INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.
Research self-efficacy and the research training environment in counseling psychology

Phillips, Julia Christman, Ph.D.
The Ohio State University, 1992
RESEARCH SELF-EFFICACY AND THE RESEARCH TRAINING ENVIRONMENT IN COUNSELING PSYCHOLOGY

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in the Graduate School of the Ohio State University

by

Julia Christman Phillips, B.A., M.A.

The Ohio State University
1992

Dissertation Committee:
Richard K. Russell
Nancy E. Betz
Pamela S. Highlen

Approved by

Advisor
Department of Psychology
Dedicated to the memory of
Elizabeth "Dolly" Miller
ACKNOWLEDGEMENTS

I would like to acknowledge the many people who have offered support during this project. First, I thank Dr. Richard Russell for his willingness to be my advisor when I was left without one. His guidance, support, and encouragement as my advisor have been unmatched. Furthermore, his integrity as a person will always be remembered. Next, I would like to thank Dr. Pamela Highlen who has imparted much wisdom and influenced me in profound ways. I also would like to thank Dr. Nancy Betz for sharing her time and imparting her knowledge to me during this project.

I would like to thank my friends who have supported me throughout graduate school as well as through life's more difficult moments. I will always cherish these women. I would like to thank Timothy Dent for the love which has helped me to remain centered. Special thanks go to my mother for her love and strength. I would like to thank my father for his love and support, without which this dissertation could not have been written in such a timely fashion. I also would like to thank my sister, Laura, and Kay Tatum for their encouragement.

Finally, I would like to thank the graduate students in counseling psychology who made this dissertation a reality.
February 17, 1965 ................................................................. Born - Columbus, Ohio

1987 ................................................................. B.A., in Psychology, summa cum laude, The Ohio State University

1988-1991 ......................................................... Graduate Teaching Associate, Psychology 120, The Ohio State University

1989 ................................................................. M.A., in Counseling Psychology, The Ohio State University

1989 - 1991 ........................................................ Residential Specialist, Jesse Carpenter House, Southeast Community Mental Health Center

Field of Study: Psychology
# TABLE OF CONTENTS

DEDICATION .................................................................................................................. 11
ACKNOWLEDGEMENTS ................................................................................................. iii
VITA ................................................................................................................................. iv
LIST OF TABLES .............................................................................................................. vi

## CHAPTER

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>II. REVIEW OF THE LITERATURE</td>
<td>6</td>
</tr>
<tr>
<td>III. METHODS</td>
<td>35</td>
</tr>
<tr>
<td>IV. RESULTS</td>
<td>48</td>
</tr>
<tr>
<td>V. DISCUSSION</td>
<td>67</td>
</tr>
</tbody>
</table>

REFERENCES .................................................................................................................. 83

