The Nexus between the Above-Average Effect and Cooperative Learning in the Classroom

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The present study examines the above-average effect (Chambers & Windschitl, 2004; Moore & Small, 2007) in assessments of task performance. Participants completed self-estimates of performance and group estimates of performance, before and after completing a task. Participants completed a task individually and in groups. Groups were self-selected by participants, or randomly assigned by the researchers. Previous research examined the above-average effect in performance self-estimates for individuals, but little has been done examining the above-average effect in group performance. Results indicated robust above-average effects for both individual and group estimates of performance, and these effects were not limited by group type. Furthermore, above-average effects were observed for estimates of performance both before and after completion of the task, suggesting that participants were not more accurate in their post-task estimates. In addition to these data, results of a group-work survey administered to participants are disseminated, suggesting some practical applications for group work in the college classroom setting.

The Nexus between the Above-Average Effect and Cooperative Learning in the Classroom

Instructors often hear students express the belief that their own academic performance is superior relative to their peers. In fact, there is a body of literature that describes the general tendency for individuals to overestimate skills, abilities, and/or personal attributes as compared to others within a variety of contexts (Moore & Small, 2007). This phenomenon is often referred to as the above-average (or better than average) effect (Chambers & Windschitl, 2004;

Moore & Small, 2007; Hamamura, Heine, & Takemoto, 2007; Kanten & Teigen, 2008).

There are numerous reasons why students may hold above-average beliefs regarding their academic performance. One explanation is that individuals are motivated to self-enhance, or believe they are better than the average person because it serves as a protective factor by promoting successful coping and personal wellbeing (Chambers & Windschitl, 2004; Taylor & Brown, 1988). Other researchers describe above-average effects as differentially weighted self-evaluations without meaningful comparison to the referent other (Chambers & Windschitl, 2004; Klar & Giladi, 1999). Still other research suggests that above-average effects are influenced by differing amounts of comparative information available to those making evaluative judgments (Moore & Small, 2007). With more information about self, individuals make more informed estimates of their performance. With less information about others, individuals make comparative judgments based on their estimates of average group performance. These estimates, in the absence of diagnostic information (such as the performance abilities of others) are posited to be at least partially responsible for the above-average effect (Moore & Small, 2007).

It is important for educators to consider the potential positive and negative implications of the above-average effect in the classroom setting specifically. One potential benefit for educators and parents would be if the above-average effect positively influences self-esteem. Research indicates that individuals with high self-esteem tend to report being happier (Baumesiter, Campbell, Krueger, & Vohs, 2003). Another educationally relevant benefit involves the connection between having high self-efficacy and the types of academic challenges that a student would be willing to attempt and the amount of effort they are willing to exert in those tasks (Bandura, 1989). Obviously, there are also

instances where the above-average effect could potentially be problematic. The most troubling outcome might be that the high self-regard could result in increased narcissism. Narcissists tend to respond negatively when their ideas or behaviors are questioned (Rhodewalt & Morf, 1998). This would be problematic in a modern classroom that values critical thinking where questioning the evidence of a belief is considered as important as whether or not you can recite a fact or concept.

Cooperative Learning

The general consensus regarding current pedagogy of the college classroom reflects the idea that traditional lecture and explicit instruction should be augmented with cooperative learning activities that allow students significant opportunities to interact with one another during learning. Common characteristics of cooperative learning activities include: (a) students organized into small groups focused on a learning objective, (b) interdependence within the group, (c) group members attempt to help one another, and (d) individual and group accountability (Sharan, 2010, p. 304). Current evidence in the fields of education and social science seem to suggest that cooperative learning techniques are generally effective and students who work in groups perform better than individuals who work alone (Baer, 2003).

A common reason that a teacher might utilize cooperative learning activities is that many of the activities tend to simulate the type of interdependence that occurs in real-life workplaces. Interdependence typically connect individuals' outcomes together, where a team must work together to all achieve a positive result (Johnson & Johnson, 2008). Another reason a teacher might decide to use these techniques is because they think there will be an advantage in terms of student achievement and social skills. In fact, there is research that suggests that, when implemented properly,

cooperative learning techniques are quite effective (Slavin, 1996). Educators typically have an interest in preparing students for the future, and as a consequence may be more interesting in advocating pedagogy more consistent with their perception of future workplace demands.

