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Cooperative Group Performance in Graduate Research Methodology Courses: The Role of Study Coping and Examination-Taking Coping Strategies

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Abstract

This study seeks to examine the extent to which cooperative group members' levels of coping strategies (study and examination-taking coping strategies) and the degree that heterogeneity (variability of study coping strategies and examination-taking coping strategies) predict cooperative groups' levels of achievement in research methodology courses. Participants were 85 graduate students. Multiple regression analysis revealed that graduate students with the highest levels of performance on article critique and research proposal assignments combined tended to report the least variation with respect to both study coping strategies and examination-taking coping strategies. The four variables combined explained 56.7% of the variance in performance.

Introduction

Almost every graduate student is required to take one or more research methodology courses. Although these courses are generally taught within individual disciplines, the common goal of the methodology courses is to promote students' attainment of a degree of expertise in research through the acquisition of research knowledge and through hands-on involvement in the research process (Gay, Mills, & Airasian, 2012). The research components of various graduate programs are designed to ensure that the students will learn enough in these courses to become active members of the research community later in their professional lives. Yet, research methodology courses can be quite a challenge for those who are not familiar with graduate level scholarly work because these courses engage students in a variety of activities, such as finding scientific research, reviewing scientific literature on a given topic, understanding qualitative and quantitative data collection and analysis methods, designing a research project or writing a research proposal.

To learn successfully scientific research methods requires rigorous thinking and critical analysis (McKeegan, 1998). It has been reported that some graduate students view research methodology courses negatively (Lei, 2008). Many approach these courses with apprehension (McKeegan, 1998). The learning difficulties encountered in graduate research methodology courses can hinder students' interest and attitude toward research and future research productivity (Astramovich, Okech, & Hoskins, 2004; Wheeler & Elliott, 2008; Woolsey, 1989).

There are several identified factors that are believed to contribute to the learning difficulties in research methodology courses. The diverse nature of the graduate student population itself is thought to be a

contributing factor because a single cohort of graduate students can span a wide range of ages, nationalities, ethnicities, educational backgrounds, and life experiences (Brinkman & Hartsell-Gundy, 2012). Other likely contributing factors that have been identified in research literature include insufficient training (Bauman et al., 2002; Mallinckrodt, 1997), low self-efficacy towards research skills (Bard, Bieschke, Herbert, & Eberz, 2000; Bishop & Bieschke, 1998), research anxiety (Brinkman & Hartsell-Gundy, 2012; Onweugbuzie, 1997a), library anxiety (Jiao & Onwuegbuzie, 2001; Jiao, Onwuegbuzie & Bostick, 2006; Jiao, Collins & Onwuegbuzie, 2008); statistics anxiety (Hsiao & Chiang, 2011; Onwuegbuzie, 1999; Onwuegbuzie, 1998), composition anxiety (Onwuegbuzie, 1997b), reading ability (Collins and Onwuegbuzie, 2002-2003; Collins, Onwuegbuzie, & Jiao, 2008).

Besides finding the possible causes of the difficulties encountered by graduate students, research also has been focusing on experimenting and assessing effective instructional practices that are believed to help reduce the anxieties and negative feelings associated with research methodology courses. For example, Pan and Tang (2004) found that a systematic and comprehensive instructional approach that includes *application-oriented teaching methods* and *instructors' attentiveness to students' anxiety issues* helped to reduce statistics anxiety for graduate students in social sciences. Smith, Miller, and Robertson (1992) reported that journal writing is an effective way of reducing levels of anxiety among students who take statistics courses. Forte (1995) argued that an effective instructional approach for statistics courses should incorporate computer usage, real-world applications, humor, language practice, and group-learning principles.