APPENDICES

<table>
<thead>
<tr>
<th>APPENDICES</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Research Training Environment Scale</td>
<td>88</td>
</tr>
<tr>
<td>B. Self-Efficacy In Research Measure</td>
<td>95</td>
</tr>
<tr>
<td>C. Items Comprising SERM Subscales</td>
<td>98</td>
</tr>
<tr>
<td>D. Demographic Questionnaire</td>
<td>100</td>
</tr>
<tr>
<td>E. Scoring System for Research Productivity</td>
<td>103</td>
</tr>
<tr>
<td>F. Representative Text for Cover Letter to Participants</td>
<td>106</td>
</tr>
<tr>
<td>G. Representative Text for Follow-Up Letter to Participants</td>
<td>108</td>
</tr>
</tbody>
</table>
### LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Frequencies of participants' self-reported ethnic backgrounds</td>
<td>36</td>
</tr>
<tr>
<td>2. Numerical representation of the distribution and return of surveys from each site</td>
<td>43</td>
</tr>
<tr>
<td>3. Means and standard deviations of all participants on the Research Training Environment Scale and the Self-Efficacy in Research Measure and their respective subscales</td>
<td>50</td>
</tr>
<tr>
<td>4. Means and standard deviations on total scores of 3 measures by gender</td>
<td>52</td>
</tr>
<tr>
<td>5. Means and standard deviations on 3 measures by ethnicity</td>
<td>52</td>
</tr>
<tr>
<td>6. Least square means and standard errors of least square means on total scores of 3 measures by ethnicity</td>
<td>54</td>
</tr>
<tr>
<td>7. Correlation matrix for total scores on Self-Efficacy in Research Measure, Research Productivity Measure, and Research Training Environment Scale</td>
<td>54</td>
</tr>
<tr>
<td>8. Comparison of correlation coefficients between variables of interest for participants early and late in their graduate school careers</td>
<td>58</td>
</tr>
<tr>
<td>9. Means and standard deviations on Self-Efficacy in Research Measure and Measure of Research Productivity for participants early and late in their graduate school careers</td>
<td>58</td>
</tr>
</tbody>
</table>
10. Correlation matrix for items on productivity measure ....................... 61
11. Comparison of correlational relationships using the original and the revised measures of productivity ......................................................... 62
Graduate training in counseling psychology currently is conducted from a scientist-practitioner model. This model of training was established for clinical psychology in 1949 at the Boulder Conference and adopted by counseling psychology at the Northwestern Conference in 1951 (Schmidt & Meara, 1984). However, science and practice were not espoused as equally important training components at this conference. Instead, recommendations were made that practicum activities consume 30% of a student's time while research activities consume 11%. More recently, the scientist-practitioner model was reaffirmed by authors contributing to a special issue of *The Counseling Psychologist* (Vol. 10, No. 2) on the future of the specialty (Harmon, 1982; Myers, 1982) and by participants in the Georgia Conference in 1987 (Rude, Weissberg, & Gazda, 1988). Both Harmon (1982) and the Training and Accreditation Work Group at the Georgia Conference suggested that science and practice should be considered equally important and interdependent components in the training and practice of counseling psychologists.
Despite the recent emphases on the scientist-practitioner model, it seems that graduate students in counseling psychology often are prone to place more importance on the practitioner side of the scientist-practitioner equation (Magoon & Holland, 1984). The scientific aspect of counseling psychologists' identities following graduation also seems to demand less attention. Indeed, one of the thematic recommendations of the Georgia Conference participants was to increase students' appreciation of and proficiency in research activities (Rude, et al., 1988).

There is debate about whether or not research productivity suffers as a result of this decreased emphasis on science. Gelso (1979) draws attention to the fact that the modal number of publications following graduation for doctorates in counseling psychology is zero. Thus, it would appear that research productivity, traditionally defined as number of publications, seems to suffer. However, Cesari (1986) challenges the notion that research productivity should be defined by number of publications, pointing to in-house research activities such as program evaluation as an example of research which is not published, yet is still legitimate research. Magoon and Holland (1984) also note that the research productivity of counseling psychology is roughly equivalent to other areas of psychology and other social sciences. However, since our ideal training model is a scientist-practitioner model, it would seem hypocritical to be satisfied with the research productivity of our profession because it mirrors other professions. Gelso (1979) notes the
contradictions in espousing the scientist-practitioner model when there is no corresponding productivity. Magoon and Holland (1984) suggest that more researchers and better use of research resources is warranted.

This issue concerning the lack of research productivity has been addressed increasingly by various writers. Different reasons for the lack of research productivity and corresponding solutions have been proposed. Various writers have hypothesized the locus of the problem to be in the graduate training of students in counseling psychology. Seeman (1973) focuses on the psychological climate of the learning experience of graduate students in psychology in the area of research. Seeman believes creativity is necessary for the initial stages of science, but that psychology has stifled creativity by enforcing rules of science in terms of methodology and statistics early in the student's search for a topic. Thus, students are prematurely preoccupied with doing research according to the "rules." Gelso (1979) suggests that students come into counseling psychology programs with ambivalence about doing research, and that programs fail to capitalize on the positive end of this ambivalence because of factors in the research training environment itself. Thus, he hypothesized ten ingredients to effective research training that would lead to increased interest in doing research and therefore, increased productivity. Magoon and Holland (1984) also point to both environmental and student deterrents to research productivity and suggest environmental remedies to the problem.

Other writers, however, believe that the problem does not lie in the research training environment, but predominately in the types of students who are selected for admission to counseling psychology
programs. Holland (1986) hypothesizes that low research productivity is a result of the fact that counseling psychology is a field comprised of Social personality types, not Investigative personality types. Holland suggests changing graduate school admissions procedures to include more Investigative types as one solution to the low research productivity problem. Holland also suggests accepting the fact that most counseling psychology graduate students are Social types and lowering the field's expectations about their research productivity.

