dominated research into the effects of group cohesiveness on achievement and productivity (Hogg & Abrams, 1988). In summary, advocates of the group cohesiveness perspective pose that motivational losses associated with "free-rider" and "sucker" effects are less likely to occur in highly cohesive groups, making the use of group rewards based on the individual learning of group members redundant.

The results of two early studies provide some support for the proposition that students achieve more when they work in highly cohesive groups. In the first of these (Shaw & Shaw, 1962), second-graders studied spelling in either high cohesive groups (in which no member rejected any other member, and some positive choices were represented) or low cohesive groups (where no member chose any other member, and some rejections were represented). Groups worked together for three daily sessions, and completed tests on the material covered on the second and third days of this study period. A significant positive correlation between group cohesiveness and achievement was found in the second, but not in the third session tests.

In the second study (Stam, 1973), fifth-graders completed a peer nomination scale (e.g., asking them to indicate which members of their class were their “best friends”) and were then assigned to four-member cooperative groups either on the basis of mutual nominations (the high cohesiveness condition) or on a random basis (the low cohesiveness condition). Each group then completed both a convergent thinking task (i.e., a series of arithmetic word problems) and a divergent thinking task (i.e., writing of a group poem). Stam reported that sociometrically chosen groups performed significantly better on the divergent thinking task, although there were no significant differences on the convergent thinking task.

Given these results, it is possible that *both* group cohesiveness and group reward contingencies may act as moderators of learning in cooperative groups. In highly cohesive groups, the motivational losses described above may be less likely to occur, making the positive effects of using group rewards for individual member contributions to an overall product unnecessary. On the other hand, the use of group rewards based on the individual learning of all students in the group may reduce or prevent the same motivational losses, thus making redundant any positive effects of high cohesiveness amongst group members.

In addition to its theoretical interest, this question has important practical implications for the use of cooperative learning in school settings. If both procedures (i.e., placing students into highly cohesive groups and using incentives based on individual contributions to a group product) can be used to achieve the same outcome (i.e., reducing motivational losses), educators could select the procedure most consistent with their own ideologies, intervention goals, and practical constraints. For example, some teachers may find using group reward contingencies impractical due to the demands made on their time and resources. On the other hand, when improving social relationships between students is a primary or concurrent intervention goal, placing students into highly cohesive groups (e.g., groups in which students indicate a preference for working together) would clearly be counterproductive.

The goal of the present study was to determine the effects of social cohesiveness and incentive structures on cooperative learning outcomes. Three types of outcome measures were used: Student achievement tests, a perceived group cohesiveness scale, and sociometric peer ratings. The latter two measures were included to assess any collateral effects of the experimental procedures on group processes.

METHOD

Participants

Eighty-nine students from three elementary-level classes participated in this study. The three classes were drawn from a school in a relatively high socio-economic Australian suburb. Class A comprised 31 fifth-grade students (17 males, 14 females). Class B, a split fifth/sixth-grade class, included 16 fifth-grade students (10 males, 6 females) and 13 sixth-grade students (8 males, 7 females). Class C included 27 sixth-grade students (13 males, 14 females). Median ages at the start of the intervention were 10 years, 2 months for the fifth-grade sample, and 11 years, 3 months for the sixth-grade sample.

Curriculum Materials

The academic tasks were drawn from an experimenter-developed workbook of practice items. These items were organised into 96 skill objectives, which covered four major areas: Fractions and Decimals; Relations and the Number System; Measurement, Statistics, and Space, and Story Problems. Within the workbook, each objective presented a worked example for students to follow so that they were able to work relatively autonomously during lessons. Students were also given access to answer books during lessons so that they could check their own work.