The challenge to the instructor is to reconcile these activities within a classroom environment where some students like group activities and function well in groups but others do not. It is important to understand some of the reasons why students may not enjoy group participations, so that potential modifications to group procedures may be implemented that might improve engagement and satisfaction. One line of research explored the negative impact of social comparison on group work and found that individuals who experienced the most group satisfaction were those who characteristically preferred to do things together and in groups (affiliation orientation) and also did not tend to compare themselves to others (social comparison orientation) (Buunk, Nauta, & Molleman, 2005).

Study Significance

Research has demonstrated the existence of the above-average effect and supports cooperative learning strategies to facilitate student learning; however, a paucity exists in the literature regarding how (and whether) above-average effects occur within group cooperative learning activities specifically. This omission is significant in a practical sense, as well, given instructors' anecdotal reports of student dissatisfaction regarding participation in group work due to their subjecting feelings of knowing more and/or contributing more than their other group members. To appease these self-identified haters of group work, some instructors allow students to self-select their group members to encourage ownership over the group process and increase satisfaction, whereas others assign students to groups for group activities. Many questions

remain unanswered. To what degree do above-average effects exist in group work? Are the effects limited by how the groups are created in the classroom? Finally, and perhaps the most fundamental question of all; are assessments of performance (for both group and individual work) accurate? That is, are students able to accurately predict or reflect on their own individual and group performance in an accurate and meaningful way?

Method

Design and Participants

The current study employed a single factor between-subjects design, where 74 participants were allowed to choose their own groups and 79 participants were randomly sorted into groups.

Participants were undergraduate student volunteers (N =153) whose ages ranged from 18-42 (M = 20.37, SD = 3.13, consisting of 48 men, 105 women) recruited from 4 2000-level psychology undergraduate courses. Participant-disclosed undergraduate class standings indicated that 21 identified as freshman, 97 identified as sophomore, 31 identified as junior, and 3 identified as senior, with one student abstaining. Participants were granted class extra credit for completing the surveys, but an alternative extra credit activity was available for those who chose not to participate.

Materials

The individual and group task used in the present study was called the "Survival on the Moon" (or "Lost on the Moon") task (Kagan, 1992). In this task, participants are given a brief scenario where they are astronauts who have landed on the lighted side of the moon and need to get to a rendezvous point 200 miles from their present location. The task lists 15 items, and the participant's job is to prioritize the items in rank order, from most needed to least needed. This task is

scored in terms of deviations, in that participants' scores are compared to the ideal score (which is not given to participants as they complete the task).

All participants received surveys eliciting information about performing the NASA task. Participants received the same basic survey, worded for individual or group performance, and worded in the future tense (for pre-task ratings) and in the past tense (for post-task ratings). The surveys asked participants to rate how difficult they rated the task (on a scale of 1-10 where 1 was "very easy" and 10 was "very hard"). The surveys next provided participants with information regarding how NASA ranked scores based on how far they were from NASA's 'ideal' score (e.g., 0-25 points away from the ideal score rates as "excellent"). With this information as a guide, participants were asked to indicate how many points from the ideal score their score was (or would be). Finally, participants were asked to rate their performance relative to others doing the task.

Last, participants received a final questionnaire, eliciting demographic information (age, gender, class standing, and GPA) as well as information about the NASA task. Participants were asked to rate how much they felt their group worked as a team, how much they felt they were a part of that team, and how much they enjoyed doing the task individually and in their group. Last, participants were asked about group work in their courses in general; how much did participants like doing group work in their courses, and how much did participants typically contribute in group work projects?

Procedure

Students were approached during class time and offered course extra credit for participation. A consent script which contained the basic research details was read to the class, and students were given an opportunity to ask questions before

agreeing or declining participation. Students were also informed that they could ask questions at any point during the procedure, refuse to answer any questions, and/or stop participating at any time. Two psychology classes were randomly selected to participate in the condition where participants were randomly sorted into groups, and two psychology classes were randomly selected to participate in the condition where participants were allowed to form their own groups.