Although not a new concept, cooperative learning (CL) as an instructional approach has been increasingly used in graduate-level research methodology courses in recent years. CL is defined as "the instructional use of small groups so that students work together to maximize their own and each other's learning" Johnson, Jonson, and Smith, 1991a, p. iii). The popularity of CL as a research-based strategy that is utilized in classrooms and professional settings worldwide is based, in part, on the collaborative and interactive opportunities it offers individuals to acquire and hone critical thinking skills as well as shape participants' attitudes and values as members of a professional community (McKeachie, Pintrich, Yi-Guang, & Smith, 1986; Tinto, 1993). The popularity of CL also is due to its base, which comprises a dynamic interplay of theory, research, and practical application, leading to empirical findings that have validity and generalizability infrequently found in educational research (Johnson & Johnson, 1993; Johnson, Johnson, & Smith, 2007). The following seven conditions characterize a CL activity: (a) positive interdependence, (b) face-to-face promotive interaction, (c) individual accountability, (d) social skills, (e) group processing, (f) creating and upholding a high level of trust, and (g) working out conflicts constructively (Johnson, Johnson, & Smith, 1991a, 1991b; Johnson et al., 2007). Additionally, group productivity is influenced by group members conversing about ways to optimize group productivity (Johnson et al., 2007).

Successful CL groups engage in behaviors that are aligned to the intent of the theories of social interdependence (Johnson, Johnson, & Smith, 1998; Johnson et al., 2007), which hypothesize that cooperation is improved when positive interdependence leads to positive interactions as cooperative group members encourage and facilitate each group member's attainment of goals (Deutsch, 1962; Lewin, 1948). Because of its emphasis on positive interdependence, individual accountability, and group processing, CL is believed to be especially effective for adult learners enrolled in courses that are distinctly different from their preexisting experiences (e.g., research methodology courses). Indeed, empirical research evaluating the impact of these techniques on graduate students' instruction and learning outcomes indicates that graduate student participation in cooperative learning activities elevates the frequency of meaningful learning opportunities in research methodology courses (Onwuegbuzie, Collins, and Elbedour, 2003; Onwuegbuzie and DaRos-Voseles, 2001).

However, researchers and instructors of the graduate-level research methodology courses that have adopted CL as a teaching method soon come to realize that to help maximize the learning outcomes of the cooperative learning groups in graduate research methodology courses, many other factors have to be understood because of the substantial individual differences and personality variabilities among graduate students. These personality variables can have a significant impact on group dynamics and group performance. For instance, Jiao, DaRos-Voseles, Collins, and Onwuegbuzie (2011) found that level of academic procrastination appears to play an important role among graduate students with respect to the performance of cooperative learning groups.

Based on this finding, it is suggested that instructors divide cooperative learning projects into parts and require that groups submit each part at regular intervals for formal or informal evaluation in order to reduce the academic procrastination and maximize learning. In a study on the personality variable of social interdependence, Onwuegbuzie, Collins, and Jiao (2009) concluded that graduate students' levels of social interdependence (i.e., individuals' cooperative, competitive, and individualistic orientations) may potentially impact group dynamics within graduate-level cooperative settings. Another research by DaRos-Voseles, Collins, Onwuegbuzie, and Jiao (2008) studied the role of self-conception in predicting the performance of cooperative learning groups in graduate-level research methodology courses and reported that the role that self-perception plays in the context of cooperative learning at the graduate level process is extremely complex and multifaceted. It is possible that the social interdependence that characterizes group processing may be detrimental to the overall group product when individuals' social comparisons reinforce negative self-concepts.

Hope as a personality variable in predicting the performance of graduate-level cooperative groups has also been studied. It is found that the two components of the hope variable predict the group outcome in different ways. One component, agenetic thinking that motivates an individual to use different pathways to attain an outcome or meet a goal, was the best predictor, explaining 17.5% of the variance in group

performance (Collins, Onwuegbuzie, and Jiao, 2009). The findings of these various studies support the importance of continuing this line of inquiry. In fact, there is a program of research that assesses the role of group dynamics on academic performance of graduate students by examining the potential relationships between personality variables and students' achievement levels in graduate methodology courses. To date, over twenty variables have been studied. More variables need to be investigated in order to maximize the students' learning outcomes of the cooperative learning groups in graduate-level research methodology courses.