Betz (1986) suggests that graduate students are doing research out of necessity, rather than desire. She suggests that one of the issues needing to be addressed is student self-efficacy in research, and that previous literature on the research training environment is actually suggesting methods of increasing students' self-efficacy in the area of research without referring to self-efficacy theory. The Research Work Group at the Georgia Conference also recommended that students' research self-efficacy be addressed in graduate training (Gelso, Betz, Friedlander, Helms, Hill, Patton, Super, & Wampold, 1988). Self-efficacy theory as originally proposed by Bandura (1977) suggests that the likelihood of a person engaging in a particular behavior is a function of his or her self-efficacy expectations for that behavior. Self-efficacy expectations are affected by previous behavioral accomplishments, modeling, verbal persuasion and encouragement, and emotional factors connected to behavior.

It seems wiser to look at the independent contributions of both student causes and environmental causes to low research productivity and the interactions between them than to focus "blame" exclusively on
one factor or the other. The area of self-efficacy provides a vehicle through which this exploration can be done. The relationships between students' research self-efficacy, the research training environment, and research productivity need to be examined to shed light on this issue.

**General Hypotheses**

It is hypothesized that student self-efficacy is positively related to research productivity. It also is hypothesized that the research training environment is related to student self-efficacy in research. Thus, if an optimal research training environment can be created, it will be possible to positively affect student self-efficacy in research, thereby increasing research productivity. See methods section for specific hypotheses.
A comprehensive computerized search of the Psychological Abstracts database was conducted for the years from 1973 to the present using terms related to self-efficacy, research training, and counseling psychology. While the bodies of literature for each of these topics are extensive, there were no articles found on the specific topic of self-efficacy and research training. Suggestions of this as an area for further theory and research apparently have not resulted in any published studies (Betz, 1986; Gelso, et al., 1988). Therefore, this literature review will first focus on the area of research training in counseling psychology, examining theoretical and empirical literature. Next, self-efficacy theory will be discussed and empirical studies in two areas in which self-efficacy theory has proven promising will be reviewed. Finally, the theoretical intersections of these two areas will be discussed.

**Historical Perspective on Research Training Literature**

Gelso, et al. (1988) note that the discussion and study of research training issues has begun only recently. As yet, it is an underdeveloped
area. Seeman (1973) provides an early exploration of the issue of student interest and aptitude in science. Unfortunately, little research in counseling psychology followed as a result of his ideas. In 1979, Gelso proposed ten ingredients for effective research training as part of an overall examination of research issues in counseling psychology. These hypotheses along with Magoon and Holland's (1984) chapter on research training in the *Handbook of Counseling Psychology* led to increased empirical research on the issue. In 1986, an entire issue on *The Counseling Psychologist* (Vol. 14, No. 1) was devoted to the subject of research training in counseling psychology. Unfortunately, following this issue relatively little additional research seems to have been done. The theoretical literature on the research training environment and corresponding suggestions for improvement will be discussed followed by an examination of the empirical research on the topic.

**Theoretical Literature on Research Training**

The theoretical literature on research training in the field of counseling psychology is filled with suggestions about how to increase research productivity among counseling psychology students and graduates based on assessments of what has led to low research productivity. Several areas of research training emerge from the literature as areas that are in potential need for change. Such areas include the way that science is traditionally taught to students, various faculty behaviors and teaching styles, the role of statistics in doing quality research, the need to teach methods for applied research, the need for more structured teaching of research, and the need to recognize
Individual differences among students in their abilities and desires to do research.

First, lack of student interest in research and corresponding low research productivity has been related to an overemphasis on traditional methods of science. Seeman (1973) suggests that creativity is vital for the initial stages of science, but that psychology has stifled creativity by enforcing rules of science early on in the students' search for a topic. Instead of looking inward for research ideas, students are prematurely preoccupied with doing research according to the rules. Howard (1986) also suggests that the emphasis on the traditional methodology of science leads students to dissatisfaction with the scientific aspect of psychology. He suggests that experimental methods fail to capture the intricacies of humanity and counseling. Thus, students fail to see the significance or importance of science to their practices.

Gelso (1979) proposed ten ingredients for effective research training in counseling psychology. Two of these ingredients are directly compatible with Seeman and Howard's ideas concerning the ways that science is traditionally taught. First, Gelso suggests that students should be taught to look inward for research ideas. Second, he suggests that students should be taught a variety of investigative styles.