Students worked on their own individualized instructional programs during lessons, which were based on their performance on the curriculum-based pretest described below. As each item in this pretest corresponded to one of the objectives in the workbook, students completed all objectives in the workbook that corresponded to items answered incorrectly or not answered on the pretest. After receiving their marked pretests, students recorded the numbers of all such items on a page that appeared at the beginning of each workbook section, and worked from these lists for the remainder of the four-week experimental period

Dependent Measures

Sociometric Rating Scale. The sociometric rating scale was used to assess students' attitudes towards other members of their class. These scores were then used to assign students to groups within the high and low cohesiveness conditions, as well as to assess the impact of the different conditions on ratings between group members. Initially, both a "play with" and a "work with" dimension (e.g., see Oden & Asher, 1977) were included. However, as a near perfect correlation was found between ratings on these two scales across all three classes (rs ≥ 0.98), mean scores were obtained for ratings across the two scales and used both in the assignment of students to cooperative groups, and in the analysis of the results. A more detailed description of this scale is included in Appendix A. Scores on each subscale ranged from 1 to 5.

Group Cohesiveness Scale. To determine whether cooperative groups whose members chose to work together were perceived as more cohesive than those whose members explicitly chose not to work together, all students completed an eight-item group cohesiveness scale at posttest. Statements in this scale are presented in Appendix B. These items were adapted from a measure developed by Hinkle et al. (1989) to measure intragroup identification within groups of college students. Items in the scale measure a number of perceptions commonly identified as central to the notion of group cohesiveness. These include students' desire to maintain ingroup status (Johnson & Johnson, 1994), perceptions of whether cooperating with the group will enhance the likelihood of personal goal achievement (Sharan & Sharan, 1976), and emotional ties to the group (Mudrack, 1989a, 1989b). The wording of the items was modified from the original scale described by Hinkle *et al.* to be more readily understood by primary-aged children. Respondents rated their agreement with each item on a five-point scale (ranging from strongly agree to strongly disagree). Based on an analysis of pretest scores in this study, the internal consistency of the overall scale was reasonably high (alpha = 0.86). Scores on this scale ranged from a minimum of 8 to a maximum of 40.

Math Achievement. The primary measure of mathematics achievement was a 76-item, experimenter-developed test that assessed all skills covered in the four-week curriculum unit. Two parallel forms were developed. Some of the items required students to select answers from a number of alternatives (i.e., multiple choice format), but most required worked problem solutions. Each of the items corresponded to one of the objectives in the Project Workbook. The test was administered with a 60-minute time limit. To obtain an estimate of the parallel-forms reliability of the test, 156 students (81 male, 77 female) from grades 4 to 7 in a separate state primary school completed Forms A and B of the test with a one-week test-retest interval. This analysis indicated high parallel forms reliability estimates for grades 5 and 6 (0.89 and 0.90, respectively). Scores on each form of this test ranged from 0 to 76.

A standardized measure of mathematics achievement was also used to provide an independent measure of study outcomes. Tests 2A and 2B from the *Progressive Achievement Tests in Mathematics* (Australian Council for Educational Research, 1984a) were selected for their relevance to the Australian mathematics curriculum. Both tests are in multiple-choice format (47 items in Test 2A and 57 items in Test 2B), and are administered with a 45-minute time limit. In the 1983 standardization (see Australian Council for Educational Research, 1984b), KR-20 reliabilities of 0.91 to 0.94 were obtained for these tests in a sample of fifth- to seventh-grade students. Raw scores on Test 2A ranged from 0 to 47, while those on Test B ranged from 0 to 57.

Procedure

Pretesting for all classes was conducted in two sessions on consecutive days during the week prior to the start of the intervention. The curriculum-based pretest was given first, followed by the standardized achievement pretest.

The experimental conditions were implemented during students' daily (one-hour) math lessons, over a period of four school weeks. The experimenter visited all participating classes during each intervention session to ensure that the procedures were implemented as prescribed. Two days before the start of the intervention, students in each class received their marked curriculum-based pretests and a Project Workbook and were briefed on the basic procedures they would follow during the four-week intervention period. This general briefing session was conducted by the experimenter. Each week, classes focused on a different topic (e.g, Fractions and Decimals). At the end of the week, all students completed a quiz that was a parallel form of the relevant section in the pre- and posttests.

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Small prizes (e.g., stickers, pencils) were awarded on the basis of making a three-point improvement on the score obtained for that section of the pretest. This improvement system was used to ensure that all students (regardless of initial ability level) would have an equal opportunity to contribute to their group's performance (see Slavin, 1996). Weekly certificates and prizes were awarded publicly on the day after the end-of-week quiz for students in all conditions (just prior to the beginning of the next experimental session), and were called in alphabetical order. These rewards were used to establish the two incentive conditions described in the next section.