One addition to this line of inquiry that might have potential towards elevating our understanding of group dynamics is the degree that graduate students utilize coping strategies, specifically, study coping and examination-taking coping strategies in the conduct of academic work. Indeed, positive associations have been found between graduate students' coping strategies and their levels of statistics achievement (Onwuegbuzie & Daley, 1996), and, conversely, a negative relationship has been found between study coping and examination-taking coping strategies and statistics anxiety (Onwuegbuzie & Collins, 2002; Onwuegbuzie & Combs, 2009; Onwuegbuzie & Daley, 1996).

The construct of coping strategies is defined as the individual's implementation of behavioral and cognitive tactics, which are deployed to combat stress that may occur when an individual perceives that the environmental demands are overwhelming his/her resources (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984). The relationships between two dimensions of this construct, stress coping and examination-taking coping strategies and learning modalities, were assessed by Collins and Onwuegbuzie (2003). These researchers conducted a study designed to examine the extent to which graduate students' learning modalities predict their levels of study coping and examination-taking coping strategies. Participants were female graduate students enrolled in a research methodology course. Results indicated that both forms of coping strategies were related statistically significantly to the following nine learning modalities: (a) motivated/unmotivated, (b) persistent, (c) responsible, (d) structure, (e) learning alone/peer–oriented student, (f) auditory, (g) kinesthetic, (h) evening/morning, and (i) needs mobility. The majority (i.e., the first eight modalities) represents learning modalities that have an intuitive appeal as characteristics that may influence group dynamics within a successful cooperative learning experience. The statistically significant relationships between these modalities and the two forms of coping strategies support the supposition that coping strategies, as a personality variable, may impact group dynamics within a cooperative setting.

Consequently, the purpose of this study was to contribute to the literature, in general, and the program of research examining personality variables, in particular, by examining the roles of study coping and examination-taking coping strategies in predicting performance of cooperative learning groups in graduate-level research methodology courses. Specifically, the study's purpose was to examine the extent to which cooperative group members' levels of coping strategies (i.e., study

and examination-taking coping strategies) and the degree that heterogeneity (i.e., variability of study and examination-taking coping strategies) predict cooperative groups' levels of achievement in research methodology courses.

Methods

Participants

Participants were graduate students who enrolled in four sections of an introductory-level research methodology course at a midsouthern university in the United States. These students (n = 85) formed 26 groups ranging in size from 3 to 5 (M = 3.33, SD = 1.01). The same instructor taught all sections of the research methodology course. Utilizing the same instructor across the four courses minimized any implementation threat to the internal validity of the findings stemming from differential selection of instructors (Onwuegbuzie, 2003).

Setting

Graduate students enrolled in educational degree programs at the institution where the study took place were required to complete the introductory-level research methodology course. The 16-week (i.e., one semester-long) research methodology course involved classes that were held once per week for three hours. Any implementation threat to internal validity resulting from differential time of day (Onwuegbuzie, 2003) was minimized because all classes were held at the same time in the evening (i.e., 5 p.m. to 8 p.m.).

Formation of Cooperative Base Groups

On the first day of class, each student was asked to introduce themselves to the class, providing information about their current professional statuses, interests, degree programs, educational attainments and aspirations, and place of living. Students then were asked to form base groups comprising three to six students, based on specific preferences, such as, professional background, similar majors, and proximity to each other's homes. Utilizing these criteria to form the base groups resulted in group formation that was not directly related to ability or aptitude but reflected a modified stratified random assignment (Johnson & Johnson, 2002).