Various authors have also made suggestions about faculty behaviors and teaching styles to improve research training. Other of Gelso's ingredients for effective research training involve such faculty behaviors and teaching styles. Gelso's third suggestion is that faculty members model scientific behavior in more appropriate ways. For example, faculty members must show students that not only do they get
published, but that they also get rejection notices from journals, too. Similar to Gelso, Magoon and Holland (1984) focus on inappropriate modeling by faculty as an environmental deterrent to research productivity by students. They suggest that faculty need to model the process of research more readily, and not simply the finished product in the form of a published article. Heppner, Gelso, and Dolliver (1987) describe a workshop in which students learn about the publication process firsthand from faculty members as one method of effective research training. Not only is the publication process modeled, but the faculty share personal stories of pitfalls they have encountered along the way.

Magoon and Holland also point to inappropriate faculty supervision of student research as an environmental deterrent to student research. They note a lack of adequate supervision or too much supervision in students' choice of a topic as a deterrent. They also cite the long periods of time between students' submission of their work and faculty feedback, and lack of attention to students' writing skills early in students' careers as deterrents. They suggest that during supervision, faculty do not pay enough attention to the tremendous affect that is associated with doing research for many students. Gelso also suggests that appropriate supervision of student research entails the reward of scientific behavior and achievement on the part of students by the faculty and the graduate school.

Both Gelso (1979) and Magoon and Holland (1984) recommend that faculty get their students involved in research at the beginning of students' graduate school careers. This research should be non-
threatening to the students, but it should not involve just menial tasks. Magoon and Holland suggest that gradual research competencies be built into graduate programs and that students' early research activities are appropriate to their developmental levels and previous experiences.

In addition to recognition of individual differences among students' abilities to do research, the recognition by faculty members of individual differences among students in the areas of research aspirations, desires, and values also has been addressed as an area of research training that is potentially in need of change (Magoon and Holland, 1984; Stone, 1986). It is suggested that students generally are treated as if there are no differences between them. Making research training responsive to the diversity among students in these areas is recommended. In a similar vein, Gelso's eighth suggestion is that faculty attempt to make science more of a social endeavor for students to address the tendencies for students in counseling psychology to be social types. In 1979, Osipow further suggests that counseling psychology programs should not try to mold all of their students into researchers. Rather, he suggests that practice oriented people might be better off involved only in the initial generation of ideas while researchers should be responsible for design and implementation issues. Holland (1986) also suggests accepting the fact that most students are Social types and not expecting them to become researchers, thereby recognizing individual differences in students' interest in doing research.

Other suggestions for improving research training concerning teaching styles that emerge from the literature include Gelso's (1979) suggestion that faculty should teach students that all experiments are
flawed in some way. The perfect experiment which has no threats to internal or external validity is not a realistic possibility. Another of Gelso's suggestions related to the teaching of research emphasizes the importance of tying science to practice by looking to practice as a source for scientific ideas. Another of Gelso's ten ingredients for effective research training includes the untying of statistics and research. Gelso proposes that statistics need not be the focus of science and that students become disillusioned by research because of difficulty with statistics. He suggests a de-emphasis on this relationship and advocates the use of statistical consultants. Others in the field of counseling psychology disagree with this idea and point to the necessity of knowledge about statistics in the planning stages of research (Betz, 1986; Wampold, 1986).

Other suggestions for increasing research productivity involve changing the types of research experiences in which students are required to participate. A final suggestion by Gelso to improve the research training environment involves training students to do the types of research that they will most likely be involved in once they graduate and become staff members of mental health agencies, such as program evaluation. In 1982, Nevid and Metlay noted the shifting employment patterns of psychologists from academia to applied settings. In response to such changes, they describe an innovative research practicum at Hofstra University in which students develop necessary research competencies by spending 2 1/2 days in an agency actually conducting research. Stone (1986) also advocates for hands on experience in doing research and suggests that programs in counseling psychology need to
build structured time into their curricula for research activities. He points to the large amount of structured time which counseling practicum consumes as opposed to no structured time for research activities. Gelso, et al. (1988) also suggest that the role of researcher is not learned as quickly as it appears current training practices assume that it is. They recommend increased structure in research training with the goals of increasing student self-efficacy in the area of research, student interest in doing research, and the value that students place on doing research in their future careers.