Posttesting was conducted over three consecutive days immediately after the last day of the intervention. The Group Cohesiveness and the sociometric scales were completed in the first session, followed by the curriculum-based and the standardized achievement tests, respectively

Experimental Conditions

Following the pretesting sessions, students in each of the three classes were assigned randomly (stratifying for curriculum based pretest scores and sex) to either the high or the low group cohesiveness condition. Thus, approximately half of the students in each class were assigned to each condition.

In the high cohesiveness condition, students were assigned to four-member cooperative groups so that there were no negative ratings between members (i.e., no ratings less than 0 on the rating scale), and each member rated at least one other member of the group positively (i.e., a rating of 1 or more on the rating scale).

In the low cohesiveness condition, students were assigned to groups so that there were no positive choices among members (i.e., no ratings more than 0 on the rating scale), with each member rating at least one other member negatively (i.e., a rating of less than 0 on the pretest rating scale). Assignments to groups were counterbalanced for sex and scores on the curriculum-based pretests to ensure that a mixture of males and females and ability levels was maintained in both high and low cohesive groups.

Within each of these conditions, groups were then assigned randomly to one of two incentive criteria conditions:

Individual contributions: Students in this condition were encouraged to work together and consult other members in their groups before asking for teacher assistance during lessons. These students were told that they would receive a certificate and a small prize at the end of each week if all members of their group had met their individual performance goals on the end-of-week quiz (i.e., made a three-point improvement on their initial score for the relevant subsection of the pretest). It was made clear that it was the responsibility of all group members to ensure that everyone met their performance goals, and that no-one in the group would receive a certificate or prize unless all group members had achieved their respective goals

Group products: Students in this condition followed identical procedures to those in the individual contributions condition during lessons. However, these students did not complete individual quizzes at the end of each week. Instead, each cooperative group completed a parallel form of the curriculum-based pretest as a group on the day before the experiment commenced, and received a group pretest score for the four subtests. During this group pretest, all members were encouraged to contribute to the solution of the test problems, and to reach consensus on each answer before moving onto the next item. Each group also completed an overall group quiz at the end of each week, identical to the end-of-week quizzes completed individually by students in the other two conditions. Group members were told that they should aim to contribute to the solution of at least three new items on each end-of-week quiz, and that they would receive certificates and prizes if their group as a whole improved by three points on their group pretest score. All group members who were present during the end-of-week quiz received a certificate and prize if the group as a whole met its performance goal.

RESULTS

Of the 89 students, one was absent during the curriculum-based achievement posttest sessions, while three chose not to complete the sociometric rating scale. As none of these students could be tested at a later date, their data sets were deleted from the relevant analyses. Overall descriptive statistics and bivariate correlations for the dependent measures are presented in Appendix C. For all measures, the experimental conditions were compared using a 2 (incentive criterion: individual contributions versus group products) by 2 (group cohesiveness: high versus low) by 3 (class: A, B, or C) factorial design. As the outcomes were not independent within classes, class was included as an independent variable in all analyses to test for interaction effects with experimental condition. Given the low number of students in each group, multivariate and univariate analyses of variance and covariance were used rather than hierarchical linear models for these analyses. Correlations between individual students' scores and group mean scores within conditions were non-significant for all dependent measures (ps > 0.10), providing some support for conformity to the independence assumption

Group Cohesiveness Outcomes

Scores on the group cohesiveness scale were subjected to a univariate analysis of variance (ANOVA). Means and standard deviations for posttest scores on the Group Cohesiveness Scale are shown in Table 1. The 2 (group cohesiveness) by 2 (incentive criteria) by 3 (class) ANOVA on these scores indicated no significant main effect for class ($F(2,77) = 1.90$, $p > 0.05$), for incentive criteria, or for group cohesiveness (both Fs < 1). All two-way interactions were also non-significant ($\alpha = 0.05$).

