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EFFECTS OF INTERPERSONAL ATTRACTION ON COOPERATIVE LEARNING OUTCOMES FOR SECONDARY LEVEL STUDENTS

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ABSTRACT

Researchers have posed group cohesiveness (e.g., members' liking and commitment to the group) to be a critical moderator of small group learning outcomes. Despite this, very little research has been conducted that directly tests this prediction. In the present study, 46 seventh-grade students were randomly assigned to work in either high or low cohesive groups over a four-week period. Results indicated no significant differences between the two conditions on the achievement measures, although the mean performance on Quiz 1 was slightly higher in the low cohesive than in the high cohesive condition. There was also a significant sex by condition interaction effect on a subject-related attitudes scale, indicating that while females showed a preference for working in the low cohesive condition, there was a minimal difference between the two conditions for males. Implications for further research using different operationalizations of group cohesiveness are discussed.

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Cooperative learning is a widely used form of classroom organisation in which students of mixed ability work together in small groups. Research on the effects of cooperative learning has shown these methods to have positive effects in a wide range of outcome areas, including academic achievement, social acceptance, school-related attitudes, and self-esteem (Slavin, 1995). This research has also, however, shown that cooperative learning is not effective for improving student outcomes under all conditions. In particular, meta-analyses of the effects of cooperative learning on student achievement have indicated substantial variations in the effects obtained across different methods (Johnson & Johnson, 2002; Slavin, 1995). Similarly, while some studies

have reported positive effects of these methods on subject-related attitudes (e.g., Kagan, et al., 1985) others have reported no significant effects in this area (e.g., Madden & Slavin, 1983).

Johnson & Johnson (1994) have argued that cooperative learning outcomes will vary with the cohesiveness of the cooperative groups, or the level of students' commitment to and liking of the group, and their desire to be a part of the group. In this view, members of cohesive groups are typically more committed to working towards the group's goals, more readily accept assigned tasks and roles, and communicate more frequently and effectively. This view is consistent with general social psychological perspectives on cohesiveness and group processes. For example, Hogg & Abrams (1988) argue that interpersonal attraction binds group members together and is responsible for feelings of group belonging. Group cohesiveness is traditionally viewed to reflect the perceived attractiveness of the group to its members, and the extent to which the group mediates social and individual goals that its members value (Festinger, Schacter & Back, 1950).

Two studies have examined the relationship between group cohesiveness and learning in cooperative groups. In the first of these (Shaw & Shaw, 1962), second-graders nominated members of their class with whom they would most and least prefer to work, and were then assigned to study spelling lists in either high or low cohesive groups. In high cohesive groups, no member rejected any other member, and some positive choices were represented. In low cohesive groups, no member chose any other member, and some rejections were represented. Groups worked together for three daily sessions, and completed tests in the second and third sessions. A significant positive correlation between group cohesiveness and spelling scores was found in the second session, but not the third session tests. Based on these results, the authors concluded that group cohesiveness was positively related to learning during the early phases of interaction (i.e., in sessions one and two), but was unrelated over a longer period of time (i.e., by the end of the third session).

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In the second study (Stam, 1973), fifth-graders nominated members of their class that they would like to spend a Saturday afternoon with, were their best friends, were people that they admired, were people they would trust with a secret, and were people that they would choose to invite to a party. Students 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. In this study, however, students did not complete individual achievement tests. That is, one assignment or test sheet was submitted for each group, making it impossible to assess whether the individual learning of group members differed across the two cohesiveness conditions. It is also unclear whether the correlations reported by Shaw & Shaw (1962) are based on individual or group performance scores.

Despite the perceived importance of group cohesiveness in cooperative learning, no recent studies have appeared that systematically evaluate its impact on achievement or other outcomes.

The aim of this study was to evaluate the effects of one aspect of cohesiveness (liking or desire to work together between group members) on student achievement and subject-related attitudes. Based on sociometric ratings, seventh-graders worked in cooperative groups in which there was either a high or low level of attraction (cohesiveness) between students. It was predicted that those who worked in high attraction groups would have higher scores on two measures of individual achievement.

To assess any collateral effects of the conditions on students' affective responses to the learning tasks, and to generate process data that might inform the interpretation of observed achievement effects, students also completed a subject-related attitude scale at pre- and posttest. As previous studies have not reported collateral effects on students' task attitudes, however, no specific hypotheses were formulated for effects on this measure.

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Subjects

Subjects were 46 students from two seventh-grade Studies of Society and the Environment (SOSE) classes in a middle class Australian secondary school. Class A comprised 19 students (13 males, 6 females). Class B consisted of 27 students (16 males, 11 females).