The theoretical literature on research training does not focus exclusively on elements in the research training environment. The appropriate selection of students for admission to graduate programs in counseling psychology is emphasized by several authors (Heppner, et al., 1987; Holland, 1986; Magoon & Holland, 1984). While Heppner, et al. (1987) describe different methods for teaching research to counseling psychology graduate students, they also emphasize the importance of choosing students who express some initial interest in counseling psychology as a science. Holland (1986) hypothesizes that low research productivity is a result of the fact that counseling psychology is a field comprised of Social personality types, not Investigative personality types. Social types shape Social training programs and attract other Social types into the field. Social types leave for Social work environments that do not support research endeavors. Thus, investigative activities such as research are not promoted. Holland therefore suggests changing graduate school admissions procedures to
include more investigative types as a solution to the low research productivity problem.

Magoon and Holland (1984) focus on more specific deterrents to research productivity that have their locus within the students themselves. Such deterrents include misperceptions by students about research and graduate study. First, they point to students entering the field for the sole purpose of practicing psychology. Such goals are incongruent with the pursuit of becoming scientist-practitioners, but are held by students nevertheless. They also note misperceptions about the research process which typically deter students from pursuing research in their subsequent careers. These misperceptions are related to students' previous experiences with writing papers for classes and with conducting their thesis and dissertation research projects.

Thus, there are a number of suggestions in the theoretical literature concerning methods of improving research training in counseling psychology graduate programs with the goal of increasing research productivity among counseling psychologists. The empirical literature on this topic will be reviewed next.

**Empirical Research on Research Training**

Empirical studies on research training in counseling psychology have investigated the subject from the perspectives of counseling psychology graduate students, training directors of counseling psychology programs, and professionals in the realm of counseling psychology. Conclusions from these studies support the notions that early involvement in research, actual research projects, encouragement and appropriate
modeling by faculty, faculty-student relationships, integrating clinical practice with research, and emphasizing less traditional approaches to research have a positive impact on students' attitudes, skills, and productivity in research. Some support also is found for the idea that research design, statistics, and computer skills are inadequately taught, and thus have a negative impact on attitudes toward research. Finally, there also is support for the notion that personality variables influence students' research interests and that person-environment interactions should be taken into account when making recommendations about changing the research training environment in counseling psychology graduate programs.

Research using graduate students. One of the earliest empirical studies on the research training environment in counseling psychology investigated graduate students' and counseling psychology graduates' attitudes toward research and factors in the research training experience that had an impact on those attitudes (Gelso, Raphael, Black, Rardin, and Skalkos, 1983). The purposes of this study were to assess change in students' attitudes toward research over the course of graduate training, to determine students' perceptions of graduate programs' expectations of them regarding research, and to discover factors in the research training environment that promote or hinder attitudes toward and/or skill in research. Based on the combined results from students and graduates, the authors conclude that the following three factors are influential in the research training environment: (a.) the quality of social and interpersonal relationships,
(b.) an emphasis on training in applied, practical, and less traditional approaches to research, and (c.) early and active involvement in research by students.

In this study, student participants were limited to 35 graduate students of the University of Maryland's doctoral program in counseling psychology. Participants completed a four part instrument devised by the researchers. Four questions in the first part addressed the participants' current and retrospective perceptions of the percentage of time they thought the program expected them to devote to research, the percentage of time they wanted to give to research, their interest in doing research, and the value of doing research in their careers. The second part of the survey measured participants' perceptions of the impact of 22 research related activities and factors on their skills and interests in doing research. These items fell into six categories including coursework, required research, nonrequired research, attendance at presentations, presentation of research, and research relevant relationships. The third part of the survey assessed research productivity as defined by number of publications, research in progress, and presentations at conferences. The final part of the survey was an open-ended question on elements of training that affected attitudes toward the role of research in the participants' careers.

While the external validity of the Gelso, et al. (1983) is questionable because of its use of only University of Maryland students and the construct validity is threatened by the retrospective nature of the data, these results provide initial data on factors in the research training environment affecting students' skills and interests in research. Results
from the attitudinal data suggested that student participants perceived the program as expecting them to do more research than they actually wanted to do. In retrospect, students reported significantly increased interest in doing research over time. The perceived value of research increased over time, but only approached statistical significance. Results from the questions concerning the effect of research related activities and factors on skill and interest in research suggested that for current students, factors most positively affecting skill and interest included those that involved active participation, personal investment (thesis, dissertation) and interpersonal relationships. Results from the qualitative data suggested two overall themes. First, the importance of interpersonal relationships and contact with others in the research process was noted. Second, the desire for more training in applied and practical research emerged as an important theme.