Cooperative Group Assignments

As members of a cooperative base group, students were expected to complete two major course requirements. Specifically, students were asked to write a detailed critical evaluation of a published research report (i.e., article critique). The purpose of this assignment was to provide an opportunity for students to develop skills in evaluating published research articles utilizing principles of the scientific method. The other major course requirement that was undertaken via cooperative learning groups involved the completion of a research proposal. The goal of this proposal was to prepare students to be able to write proposals for theses and dissertations and to seek external funding. Each base group undertook one article critique and one research proposal.

Instruments

Graduate students completed the Coping Strategies Inventory for Statistics (CSIS: Jarrell & Burry, 1989). This CSIS comprises 40 items and students' levels of coping strategies are measured on two 10-point Likert-format scales. The first scale assesses graduate students' study coping strategies and the second scale measures examination-taking coping strategies. For each scale, a higher score indicates a higher level of coping strategy. Criterion-related validity was documented by Jarrell and Burry (1989) via statistically significant correlations between the final grade point averages of students (n = 117) and scores on the examination-taking coping strategies subscale (r = .59, p < .0001), and on the study coping strategies subscale (r = .46, p < .0001). Further, Jarrell and Burry reported score reliability coefficients, as measured by coefficient alpha, of .81 for the examination-taking coping strategies subscale and .79 for the study coping strategies subscale. For the current study, the study coping strategies subscale and the examination-taking coping subscale generated scores that had a classical theory alpha reliability coefficient of .77 (95% CI = .70, .83) and .82 (95% CI = .77, .86), respectively.

For each of the two CSIS subscales, the possible scores range from "0" to "180," with a "0" indicating a complete lack of coping strategies and "180" indicating a very high level of coping strategies. According to the authors of the CSIS, a student with a score of "130" or higher on a subscale is able to cope well in that area. A score between "110" and "129" might indicate remediation in certain areas. Finally, a score below "110" is indicative of a need for training in the use of coping strategies (Jarrell & Burry, 1989).

Article Critique and Research Proposal

Three rubrics were used to evaluate the article critique, each comprising a 5-point Likert-format scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The first rubric contains 35 items. This rubric provides a score for the summary of the selected research article, with scores ranging from 35 to 175. The second rubric assesses how accurately the 150-item reviewer checklist is completed, with scores ranging from 150 to 750. The third rubric contains 50 items that evaluate all components of the critique section, assessing the narrative for the critique section of the article, with scores ranging from 50 to 300. Group scores obtained from the three rubrics were aggregated and converted into a 100-point scale using the following weighting scheme: 35% for the summary rubric, 25% for the reviewer checklist, and 40% for the critique narrative.

Two rubrics were used to evaluate the research proposal assignment. The first rubric consisted of a 5-point Likert-format scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) that was designed to provide a score for the content of the research proposal. This rubric contains 145 items that evaluate all components of the research proposal (i.e., summary, introduction, literature review, method, analysis, reference list, appendix), such that scores range from 145 to 725. The second rubric, also comprising a 5-point Likert-format

scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree), assesses the extent to which the research proposal does not contain grammatical and typographical errors and follows the guidelines of the Publication Manual of the American Psychological Association (APA, 2010). This second rubric contains 89 items with scores ranging from 89 to 445. Scores from both rubrics were converted into percentages. From these percentages, a final score was derived using the following weighting scheme: 60% for the content rubric and 40% for the writing style rubric. Thus, each proposal received a group score on a 100-point scale.

Analysis

For each group, means and standard deviations pertaining to graduate students' scores on the two coping strategies subscales were computed. This generated four sets of group scores that were used as the unit of analysis, rather than individual scores, to decrease the possibility of the statistical independence assumption being violated and systematic error being created (McMillan, 1999). In addition, the group article critique scores and research proposal scores were averaged to yield an overall group performance score that presented a 100-point scale.