Curriculum Materials and Dependent Measures

The intervention was implemented in the subject *Studies of Society and the Environment*, or SOSE. All academic material used was adapted by the experimenters from the school's curriculum plans. Class A studied Antarctica during the four-week intervention, and Class B studied Ancient Egypt. Students completed a curriculum-based pretest, which included two 18-item multiple-choice sections (corresponding to topics covered in the first and second two-week blocks of the intervention). The items in this measure were based directly on the materials developed for the study.

Students completed two posttest quizzes, one at the end of each two-week block. Each of these quizzes was 18 items long, and represented a parallel version of the relevant section of the pretest. These quizzes were completed under a 15-minute time limit just after the last session of each two-week block.

A sociometric rating scale was also used to provide a basis for assigning students to groups within the high and low cohesive conditions. Although Shaw & Shaw (1962) and Stam (1973) both used peer nomination as a measure of social liking amongst students, the present study used a rating scale to ensure that students' attitudes towards all members of the class was obtained. These measures have also been reported to be more reliable than peer nomination measures (e.g., Oden & Asher, 1977; Asher, Singleton, Tinsley & Hymel, 1979). In this scale, students were presented with a list of the names of their classmates, and were asked to rate how much they would like to work with each person on a five-point scale (1 = Not at all, 5 = Very much so).

Finally, to assess effects of the two conditions on students' attitudes towards the assigned learning tasks, students completed an experimenter-developed attitude scale at pre- and posttest. The scale consisted of three subscales that assessed attitudes in three areas that have emerged in previous studies (Nyberg & Clarke, 1978): Coping (e.g., "The work we do in SOSE is too difficult"); Liking (e.g., "SOSE assignments are fun"); and Importance (e.g., "The projects we do in SOSE provide me with useful information"). Each subscale included four items (12 items in total), to which students rated their agreement on a five-point scale (1=Strongly Disagree, 5=Strongly Agree). A full list of statements used in the scale is presented in Appendix A.

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Procedure

Pretesting. Pretesting for both classes was conducted in two separate sessions one week prior to the start of the intervention. Students completed the peer rating scale and attitudes scale in the first session. For the peer rating scale, six different forms of the test were distributed randomly during the testing sessions so that students could not determine their own ratings by observing the response patterns of other class members. Students were required to keep the list of names on this scale folded over whilst completing the form, and to detach the list of names from the form immediately after completing the scale. For the attitudes scale, students were simply asked to rate the 12 items according to the five-point scale. The achievement test was given in the second session, with a 30-minute time limit.

Experimental Conditions. Following the pretesting sessions, students in each of the two classes were assigned randomly (stratifying for pretest achievement scores) to either the high or low cohesiveness condition. Thus, approximately half of each class were assigned to each condition. Within the high cohesiveness condition, students were assigned to groups so that there were no negative ratings amongst members (i.e., no ratings less than 2 out of 5 on the rating scale), and each member rated at least one other member of the group positively (i.e., a rating of 4 or more on the rating scale). Within the low cohesiveness condition, students were assigned to groups so that there were no positive choices between members (i.e. no ratings above 4 on the rating scale), and each member rated at least one other member negatively (i.e. a rating of 2 or less on the rating scale).

Across the entire sample, 12 groups of three to five members were formed. Given the disproportionate number of males in the sample, and the biases across conditions that could be introduced through the use of mixed-sex cooperative groups (i.e., high opposite-sex sociometric ratings occurred far less frequently than low opposite-sex ratings), 11 of the 12 groups were either all-male or all-female. Due to class numbers, however, it was necessary to form one mixed-sex group in the high cohesiveness condition.

The intervention was implemented during students' normal SOSE lessons, over a period of four weeks. Sessions lasted approximately 40 minutes, and took place three times per week. The experimenter visited both participating classes during each session to ensure that all procedures were implemented correctly. Prior to the intervention, students were briefed by one of the

experimenters about the basic procedures they would follow during the four-week period. Students were encouraged to work together and consult with other group members before asking for teacher assistance.

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Small prizes were made available for students who met a specified performance criterion on the quizzes. This was done to ensure that students took the tasks and quizzes seriously, and performed at their best level over the intervention period. For each quiz, all students were informed that they should aim to ensure that their score represented an improvement of three or more points on their score for the relevant pretest section. As scores for pretest sections were low (around 3 or 4 as an average), there were no ceiling effects present for either quiz. These incentives were distributed the day after each two-week quiz.