Royalty, Gelso, Mallinckrodt, and Garrett (1986) studied graduate students in 10 counseling psychology programs to determine their attitudes toward research, perceptions of their research training environments, and the impact that these environments had on students' attitudes. The authors conclude that while participants' attitudes toward research became more positive overall, programs had differing impacts on student's attitudes toward research. Furthermore, student perceptions of the research training environments differed for those programs that had more of an impact on student attitudes. From their results, the authors confirm several of Gelso's (1979) ingredients for effective research training in counseling psychology.
Participants in the Royalty, et al. study included students from 5 of the top producing counseling psychology programs according to an analysis of publications in the *Journal of Counseling Psychology* (Goodyear, Abadie, & Walsh, 1983) and students from 5 other randomly selected programs not on that list. Attitudes toward research were measured by items inquiring about participants' preferences to have the option to complete the Ph.D. without a dissertation, participants' interest in doing research, participants' value on the place of research in their future career and their priorities concerning participating in research activities after graduation. Participants were asked to rate these items on a 5 point Likert scale for their current attitudes as well as their recollected attitudes upon entrance to graduate school. Reliability data on these items was good (alphas above .89). The Research Training Environment Scale, a 45 item inventory designed by the researchers, measured 9 of 10 of Gelso's (1979) hypothesized ingredients for effective research training. The number of items per subscale varied with the amount of attention that Gelso gave to each in his original formulation. The number of items per subscale is given in parentheses. The nine subscales included faculty modeling of appropriate scientific behavior (8), reinforcement of student research (7), early involvement in research (5), untying of statistics and research (4), facilitating students' "looking inward" for research ideas (5), science as a partly social experience (5), teaching that all experiments are flawed and limited (4), focus on varied styles of investigation (4), and wedding of science and clinical practice (3). Reliability data using Cronbach's alpha and test-retest are adequate for 3 subscales (alphas
above .70), and questionable for the remaining subscales (alphas ranging from .24 to .66 and test-retest r's ranging from .57 to .86).

Results suggested that recalled research attitudes upon entrance to graduate school did not differ for the ten programs. Overall, participants' attitudes became somewhat more positive over time. Training programs varied in impact on research attitudes and research training environment. Two programs stood out as being more impactful on students' attitudes toward research. These programs differed from the remaining eight programs on several ingredients. Participants in the impactful programs had significantly more positive perceptions of the total research training environment. For the subscales on the RTES, participants in the impactful programs perceived more appropriate faculty modeling, more positive reinforcement, more early involvement in research, more teaching that all experiments are flawed, and increased wedding of science to clinical practice. Furthermore, participants in impactful programs perceived less of an emphasis on looking inward for research ideas. There were no differences on the subscales of untying research and statistics, science as a social endeavor, or focus on varied styles of investigation. The pattern of correlation of students' attitudes with the different subscales was different for students at different points in the program. A negative correlation was observed on 6 of 9 subscales for students beyond their fifth years. This pattern was hypothesized to result from students who had completed all of the requirements for the Ph.D except their dissertations who were in research training environments that emphasize research.
The results of this study must be interpreted with caution due to the low reliability of the RTES subscales. Of the findings reported, only those pertaining to the total RTES score, faculty modeling subscale, reinforcement of student research subscale, and focus on a variety of investigative styles subscale can be interpreted with confidence.