Once participants had heard the consent statement and agreed to participate, those in the randomly assigned group condition were separated into groups of four by asking students to "count off" and form a group with other students who were assigned the same number. Students were asked to remain seated during the counting procedure, to keep students from moving to manipulate their group assignment. Participants in the "choose your own group" (self-selected) condition were given a few minutes to sort themselves into groups of four. Ideally, groups would have been standardized to 4 members each, but due to the in-class setting, there were four groups in the study with only three participants, and one group containing 5 participants. The remainder of the procedure was the same for all participants.

After sitting with one's group, participants were given a packet with all of the research materials. Participants were closely observed to ensure that they only used the sheet that they were instructed to use, and that they kept all completed sheets put away, face down. The experimenter read the "Survival on the Moon" scenario to all participants and explained that they would be completing the task by themselves, as well as with their group. Task order (self first or group first) was counterbalanced. After learning about the task, participants were instructed to complete the pretest, which asked participants to predict how they thought they

would perform on the task individually, as well as how they thought their group would perform.

Next, participants completed the "Survival on the Moon" task. Participants were given 10 minutes to complete the task alone, as well as 10 minutes to complete the task in a group. All participants (groups and individuals) were able to complete the task within the time allotted. Following completion of the task, participants completed post test surveys, eliciting the same information as was asked in the pretest, but now with the benefit of experiencing the task itself, as well as the benefit of experiencing their group members' contributions, to inform their estimates. Last, participants completed the final questionnaire, which elicited demographic information as well as perceptions about group work in the study, and in coursework in general. The experimenter collected the packets, debriefed the participants, and thanked them for participation.

Results

One participant's data was removed from analyses for having incomplete information, as well as not following directions in those responses that were given. For this reason, the final sample size for the randomly assigned groups condition was (n = 73), and the final sample size for the self-selected groups condition was (n = 79), for a total sample size of 152.

Group condition differences.

The researchers first needed to determine whether there were pre-existing academic differences between students in the randomly assigned and self-selected groups. To investigate this possibility, an independent samples t-test was conducted on students' self-reported GPA scores (N = 151: one student abstained). No significant effect of group was observed $t(149) = -.70$, $p = .482$, $r = .06$. Self-reported GPA did not significantly differ for those in the randomly assigned groups

condition (M = 3.11, SD = .57) compared to those in the self-selected groups condition (M = 3.17, SD = .45). This indicates that the students in the two group conditions were not significantly different in terms of self-reported academic performance. Thus, any differences observed by group would not be due to pre-existing academic performance differences.

NASA task performance.

Performance on the NASA task was scored in terms of deviations: how many points away from NASA's ideal ranking did groups and participants have? A higher deviation score equals poorer performance on the task because that score is further away from NASA's ideal ranking. Thus, for these data, a lower score is indicative of better performance, as it reflects a score that is closer to the ideal. These resulting NASA task scores were submitted to a 2 x 2 mixed ANOVA, where score type (self score and group score) was manipulated within-subjects and group (randomly assigned group or self-selected group) was manipulated between-subjects. A significant main effect of score type was observed $F(1, 150) = 48.45$, $p < .001$, *partial* $\eta^2 = .24$. Participants' scores on the NASA task were significantly further from the ideal score when they did the task alone (M = 43.58, SD = 10.43) compared to when they completed the task in a group (M = 37.53, SD = 7.55). A significant main effect of group was also observed $F(1, 150) = 11.04$, $p = .001$, *partial* $\eta^2 = .07$. Participants who were in randomly assigned groups had task scores that were significantly closer to the ideal score, relative to those who were in self-selected groups (M = 38.55, SE = .84 for randomly assigned, M = 42.41, SE = .81 for self-selected). However, this main effect collapses NASA task scores across individual and group task performance. Thus, this effect is not informative, because a difference between self-selected and randomly assigned groups is only relevant to the group task (and not the individual task). The score type

by group interaction was not significant ($F < 1$). These findings suggest that participants performed significantly better (e.g., closer to the ideal score) when they completed the task with a group compared to doing the task alone. This finding is consistent with Slavin, Lake, and Groff (2009) who found better performance (in high school students) for those working in groups (relative to working with a computer or textbook). As previously mentioned, the significant main effect of group condition is less meaningful, as the main effect indicates NASA task performance group differences are only observed when one combines individual and group task scores.