Lesson format At the beginning of each lesson, students divided up into their respective groups. In these groups, students were prompted to share information and to try and work any problems out as a group before requesting assistance from the teacher. When assistance was provided, it only involved directions as to where to look for information (e.g. appropriate texts) and clarification of the task or assignment questions. Students were told to devise their own strategies regarding the division of tasks amongst members. The cooperative activities varied from those in which students combined individual products to form a single group assignment (e.g., a group poster on Antarctic food chains) to individual assignments in which students shared their information with group members after completing the task (e.g., an assignment on an Antarctic explorer).

At the end of the each two-week intervention block, each student completed the 18-item quiz that corresponded to the material covered in that six-lesson component. A 15-minute time limit was imposed for each quiz. Students completed these tests in their normal seating positions rather than in their groups. In the second quiz session, students also completed the posttest attitudes scale. Procedures for the administration of the latter measure were the same as those described for the pretest.

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RESULTS

Achievement Outcomes

A matrix of bivariate correlations between all dependent measures in the study is presented in Appendix B. To determine whether posttest achievement differed across members of high and low cohesive groups, scores on Quiz 1 and Quiz 2 were entered into separate analyses of covariance (ANCOVAs), with scores on the achievement pretest entered as covariates. Given the sample size, it was not viable to use a procedure that took the nested study design (e.g., students within groups), into account (e.g., hierarchical linear modelling). However, correlations between individual and mean group scores were non-significant for all dependent measures ($ps > 0.10$),

providing some support for the independence assumption. Class and sex were entered as independent variables in each ANCOVA to test for interaction effects and to reduce within-condition error variance, producing a 2 (cohesiveness: high versus low) by 2 (class: A versus B) by 2 (sex: male versus female) factorial design.

Means and standard deviations for scores on the two quizzes and on the achievement pretest are shown in Table 1. As the class factor was not involved in any significant interactions either for the achievement or attitude measures, descriptive statistics were collapsed over class to simplify presentation. An initial 2 by 2 by 2 analysis of variance (ANOVA) on achievement pretest scores indicated no significant main effects for condition ($F(1,38) < 1$). There were also no significant two-way interactions between condition and class, condition and sex, or class and sex ($F(1,38) < 1$). The three-way interaction between condition, class, and sex was also non-significant ($F(1,38) = 1.73, p = 0.20$).

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Table 1. Observed Means ($M_{OBS.}$), Adjusted Means ($M_{ADJ.}$), and Standard Deviations (SDs) for Scores on the Achievement Pretest and Quizzes by Condition and Sex

Cohesiveness		Pretest		Quiz1			Quiz 2			
Condition	Sex	N	$M_{OBS.}$	SD	$M_{OBS.}$	$M_{ADJ.}$	SD	$M_{OBS.}$	$M_{ADJ.}$	SD
	Female	9.00	6.56	2.00	8.20	8.20	1.50	8.89	8.01	1.17
	Male	14.00	6.35	1.64	8.48	8.58	1.58	7.71	8.04	2.61
High	Total	23.00	6.43	1.78	8.37	8.43	1.55	8.17	8.03	2.05
	Female	8.00	6.75	1.00	8.97	8.86	1.06	9.00	8.03	1.62
	Male	15.00	6.47	1.00	9.00	9.04	1.38	7.29	8.03	2.41
	Total	23.00	6.57	1.00	8.99	8.98	1.27	7.89	8.03	2.13
Low	Female	17.00	6.65	1.53	8.56	8.51	1.29	8.94	8.02	1.38
	Male	29.00	6.41	1.31	8.75	8.82	1.48	7.49	8.03	2.51

For results of Quiz 1, an initial assessment of conformity to ANCOVA assumptions produced satisfactory results. The test for heterogeneity of regression slopes was not significant ($F(1,44) < 1$), suggesting that use of the pooled within-cells regression co-efficient was tenable. Regression analysis indicated a significant relationship between Quiz 1 scores and pretest achievement scores ($F(1,37) = 11.26, p = 0.00$, partial eta squared = 0.23), indicating that use of covariance analysis produced a significant reduction in posttest error variance. These analyses also indicated no significant violations of the homogeneity assumption (Cochran's $C(5,8) = 0.23, p = 0.75$).

The ANCOVA on Quiz 1 scores indicated no significant main effects for class ($F(1,37) = 2.39, p = 0.13$) or sex ($F(1,37) < 1$). The condition main effect approached, but did not attain, significance at the 0.05 level ($F(1,37) = 2.85, p = 0.10$). As indicated by the adjusted means in Table 1, the mean Quiz 1 score of low cohesive group members was, in fact, slightly higher than the mean for high cohesive group members. All interaction effects involving the condition factor

were non-significant ($F(1,37) < 1$), indicating that these effects were consistent across classes and across males and females.