Using the same subject sample as the Royalty, et al. (1986) study, Mallinckrodt, Gelso, and Royalty (1990) investigated the relationships between students' research interests, their perceptions of the research training environment, and their Holland codes as assessed by the Vocational Preference Inventory - Form B (VPI-B). Results from this study suggested that there was a significant increase in interest in research from the time of entry into the program to the then current time for the general sample. This increase was also significant for students who were classified as high Social types, high Investigative - Artistic - Social types, and low Investigative - Artistic - Social types. The two most impactful programs in terms of changing students' research interests in the Royalty, et al. (1986) study also had students with significantly higher scores on the Investigative theme than did the remaining eight programs. As for developmental differences, it was reported that students who were still in graduate school after five years were less likely to have Investigative interests and more likely to have Enterprising interests. Controlling for entry level interests, it was reported that VPI-B subscale scores uniquely accounted for 10% of the variance in current research interest while 4% of the variance was uniquely accounted for by the RTES subscales. An additional 1% - 1.5% of the variance was uniquely accounted for by 3 of 27 person-environment
Interactions. The subscales of reinforcement of student research and science as a social experience affected students more positively as their Social and Artistic interests increased. Again, these results should be interpreted with caution due to the low reliability of the RTES subscales. While recognizing the significant contribution of individual personality factors to research interest, Mallinckrodt, et al. (1990) note that only 16% of the sample were Investigative, Investigative-Artistic, or Artistic Investigative types. They suggest that applicant pools are most likely not to have large numbers of Investigative types. Thus, changing enrollment procedures in counseling psychology programs may not be a total solution to the problem of low research interest and productivity among students. The authors therefore suggest changing the research training environment to be more responsive to the individual differences among students due to personality type.

Research using professionals. Three studies have investigated professionals in the realm of counseling psychology. In addition to surveying then current graduate students at the University of Maryland, Gelso, et al. (1983) also surveyed 34 recent graduates of its program. Participants completed the same materials as the students as well as additional questions about their current research practices. In retrospect, graduates perceived their program as expecting to do more research than they actually wanted to do. Results also suggested that, in retrospect, graduates' attitudes toward research increased over time. They reported significantly more interest in doing research, and the perceived value of research in their careers also increased significantly.
For graduates, required research and activities that entailed active research participation received high ratings only on perceptions of impact on skill in doing research, while interpersonal relationship items were rated as highly impactful on their interest in doing research. The generalizability of these results to all counseling psychology graduates and programs is obviously limited. However, the conclusions are generally supported in the following study which utilized professionals in the field of counseling psychology.

Royalty and Reising (1986) randomly selected and surveyed 500 members of Division 17. A response rate of over 70% was reported with only a slight underrepresentation of women as predicted by Division 17 membership. The majority of respondents received their Ph.D.'s in education (68%), a significant minority in psychology (22%), and 10% in other areas. 41% of the respondents were employed in academia, 18% in private practice, and 15% in counseling centers. Thus, while all participants were not necessarily trained in counseling psychology, all of them were active in the field as represented by affiliation with Division 17.

While employers expected respondents to devote a mean of 3.9 hours per week to research, respondents actually devoted 5.4 hours per week to research and they wanted to devote a mean of 9.5 hours per week to research. Respondents completed an Instrument devised by the researchers called the Survey of Research Training (SORT). The SORT is an assessment of participants' perceptions of their current research skills, of the contribution of their graduate research training to those skills, and of the contribution of 19 research related activities in
graduate school to their interest in doing research. 5 point Likert scales assessed each of these items as well as how graduate training programs affected respondent's interest in doing research overall and how adequately they prepared him or her to do research overall.

Results suggested that the means of all self-perceived current research skills were significantly higher than 3 (moderate) on a 1-5 scale, except for statistical skills (3.04), confidence in statistical skills (3.03), test construction and validation (3.10), and computer skills (2.16) which was significantly lower than 3. When rating the contribution of graduate programs to research skills, 14 of 23 items had means significantly higher than 3. Most of those were related to research design and statistics, while others related to writing and background reading and preparation. Conversely, 5 items were rated significantly lower than 3. Four of these related to practical research skills such as forming and managing a research team, time management, resourcefulness, and clerical skills. The fifth item, rated the lowest, was computer skills. Respondents rated all 19 training experiences as positively contributing to their research interest. Means for all items were significantly greater than 3 (neither positively nor negatively) on a 1-5 scale (very negatively to very positively). The highest rated items included the doctoral dissertation, individual research effort, presenting at professional meetings, role models, master's thesis, advisor-advisee relationships, and research assistantships. Courses in methodology, statistics, attendance at conferences and colloquia were rated as less influential. Respondents were least likely to have received continuing education in the areas of scientific writing, research apprenticeships,
statistics and research methodology, and statistical computer package training. Using the number of publications per year post graduation as an indicator of productivity, the authors reported that the current research design skills, practical research skills, and quantitative and computer skills were positively related to productivity. Demographic factors were unrelated. While social desirability may have biased these results, the authors make several recommendations for research training. First, they suggest that students' practical research skills be enhanced. Second, they recommend a practicum research experience designed to desensitize students to working on computers with statistics. Finally, they recommend an increased emphasis on research design.