Table 1. Means and Standard Deviations for Scores on the Group Cohesiveness Scale By Incentive and Cohesiveness Condition

Incentive Condition	Cohesiveness Condition	Group Cohesiveness Scale	
		N	Posttest Mean
Individual Contributions	Low	22	25.45(6.90)
	High	23	25.48(6.08)
	Total	45	25.47(6.42)
Group Products	Low	20	23.15(6.20)
	High	24	25.29(6.50)
	Total	44	24.32(6.39)
Collapsed Group Means	Low	42	24.36(6.60)
	High	47	25.38(6.23)
	Total	89	24.90(6.39)

There was, however, a significant three-way interaction ($F(2,77) = 4.84$, $p < 0.05$). Simple interaction tests performed for each level of class indicated a significant interaction between performance criteria and group cohesiveness in class B ($F(1,77) = 9.72$, $p < 0.016$, partial eta squared = 0.31), but not in either of the other classes (*ps* > 0.016). Cell mean contrasts indicated that the effect of group cohesiveness was significant in the group products, but not in the individual contributions, incentive condition ($F(1,77) = 8.62$, $p < 0.008$, partial $\eta^2 = 0.48$; $F(1,77) = 2.24$, $p > 0.008$, respectively). This indicates that students in high cohesive groups reported higher cohesiveness scores than those in the low cohesive groups in the group products condition in Class B.

The fact that there was no significant main effect for condition on the group cohesiveness scale does suggest that members of high cohesive groups did not actually perceive their groups to be more cohesive than those in low cohesive groups. Thus, while the groups differed initially in the extent to which members *liked* one another, this did not lead to a more general perception of high cohesiveness.

Achievement Outcomes

Scores on the two achievement tests (curriculum-based and standardized) were subjected to a multivariate analysis of covariance (MANCOVA), with corresponding pretest scores entered as covariates. Screening procedures for conformity to univariate and multivariate analysis of variance assumptions produced satisfactory results. Pretest means and standard deviations for the curriculum-based and standardized tests are presented in Tables 2 and 3, respectively. A 2 (performance criteria) by 2 (cohesiveness) by 3 (class) multivariate analysis of variance (MANOVA) on these scores indicated a significant main effect for class ($V = 0.23$, $F(4,152) = 4.84$, $p < 0.05$), with univariate analyses of variance (ANOVAs) indicating significant effects for both the curriculum-based and standardized tests ($F(2,76) = 11.04$, $p < 0.025$, partial eta squared = 0.22; $F(2,76) = 7.45$, $p < 0.025$, partial eta squared = 0.16, respectively). There were, however, no significant main effects either for group cohesiveness ($V = 0.01$, $F(2,75) < 1$) or incentive criteria ($V = 0.01$, $F(2,75) < 1$), and all multivariate two- and three-way interactions were also non-significant ($\alpha = 0.05$). Thus, pretest scores did not differ significantly across the experimental conditions, either within classes or across the full three-class sample.

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Table 2. Means and Standard Deviations for Scores on the Curriculum-Based Test by Incentive and Cohesiveness Condition

Incentive Condition	Cohesiveness Condition	N	Pretest Mean	Posttest Mean	Adjusted Posttest Mean
Individual Contributions	Low	22	36.79(14.75)	49.14(13.14)	49.57
	High	23	37.52(15.34)	47.04(14.60)	47.55
	Total	45	37.17(14.89)	48.07(13.79)	48.56
Group Product	Low	19	33.70(13.56)	44.82(12.19)	46.97
	High	24	40.54(15.56)	47.35(15.77)	44.64
	Total	43	37.43(14.92)	46.23(14.19)	45.81

Collapsed Means	Low	41	35.32(14.11)	47.13(12.74)	48.27
	High	47	39.06(15.36)	47.20(15.04)	46.10
	Total	88	37.30(14.82)	47.17(13.94)	47.18

Table 3. Means and Standard Deviations for Scores on the Standardized Achievement Test By Incentive and Cohesiveness Condition