Self-estimates of performance.

Participants were instructed to estimate their own performance (in the same scale as the actual task: number of points away from NASA's ideal ranking) both before and after they completed the task. A 2 x 2 mixed ANOVA was conducted, with participants' estimates of their performance on the individual task manipulated within-subjects (before and after completing the NASA task) and group (randomly assigned group or self-selected group) manipulated between-subjects. No significant effects were observed ($p > .223$ for all effects). These results indicate that participants' estimates of their own performance were not affected by group condition, nor were they affected by timing of the estimate (before or after completing the task), nor did the two factors interact.

Next, participants' self-estimates were examined relative to their actual performance on the NASA task, to investigate whether self-estimates of performance were actually accurate indicators of performance. First, a Pearson r correlation coefficient was calculated to examine whether there was a relationship between participants' scores on the NASA task and their pre-task estimates of their own performance ($N = 152$). No significant correlation was

detected (r = -.04, p = .644). Thus, participants' estimates of their performance, collected prior to doing the NASA task, were not accurate predictions.

Similarly, no significant correlation was observed in examining the relationship between participant scores on the NASA task and their post-task estimates of their own performance (r = .11, p = .190). These results indicate that estimates of self-performance, after completing the task individually, are not a good indicator of actual performance on the NASA task. However, these pre-and post-task estimates of performance do not provide information regarding any potential differences by group condition.

In order to investigate pre-task self-estimates and individual performance on the NASA task by group condition, a 2 x 2 mixed ANOVA was conducted, with participants' pre-task self-estimates and individual NASA task performance manipulated within-subjects, and group (randomly assigned or self-selected) manipulated between-subjects. A significant main effect was observed, such that participants' pre-task estimates of their performance were significantly better (M = 31.14, SD = 14.69) than their actual performance on the NASA task (M = 43.58, SD = 10.43), $F(1, 150) = 69.39$, $p < .001$, *partial* $\eta^2 = .32$. This indicates the presence of an above-average effect in that participants are overall predicting that their performance will be significantly better than it turns out to be. No other significant effects were observed ($p > .115$ for all other effects).

Likewise, to investigate post-task self-estimates relative to individual performance on the NASA task, a 2 x 2 mixed ANOVA was conducted, with post-task self-estimates and individual NASA task performance manipulated within-subjects, and group (randomly assigned or self-selected) manipulated between-subjects. As with the pre-task estimates, a significant main effect was observed where participants'

post-task estimates of their performance were significantly better (M = 32.57, SD = 13.88) than their actual NASA task performance (M = 43.58, SD = 10.43), $F(1, 150) = 67.67$, $p < .001$, *partial* η^2 = .31. No other significant effects were observed ($p > .104$ for all other effects). Given that the observed above-average effect pattern did not change from pre to post-task estimates suggests that participants are either not getting diagnostic information from completing the task, or the NASA task does not provide diagnostic information in and of itself to allow students to update their individual estimates. Both before and after the task, participants are overestimating their performance.

Group estimates of performance.

Similarly to the self-estimates of performance, participants were instructed to estimate their group's performance (in the same scale as the actual task: number of points away from NASA's ideal ranking) both before and after they completed the NASA task with their group. A 2 x 2 mixed ANOVA was conducted, with participants' estimates of their group's performance manipulated within-subjects (before and after completing the group NASA task), and group (randomly assigned group or self-selected group) manipulated between-subjects. A significant main effect of performance estimate was observed $F(1, 150) = 5.36$, $p = .022$, *partial* $\eta^2 = .03$. Participants gave significantly higher estimates of their group performance before completing the task with their group (M = 29.71, SD = 10.60), compared to estimates given after (M = 32.22, SD = 16.05). No significant main effect of group condition was observed ($F < 1$). However, a marginally significant estimate by group condition interaction was observed $F(1, 150) = 3.68$, $p = .057$, *partial* $\eta^2 = .02$. Post-task group estimates did not significantly differ by group (M = 33.05, SD = 15.57 for randomly assigned groups, M = 31.46, SD = 16.55 for self-selected groups). However, in the pre-