The major analysis undertaken in the present study involved the use of all possible subsets (APS) multiple regression (Onwuegbuzie & Daniel, 2003; Thompson 1995). This analysis was used to identify an optimal combination of coping strategies variables (i.e., predictor variables) that predicted the group performance score (i.e., combined article critique and research proposal score). For this study, the criterion used was the maximum proportion of variance explained (*R2*), which yields an important measure of effect size (Cohen, 1988). According to Cohen (1988), for multiple regression models in the behavioral sciences, *R2* values between 2% and 12.99% suggest small effect sizes, values between 13% and 25.99% indicate medium effect sizes, and values of 26% and greater suggest large effect sizes. These same criteria were used to assess whether the proportion of variance explained by the independent variables, R2, was suggestive of a small, medium, or large effect.

Results

The Shapiro-Wilk test (Shapiro & Wilk, 1965; Shapiro, Wilk, & Chen, 1968) did not indicate that the distribution of group performance scores was non-normal ($W = .97$, $p > .05$), thereby justifying the use of multiple regression. In addition, evaluation of assumptions of linearity and homogeneity indicated no threat to multiple regression analysis.

The APS multiple regression analysis revealed that the model containing the four independent variables contributed statistically significantly ($F[4, 21] = 3.60$, $p < .05$) to the prediction of group performance score. However, further analysis indicated that the following two variables both statistically significantly and practically significantly predicted group performance: within-group variability in study coping strategies and within-group variability in examination-taking coping strategies. Specifically, groups attaining the lowest levels of performance tended to report the most variation with respect to both study coping

strategies and examination-taking coping strategies. Within-group variability in examination-taking coping strategies explained by far the most variance in group performance scores, accounting for 38.1% of the variance, which represented a very large effect size. This was followed by within-group variability in study coping strategies, which explained 11.6% of the variance, representing a medium effect size. These three variables combined explained 49.7% of the variance in performance, suggesting that coping strategies play a role in the cooperative learning group process. Using Cohen's (1988) criteria for assessing the predictive power of independent variables in a multiple regression model, the proportion of variance explained indicates a very large effect size, because it well exceeds 26%.

An examination of the studentized residuals generated from the model (Myers, 1986) suggested that the assumptions of normality, linearity, and homoscedasticity were met. Using the Bonferroni adjustment, none of the studentized residuals suggested that outliers were present. Additionally, an examination of the structure coefficients, using a cutoff correlation of 0.3 recommended by Lambert and Durand (1975) as an acceptable minimum coefficient value, suggested that within-group variability in examination-taking coping strategies and study coping strategies made important contributions to the selected regression model. The fact that both the standardized and structure coefficients pertaining to the two variables were noteworthy indicates that none of these constructs acted as suppressor variables (Thompson, 1998; Thompson & Borrello, 1985).

Discussion

The purpose of this study was to examine the extent to which cooperative group members' levels of coping strategies (i.e., study coping and examination-taking coping strategies) and the degree that heterogeneity (i.e., variability of study coping and examination-taking coping strategies) predict cooperative groups' levels of achievement in research methodology courses. Findings indicated that graduate students with the lowest levels of performance tended to report the most variation with respect to both study coping strategies and examination-taking coping strategies. This finding suggest that homogeneity of cooperative learning groups with respect to study coping strategies and examination-taking strategies elevate cooperative groups' levels of performance in terms of addressing the requirements of these two assignments. Overall, the present findings suggest that study coping strategies and examination-taking skills work in tandem to impact group performance in research methodology courses.

The interpretation of the significant relationships found between variability in study coping strategies and examination-taking skills and cooperative group performance is supported by Wine's (1980) Cognitive-Attentional-Interference theory. According to this theory, anxiety interferes with a student's ability to perform tasks by affecting negatively his or her ability to proceed efficiently in completing a task requiring concentration and focus. Specifically, a student's level of anxiety reduces the efficiency with which memory processes are utilized in the context of encoding and

processing new information, thereby making it difficult to complete successfully the task. However, a student who possesses appropriate study coping strategies and examination-taking skills would tend to have reduced levels of anxiety, thereby allowing the student to direct cognitive effort towards addressing the task parameters and not utilizing cognitive effort to address anxiety.