Incentive Condition	Cohesiveness Condition	N	Pretest Mean	Posttest Mean	Adjusted Posttest Mean
Individual Contributions	Low	22	27.81(9.69)	31.77(10.20)	31.90
	High	23	26.82(10.08)	30.52(11.56)	31.20
	Total	45	27.31(9.79)	31.13(10.81)	31.55
Group Product	Low	19	26.40(8.29)	31.11(11.13)	33.06

	High	24	30.16(11.05)	33.25(11.98)	31.07
	Total	43	28.45(9.97)	32.30(11.53)	32.06
Collapsed Means	Low	41	27.14(8.97)	31.46(10.51)	32.48
	High	47	28.53(10.61)	31.91(11.73)	31.14
	Total	88	27.87(9.84)	31.70(11.12)	31.81

The multivariate test for the relationship between combined pre- and posttest scores was significant (V = 0.97, $F(4,148) = 34.76$, $p < 0.05$). Univariate regressions indicated significant relationships between combined pretest scores and posttest scores on both the curriculum-based ($F(1,74) = 221.90$, $p < 0.025$, partial eta squared = 0.86) and the standardized achievement tests ($F(1,74) = 101.77$, $p < 0.05$, partial eta squared = 0.73). Thus, use of these pretest scores as covariates produced a significant reduction in posttest error variance. Tests for heterogeneity of regression across the 12 cells of the design were also non-significant (ps > 0.10), indicating that the assumption of regression homogeneity was tenable.

The multivariate test for the three-way interaction was not significant ($V = 0.08$, $F(4,148) = 1.48$, $p > 0.05$), and there were no significant multivariate or univariate two-way interactions (all Fs < 1). The multivariate F for the class main effect was significant, however ($V = 0.36$, $F(4,148) = 8.09$, $p < 0.05$), with univariate ANCOVAs indicating significant effects on both the curriculum-based test ($F(2,74) = 18.12$, $p < 0.025$, partial eta squared = 0.33) and the standardized achievement test ($F(2,74) = 8.95$, $p < 0.025$, partial eta squared = 0.19). Thus, inclusion of class as an independent variable produced a significant reduction of error variance in achievement posttest scores.

The MANCOVA indicated a significant main effect for incentive criterion on adjusted posttest scores ($V = 0.12$, $F(2,73) = 4.94$, $p < 0.05$). The effect for group cohesiveness also approached significance ($V = 0.06$, $F(2,73) = 2.27$, $p = 0.11$). As the adjusted within-cells correlation between curriculum based and standardized posttest scores was significant ($r = 0.40$, Bartlett's chi-square(1) = 12.73, $p < 0.05$), both univariate and stepdown Fs were used in the interpretation of these effects. As the curriculum-based measure provided a direct test of the material covered in the program, scores on this test were entered prior to standardized achievement scores in the stepdown analysis. All univariate and stepdown Fs were tested for significance at Bonferroni-adjusted alpha levels to maintain nominal familywise alpha at or below 0.05 for each set.

Univariate ANCOVAs indicated a significant effect for incentive criterion on the curriculum-based test ($F(1,74) = 7.25$, $p < 0.025$, partial eta squared = 0.09), but not on the standardized achievement test ($F(1,74) < 1$). As indicated in Table 2, the effect on the curriculum-based measure favored the individual contributions condition. The univariate effect for group cohesiveness approached significance for scores on the curriculum based test ($F(1,74) = 4.50$, $p = 0.04$, partial eta squared = 0.06) but not for scores on the standardized achievement test ($F(1,74) = 1.33$, $p > 0.025$). As indicated in Table 2, the marginal effect on the curriculum-based test favored the low cohesiveness condition.

Sociometric Outcomes

Means and standard deviations for pre- and posttest scores on the sociometric scale are also shown in Table 4. To determine whether there were significant differences between the conditions on these scores, a 2 by 2 by 3 ANCOVA was performed. Again, the ANCOVA indicated a significant relationship between the pre- and posttests ($F(1,73) = 63.99$, $p < 0.0001$, partial eta squared = 0.47), but no significant pretest by condition interaction effects (ps > 0.15), indicating that the use of covariance analysis was tenable.