task group estimates, those in the randomly-selected group condition (M = 28.30, SD = 10.62) predicted significantly better scores than those in the self-selected group condition (M = 31.01, SD = 10.49). It is puzzling that those in the randomly assigned groups condition are actually predicting better performance than those in the self-selected condition, especially on the pre-test for the task, but as this effect is only marginally significant, it may not reflect a reliable difference.

Next, participants' group performance estimates were examined relative to their actual group performance on the NASA task to determine whether participants' group estimates of performance were accurate or not. Group pre- and post-estimates were correlated (via the Pearson r correlation coefficient) to performance on the group NASA task. No significant correlation was observed between group performance on the NASA task and pre-task group estimates (r = .01, p = .898) or between group performance on the NASA task and post-task group estimates (r = .11, p = .186). These results suggest, as with the self-estimates of performance, that estimates of group performance do not appear to be accurate in that they are not significantly related to scores on the NASA task itself.

To investigate pre-task group estimates and group performance on the NASA task by condition, a 2 x 2 mixed ANOVA was conducted, with participants' pre-task group estimates and group NASA task performance manipulated within-subjects, and group (randomly assigned or self-selected) manipulated between-subjects. A significant main effect of score was observed $F(1, 150) = 54.77$, $p < .001$, *partial* $\eta^2 = .27$. Participants' pre-task group estimates (M = 29.71, SD = 10.60) were significantly better than their actual group performance on the NASA task (M = 37.53, SD = 7.55). These results suggest a general above-average effect for group pre-task performance estimates, such that participants are over-estimating their group's performance in their

predictions. The score by group condition interaction was not significant ($p > .750$), and while a main effect of condition was observed $F(1, 150) = 8.58$, $p = .004$, *partial* $\eta^2 = .05$, this result is not informative, as it collapses across pre-task group estimates and group performance on the NASA task.

Post-task group estimates and group performance on the NASA task were also investigated by condition, using a 2 x 2 mixed ANOVA. Participants' post-task group estimates and group NASA task performance were manipulated within-subjects, and group (randomly assigned or self-selected) was manipulated between subjects. A significant main effect of score was observed $F(1, 150) = 15.51$, $p < .001$, *partial* $\eta^2 = .09$. Participants, after completing the group task, estimated their group's performance significantly better ($M = 32.05$, $SD = 16.15$) than it actually was ($M = 37.53$, $SD = 7.53$). No other significant effects were observed. ($p > .09$ for all other effects). These data suggest that the above-average effect observed in pre-task group estimates are not modulated by the experience of actually completing the group task, and the non-significant score by group interaction suggests that these effects do not differ for those in randomly-selected or self-selected groups.

Final questionnaire.

Participants' final questionnaire information was scored and examined by condition. The different questions about the individual and group experiment task, as well as questions about group work in general, were submitted to independent-samples t-tests to examine possible differences by group condition. Participants gave a rating on a scale of 1-10 (where 1 is "not at all" and 10 is "very") regarding how much they felt their group worked on the NASA task as a team. A significant effect of group was found $t(150) = -2.09$, $p = .038$, $r = .17$. Participants in the self-selected groups condition rated the group teamwork as significantly higher ($M = 8.62$,

SD = 1.57) than those in the randomly assigned groups condition (M = 8.01, SD = 1.99). Similarly, participants were asked (again on the same scale of 1-10) whether they felt they were part of their group. Participants in the self-selected groups condition gave significantly higher ratings (M = 8.78, SD = 1.53) than those in the randomly assigned groups condition (M = 7.88, SD = 2.66) $t(150) = -2.60$, $p = .010$, $r = .21$. When participants were also asked to rate how much they enjoyed doing the task as a group, participants in the self-selected groups condition gave significantly higher ratings (M = 7.35, SD = 2.08) relative to those in the randomly-assigned groups condition (M = 6.05, SD = 2.61) $t(150) = -3.41$, $p = .001$, $r = .27$. These results all indicate that some aspects of the NASA task, and group work in general, are perceived as more enjoyable when students can select their own group members for the activity. There were no other significant differences by condition observed for other ratings elicited in the final questionnaire ($p < .164$ for all other comparisons).