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Screening tests for conformity to ANCOVA assumptions on Quiz 2 also indicated no significant violations of the homogeneity of regression and variance assumptions ($F(1,44) < 1$; Cochran's $C(5,8) = 0.34, p = 0.08$, respectively). The relationship between pre- and posttest scores on this measure was also, however, non-significant ($F(1,37) = 0.36, p = 0.55$), indicating that use of the pretests as covariates did not produce a significant reduction in error variance in posttest scores. The ANCOVA on Quiz 2 scores indicated no significant main effects for class ($F(1,37) = 2.06, p = 0.16$) or condition ($F(1,37) < 1$), and no significant interaction effects involving the condition factor ($F(1,37) < 1.15, ps > 0.29$). Thus, there were no significant effects of group cohesiveness on Quiz 2 performance.

Attitude Outcomes

Total scores on the attitude measure were also entered into a 2 (condition) by 2 (class) by 2 (sex) factorial ANCOVA, with total scores on the pretest attitude scale used as covariates. Screening tests on this measure indicated no significant violations to the homogeneity of regression and variance assumptions ($F(1,44) = 1.16, p = 0.29$; Cochran's $C(5,8) = 0.21, p = 1.00$, respectively). A 2 X 2 X 2 ANOVA on pretest attitude scores also indicated no significant main effects for condition ($F(1,38) = 1.71, p = 0.20$), class ($F(1,38) < 1$), or sex ($F(1,38) = 1.58, p = 0.22$), with no significant interaction effects involving the condition factor ($F(1,38) < 2.47, ps > 0.10$). There was, however, a significant relationship between pre- and posttest attitude scores ($F(1,37) = 23.48, p < 0.0001$, partial eta squared = 0.39), indicating that the inclusion of the attitude pretests produced a significant reduction in posttest score variance.

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Table 2. Observed Means ($M_{OBS.}$), Adjusted Means ($M_{ADJ.}$), and Standard Deviations (SDs) for Scores on the Attitude Pre- and Posttests by Cohesiveness Condition and Sex

Cohesiveness Condition	Sex	N	Pretest		Posttest		
			$M_{OBS.}$	SD	$M_{OBS.}$	$M_{ADJ.}$ SD	
High Cohesive	Female	9	38.11	6.59	34.67	34.92	6.49
	Male	14	32.83	4.73	34.90	34.26	5.81
	Total	23	34.89	5.46	34.81	34.52	6.08
Low Cohesive	Female	8	32.33	6.26	35.88	34.35	6.97
	Male	15	33.24	4.68	33.21	34.48	5.35
	Total	23	32.92	5.23	34.14	34.43	5.91
Combined Cohesive	Female	17	35.39	6.44	35.24	34.65	6.72

Male 29 33.04 4.70 34.03 34.37 5.57

The 2 X 2 X 2 ANCOVA on posttest attitude scores indicated no significant main effects for class ($F(1,37) = 2.57, p = 0.12$), condition ($F(1,37) = 2.14, p = 0.15$), or sex ($F(1,37) < 1$), and no significant two-way interactions between class and condition or between class and sex ($F(1,37) < 1$). There was, however, a significant condition by sex interaction effect ($F(1,37) = 5.57, p = 0.02$). As shown by the adjusted means in Table 2, this indicated that females had more positive attitudes in the low cohesive than in the high cohesive group, whereas for males, a smaller effect was found in the opposite direction.

DISCUSSION

The results of this study did not support the hypothesis that members of cooperative groups who chose to work together (high cohesiveness) would outperform those in groups who explicitly did not want to work together (low cohesiveness). As noted in the introduction, the criterion measures used by Shaw & Shaw (1962) and by Stam (1973) were indices of group productivity, rather than of individual student learning. Together, the results of these studies and the present one suggest that while members of highly cohesive groups may coordinate their efforts more effectively in a group task, these students will not necessarily *learn* more as a result. Thus, highly cohesive groups may be more effective when the primary goal is to have students cooperate towards a high-quality overall product, but not when the primary goal is to enhance individual student learning.

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The hypothesis that members in high cohesive groups would report more positive attitudes towards the subject being studied than members of low cohesive groups was also not supported. There was, however, a significant interaction between condition and sex, indicating that females in the low cohesive condition had more positive subject-related attitudes than females in the high cohesive condition. For males, there was a smaller effect in the opposite direction. The reasons for this effect are not entirely clear. Given the relatively low sample size for the study, further research is needed to explore this question in detail.