A limitation of this study is that only quantitative information was collected. Utilizing qualitative data collected from students' journals, interviews, or focus groups would expand the data set and allow researchers to assess graduate students' perceptions of the degree that study coping strategies and examination-taking skills influenced the group dynamics. Alternatively, utilization of these qualitative measures also might alleviate students' stress levels. Recently, research conducted by Kelly and Barry (2010) support the use of journal writing as a venue to reduce the symptoms of students' levels of stress in college settings. Given the complexity of content taught in research methodology courses, the findings of our study could serve as an impetus for research methodology instructors, in particular, to consider the potential roles of students' study coping strategies and examination-taking skills in the context of instruction and learning.

However, given the small sample size, the results of this current study pertain only to this specific sample. Subsequently, more research utilizing larger samples comprising female and male participants would expand the interpretability of the findings in terms of forming external generalizations. This current study is part of a program of research assessing the degree that personality variables impact group dynamics among cooperative learning groups. The results of these studies indicate that a variety of personality variables are significant predictors of achievement in research methodology courses. Table 1 documents the proportion of variance in graduate students' group outcomes explained by 24 personality variables found to be significant predictors in the eight studies that have been conducted to date, comprising the present investigation as well as seven previous studies (i.e., Collins et al., 2004; Collins et al., 2001; DaRos-Voseles et al., 2003, 2005, 2008; Jiao et al., 2008; Onwuegbuzie et al., 2009).

Table 1. Proportion of Variance Explained in Group Performance by Each Personality Variable across Studies[1]

Variable	Proportion of Variance Explained
Within-group variability in examination-taking coping strategies	**38.1**
Procrastination level associated with task aversiveness	32.5
Individualism	30.3
Procrastination associated with performing administrative	26.4

tasks	
Perceived self-worth	23.6
Within-group variability in other-oriented perfectionism	21.0
Within-group variability in affective barriers	20.2
Agentic thinking	17.5
Within-group variability in perceived social acceptability	14.9
Within-group variability in research anxiety	13.2
Within-group variability in barriers with staff	12.4
Procrastination associated with writing a term paper	11.8
Within-group variability in study coping strategies	**11.6**
Within-group variability in perceived scholastic competence	10.9
Within-group variability in perceived humor	10.1
Perceived job competence	9.8
Within-group variability in knowledge of the library	9.1
Procrastination on keeping up with weekly reading assignments	8.8
Other-oriented perfectionism	8.0
Perceived creativity	6.5
Within-group variability in self-oriented perfectionism	5.7
Within-group variability in socially prescribed perfectionism	4.9
Within-group variability in pathways	3.0
Socially prescribed perfectionism	2.3

[1] Bold text denotes findings from the present study.

It can be seen from Table 1 that, of the 24 personality variables, variability in examination-taking coping strategies and variability in study coping strategies explain the 1st and 13th highest proportion of variance in cooperative group achievement, respectively. That variability in examination-taking coping strategies explain a higher proportion of variance in cooperative group outcome than does any other variable to date is extremely notable. Thus, much more research is needed to determine why and how examination-taking coping strategies appears to be such an important predictor of cooperative group outcomes among graduate students. As stated previously, qualitative research approaches can play a vital role here, yielding mixed research studies—an emerging research methodology in the area of stress and coping (cf. Collins, Onwuegbuzie, & Jiao, 2011; Onwuegbuzie, Jiao, & Collins, 2007). In conclusion, the personality variables assessed to date are significant predictors of achievement in research methodology courses, thereby

warranting continued research evaluating the impact of other personality variables on group dynamics in postsecondary through graduate-level research methodology courses. Such studies will help instructors to determine conditions under which the benefits of cooperative learning are maximized. The results from these studies also will benefit students. They would help students sort out their feelings and build confidence by being able to better understand themselves emotionally and aware of the many factors interfering with their acquiring research knowledge and skills in a cooperative learning environment of the methodology courses.

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