Table 4. Means and Standard Deviations for Scores on the Sociometric Scale By Incentive and Cohesiveness Condition

Incentive Condition	Cohesiveness Condition	Sociometric Scale			
		N	Pretest Mean	Posttest Mean	Adjusted Posttest Mean
Individual Contributions	Low	21	2.06(.40)	2.22(.57)	2.94
	High	22	3.78(.40)	3.61(.43)	2.94
	Total	43	2.94(.95)	2.93(.86)	2.94
Group Products	Low	19	2.01(.44)	2.07(.45)	2.84
	High	24	3.72(.39)	3.38(.48)	2.76
	Total	43	2.94(.95)	2.80(.80)	2.80
Collapsed Group Means	Low	40	2.04(.41)	2.15(.52)	2.89
	High	46	3.75(.39)	3.49(.46)	2.85
	Total	86	2.94(.95)	2.87(.83)	2.87

The ANCOVA on sociometric posttests indicated a marginally significant main effect for incentive condition ($F(1,73) = 2.96$, $p = 0.09$ partial eta squared = 0.04), but all other effects were non-significant (Fs < 1). As indicated by the means in Table 4, the main effect for incentive indicated significantly higher scores for the individual contribution condition.

DISCUSSION

These results indicate that students who worked in cooperative groups and received group rewards based on individual contributions to the group product made significantly greater gains on a curriculum-based achievement test than those who received rewards based an overall group product. Slavin (1996) predicted that use of group rewards for individual performance would have positive effects on learning in cooperative groups by eliminating factors that lead to group motivation losses. As members are made individually accountable for the group's success, this precludes any diffusion of responsibility between group members, eliminating motivational losses associated with "free-rider' and "sucker" effects.

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The hypothesis that members of groups who chose to work together would perform better than those in other groups was not supported. Indeed, it was found that students in high cohesive groups actually performed marginally *worse* than those in low cohesive groups. Thus, the motivational losses discussed above appear to have been more, rather than less, pronounced in groups where members chose to work together. Informal observations of high and low cohesive groups suggested that members of high cohesive groups interacted more than those in low cohesive groups, but that these interactions were largely off-task. This result is not consistent with the results reported by Shaw & Shaw (1962) and by Stam (1973). However, as noted, both of these studies appear to have used group productivity, rather than individual achievement measures. The discrepancy in the results of these studies and the present one suggests that although members who like one another may coordinate their efforts more effectively in a group task (e.g., a group quiz or assignment), as suggested by the Shaw & Shaw and Stam results, they may not *learn* more individually from working with other students that they like.

The results also indicated a significant effect on the sociometric scale for incentive criterion. Interestingly, this effect favored the individual contributions condition. It is possible that this was due to the improvement-based scoring system used in the present study. When the curriculum materials used are appropriately task-analyzed (ensuring that each new skill introduced builds on previous ones), this system ensures that each member of the group has an equal opportunity to contribute to the group's success (Slavin, 1996). Further, the use of this system imposes a structure that ensures that the group is not dominated by the contributions of one or two high-status members. Gordon Allport (1954) specified that intergroup contact would promote positive relations between majority and minority group members only when participants engaged in equal status interaction in the pursuit of common goals. The result obtained here may simply reflect the fact that this can only be achieved when group processes are structured by incentives that impose equal opportunities for all group members to contribute.

The results of this study should, however, be interpreted in light of the fact that there was no significant difference between the conditions on the perceived group cohesiveness scale. Thus, while the level of interpersonal attraction between group members differed initially across the two conditions, this did not lead to predicted differences in cohesiveness perceptions. This outcome may reflect the nature of the group cohesiveness scale used. The experimental manipulation used in the present study focused on *social* cohesiveness, while the cohesiveness scale focused more (although not exclusively) on *task-based* cohesiveness. Hackman (1976) defined task-based cohesiveness as members' "shared commitment to the task of the group" (p. 1517). In a meta-analysis of studies that explored the effects of cohesiveness on group productivity, Mullen & Cooper (1994) found that, on average, correlational studies revealed a positive relationship between task-based cohesiveness and group productivity, but a *negative* relationship productivity and social cohesiveness. Other authors (e.g., Hackman, 1976, Lott & Lott, 1965) have also posed that increases in interpersonal attraction will lead to process *losses* in groups by increasing the number of member interactions and activities away from the task. Even though these predictions relate specifically to group productivity outcomes, the same factors may also apply to individual learning outcomes. As such, further evaluations could explore the effects of using alternative approaches to increasing cohesiveness in cooperative groups, such as the task cohesiveness-building strategy described by Johnson et al. (1994), on learning in cooperative groups.