It should be noted here that both the present and the two previous studies used only one possible operationalization of group cohesiveness (liking between group members). While this index of cohesiveness is traditional, several theorists have called for a distinction between different types of group cohesiveness (e.g., Hogg & Abrams, 1988). In particular, a number of researchers have argued for a distinction between social and task-related cohesiveness, with the latter referring to members' shared commitment to the group task/s.

Mullen and Cooper (1994) made this distinction in their recent meta-analysis of 66 studies on the relationship between cohesiveness and group productivity. Results indicated that while experimental studies indicated positive relationships between group productivity and both forms of cohesiveness, correlational studies suggested a positive relationship for task-related cohesiveness and a negative relationship for social cohesiveness. As these results again relate to

group productivity, further research is needed to compare the effects of different types of cohesiveness on individual student learning. In the present study, the impact of the manipulations on students' perceptions of cohesiveness within the cooperative groups was not assessed. Thus, while members may have liked one another more, it is possible that this did not actually impact perceptions of group cohesiveness. Further research in the area should incorporate measures that directly assess such perceptions.

Future evaluations could explore ways to directly manipulate different forms of cohesiveness within cooperative groups. The group processing strategies developed by David and Roger Johnson at the University of Minnesota, for example, focus on building task-related cohesiveness. In group processing, members reflect on a group session to identify member actions that were helpful and unhelpful, and to make decisions about actions to continue or change in the next session (Johnson & Johnson, 1994). The purpose of group processing is to "clarify and improve the effectiveness of the members in contributing to the collaborative efforts to achieve the group's goals." (p.74). Given the results reported by Mullen and Cooper (1994), further research is needed to explore the impact of such manipulations on cooperative learning outcomes.

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The moderating effects of group cohesiveness on learning in cooperative groups may also differ across different *types* of tasks (Cohen, 1986). In particular, it is possible that motivational losses will tend to occur more frequently when groups are assigned to complete convergent tasks (i.e., knowledge-based problems, in which there is only one correct response) like the one used in the present study. Because high-achieving students are likely to be able to solve convergent problems more quickly than other group members, lower-achieving students may be more prone to perceiving their efforts to be redundant on these types of tasks than on divergent tasks, where a range of perspectives are useful. Thus, future evaluations could assess the effects of cohesiveness on learning in cooperative groups for both convergent and divergent group tasks.

In addition, students in the present study did not receive specific training in the use of effective group interaction skills. Given that a number of researchers (e.g., Sharan & Sharan, 1976; Cohen, 1994; Johnson *et al.*, 1994) have emphasised the importance of such training in the effective use of cooperative learning strategies, it is possible that the impact of group cohesiveness on learning outcomes will vary according to students' preparation for cooperative group work. Thus, future evaluations could examine the effects of cohesiveness on learning in cooperative groups as a function of previous training in the effective use of cooperative interaction skills. The present study also did not include any structured observational data on group interaction processes to verify changes in student interaction patterns as a function of the experimental conditions. Replications of the present study could use schedules similar to the ones used by Webb (1985) to examine the quality and quantity of interaction that occurs between group members under these conditions.

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APPENDIX A. ITEM STATEMENTS IN THE SOSE ATTITUDE SCALE

1. SOSE assignments are fun to do. (Liking).
2. SOSE is one of my favourite school subjects. (Liking).
3. The topics we cover in SOSE classes are interesting. (Liking).
4. I enjoy my SOSE lessons. (Liking).
5. The work we do in SOSE is too difficult. (Coping).
6. I can't understand the topics we cover in SOSE. (Coping).
7. I am worried that I won't do well in SOSE this year. (Coping).
8. I can't keep up with the work we do in SOSE. (Coping).
9. The topics we cover in SOSE are important. (Value).
10. I can see why we do SOSE in year 7. (Value).
11. SOSE provides me with useful information. (Value).
12. If I had a choice of school subjects, I would choose SOSE. (Value).

APPENDIX B. CORRELATIONS BETWEEN DEPENDENT MEASURES

	QUIZPRE	QUIZ1	QUIZ2	POSTATT	PREATT
QUIZPRE	1				
QUIZ1	.42(**)	1			
QUIZ2	.15	.50(**)	1		
POSTATT	.06	.01	.09	1	
PREATT	.18	-.08	.09	.57(**)	1

** Correlation is significant at the 0.01 level (2-tailed).

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