Discussion

The major finding of importance for the current study is that above-average effects were observed for participants completing an in-class group assignment. This result was evident in that participants' estimates of their groups' performance were significantly higher than their actual performance, both before and after completing the group task. The presence of this above-average effect, on both pre-task and post-task estimates of performance, indicates that participants are not accurately estimating their group's performance, either before or after they complete the actual group task. Furthermore, participants' pre- and post-task estimates of performance did not correlate significantly with their actual task performance.

Moore and Small's (2007) differential information explanation suggests that above-average effects are due at

least in part to lack of diagnostic information. In this particular setting, one would expect an effect of performance estimate timing, with robust above-average effects before the task, and reduced or eliminated above-average effects after completion of the task. This effect would be expected in that the experience of completing the task should provide diagnostic information to participants, which would allow for more accurate estimates of performance post-task. In other words, one would expect the experience of actually completing the task to help participants generate accurate estimates of performance. This was not found in the current study, which indicates one of two possibilities. Either participants were not using diagnostic information they received from doing the task, or the NASA task itself does not provide diagnostic information to help participants update their estimates of performance to reflect their actual performance. Interestingly, the above-average effect was observed for student participants in self-selected groups as well as those in randomly assigned groups. That is, participants' estimates of their group performance were significantly higher than their actual performance, and this effect was not limited by whether participants self-selected or were randomly sorted into their groups for the task.

The current study indicated a similar pattern for self-estimates of performance, such that participant estimates of performance did not change with the experience of having completed the task, and that an above-average effect was present for self-estimates of performance both before and after completing the individual task. Self-estimates of performance were significantly higher than actual performance on the individual task, for both pre and post-task self-estimates. These results may reflect the protective factor noted by Chambers & Windschitl (2004), and Taylor and Brown (1988). This 'protective factor' is the idea that when a participant gives him or herself higher than average

self-estimates of performance, that perception of "above-average performance" (even when it is an incorrect self-assessment) may protect the individual's self-esteem.

As noted in the results section, the present study also extended findings by Slavin, et al. (2009), who found significantly better performance in a cooperative learning setting relative to individual work (with either a textbook or computer). Slavin et al. (2009) conducted their study in the high school math classroom, but the current study extends these results to the undergraduate classroom, in a task that involves critical thinking and problem solving. Based on these results, combined with those of Slavin et al., (2009), further examination should be conducted to determine the boundaries of this cooperative learning effect. It may be the case that some domains do not yield a cooperative learning benefit. It would be especially advantageous for educators at all levels to learn when cooperative learning can be successfully (and unsuccessfully) applied. In addition to the potential achievement benefits, students' self-efficacy also deserves consideration. Cooperative learning activities may offer students an opportunity to succeed on a task that they would not have persisted on individually. That persistence and subsequent task completion may, in fact, increase their interest and effort for future classroom tasks.

The final questionnaire also yielded important information particularly related to the participants' perceptions of the group experience. Even though actual performance on the group task did not differ by group type (self-selected or randomly assigned), participants in the self-selected groups had significantly higher group work opinion ratings than those in the randomly assigned group conditions. Participants in self-selected groups gave more positive feedback in rating the extent to which their group worked as a team, their enjoyment of the group task, and their reported feeling of affiliation with their group. While these ratings

were not reflected in the task performance itself (or estimates of performance), they provide a reflection of the emotional/psychological component inherent in any class assignment. The message is clear; participants enjoy group work more when they are allowed to select their own group members. Like so many other areas of human endeavor, choice seems to be a satisfying occurrence regardless of whether it actually yields a material or quality advantage. Given that student performance on this group task did not significantly differ, regardless of whether students were in self-selected or randomly assigned groups, instructors may prefer to allow students to choose their own groups if they feel that learning will be facilitated by students endorsing a pleasant experience.

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