Students in the present study also did not receive any training in group interaction skills prior to the intervention. Given the emphasis placed on such training by other researchers (e.g., Cohen, 1994; Johnson *et al.*, 1994), it is possible that the impact of group cohesiveness and incentives will vary with students' preparedness for cooperative group work. Thus, future evaluations could examine the effects of these factors on student learning as a function of previous training in the use of effective cooperative interaction skills. Further, the present study did not include specific measures of group interaction processes (e.g., structured observational data). The information yielded by such measures would greatly facilitate interpretations of overall differences between conditions. Further work in this area could incorporate the use of schedules similar to the ones used by Webb (1985), which provide codes for assessing both the quality and the quantity of interactions between cooperative group members.

The results of this study may not generalize across all types of group learning tasks. In particular, this study used convergent problem-solving tasks (i.e., problems in which there was only one correct response), rather than divergent problem-solving tasks (i.e., problems in which a diversity of solutions are required). It is possible that the motivational losses described earlier tend to occur more frequently when groups are assigned to complete convergent tasks. Because high-achieving students are likely to be able to solve convergent problems more quickly than other members of their groups, lower-achieving students may be more prone to perceiving their efforts as redundant on these types of tasks. In contrast, in divergent problem tasks, a broad range of perspectives is often useful. Thus, future evaluations could assess interactions between the effects of incentive structure, group cohesiveness, and task structure on cooperative learning outcomes in the cognitive, affective, and social domains.

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APPENDICES

A. Sociometric Scale

For the sociometric scale, students were presented with a list of all other students in their class, and asked to rate extent to which they would like to work with and to spend their free time with each person named, for example:

		How much would you like to work with this person in the future?					How much would you like to spend your free time with this person in the future?				
Student Name	ID	Not at all	Not much	Don't mind	A bit	A lot	Not at all	Not much	Don't mind	A bit	A lot
John Smith	##										

A number of steps were taken to ensure that students' responses on this scale remained confidential. In the design of the form, class members' names appeared in a folded section of the test, and six different forms of the scale were developed for each class, with different ordering of classmembers' names. These were randomly distributed during testing sessions, so that rating patterns were not discernable at a distance. Each students' name also appeared against an I.D. number, and the list of names was given on a detachable section of the test. When students completed their forms, they detached the list of names from the form. This was done to make comparisons of forms between students difficult, and for storage purposes. The experimenter kept a list of the I.D. numbers and names in a separate location so that the information could be used in the assignment of students to groups.

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B. Items In the Group Cohesiveness Scale (Adapted From Hinkle et al., 1989)

1. I'm glad I belong to this group.

2. I feel held back by this group.

3. I am an important part of this group.

4. I don't fit in with other kids in this group.

5. I feel strongly tied to this group.

6. I don't think the group is that important.

7. I think this group worked well together.

8. I don't feel comfortable with the other kids in this group.

C. Means and Bivariate Correlations for Dependent Measures

	N	M	SD	1	2	3	4	5	6	7
1. Group Cohesiveness Posttest	89	6.90	6.39	1.00						
2. Sociometric Pretest	89	2.95	0.95	0.16	1.00					
3. Sociometric Posttest	86	2.87	0.83	0.16	.90	1.00				
4. Curriculum-Based Achievement Pretest	89	37.30	14.82	0.20	0.15	0.17	1.00			
5. Curriculum-Based Achievement Posttest	88	47.17	13.94	.22	0.04	0.05	.90	1.00		
6. Standardized Achievement Pretest	89	27.88	9.84	0.17	0.08	0.11	.81	.80	1.00	
7. Standardized Achievement Posttest	89	31.58	11.11	0.15	0.08	0.07	.82	.88	.82	1.00

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