Royalty and Magoon (1985) surveyed current counseling psychologists in academia about their interests and attitudes toward research. Participants completed the Vocational Preference Inventory (VPI) and an inventory designed by the researchers to assess different aspects of scholarly productivity. The authors were able to differentiate between the high and the low producers of research, as defined by numbers of publications, by conducting t-tests on all of the items of the Scholarly Productivity Survey and the subscales of the VPI. Some of their findings could be explained by an inflated experiment error rate. Of 176 t-tests, 40 were significant at the p < .001 level, 27 at the p < .01 level, and 20 at the p < .05 level. Thus, statistical probabilities would predict that approximately 11 of the 87 significant differences were due to chance. Nevertheless, the authors describe a pattern of responses typical of high and low producers. In the area of previous research training, high producers tended to get their Ph.D.s at earlier ages, to have had interests
in research during graduate school, to view their research training environment as having prepared them for the struggles that come with both succeeding and failing at research, and to have felt that their graduate programs expected them to do research. Suggestions for increasing research productivity follow directly from these findings. Low producers tended to be more interested in applied research that focused on helping people. Furthermore, the authors were able to predict what types of research environments participants preferred using the high points of their Holland codes. Thus, the authors suggest an increased emphasis on valuing different types of research done by different types of people based on their interests as one way of increasing research productivity among counseling psychologists. Obviously, the teaching of diverse methods of doing science would need to begin in graduate school.

Research using training directors. Wampold (1986) surveyed training directors of 25 APA accredited programs concerning the curricula of graduate programs in counseling psychology. Most programs required one year of statistics and reported that students could independently use statistical methods such as t-test, analysis of variance, correlation, multiple regression, and chi-square tests of association. However, it was reported that students were not able to use most multivariate procedures independently. 30% of training directors reported that students took one additional statistics course while less than 5% reported that students took two or more additional courses. Programs required that students take two courses in research design and less than
10% reported that students took additional courses in this area. Besides
the thesis and dissertation, additional research in various forms such as
extra research, research assistantships, research practica, and research
seminars were required by only a few programs. Training directors
reported informal methods of research training such as the use of
research teams and mentoring were prevalent. Wampold surveyed
studies published during the years 1982-1984 in the Journal of
Counseling Psychology and found that multivariate procedures were used
most often. Based on this finding, Wampold concludes that the levels of
training in research and statistics are inadequate. Wampold proposes a
training model to improve research competency in the areas of research
design, statistical knowledge, and ability to use computers that includes
more didactic training, experiential training in the forms of observation
and research practicum, and postdoctoral research positions in
universities.

In another survey of training directors of graduate programs in
counseling psychology, current training practices of ten programs of high
research productivity and ten programs of low research productivity
were compared (Galassi, Brooks, Stoltz, & Trexler, 1986). Student
productivity was measured by the number of papers presented at
professional meetings and the number of articles published for the 1983-
1984 academic year. The high group had a mean of 40.3% of students
presenting and 26.9% of students publishing while the low group had
means of 6.5% and 4.2% respectively. 48 t-tests and chi-square tests of
association were computed to examine the differences between the two
groups. Nine of the tests were significant using an alpha of .05. Thus,
2.5 of the tests may have been significant by chance due to experiment-wise error. Differences between the programs included that highly productive programs involved students in research earlier in their graduate careers. High programs had directors who perceived high degrees of informal support for research in the form of encouragement. Typing services were provided in the high programs as well. High programs also emphasized philosophy of science and qualitative research designs more heavily than low programs. Finally, low programs were more likely to approve correlational and ex-post facto research designs for doctoral dissertations than high programs. Methodological criticisms include potential subjectivity on the part of training directors and the classification of programs as either high or low in productivity on the basis of just one year.

**Self-Efficacy Theory**

Bandura (1977) notes the growing body of evidence in support of cognitive mechanisms as mediators of human learning and motivation. He describes self-efficacy theory as a cognitive theory of behavior acquisition, maintenance, and change that suggests that behavior is a function of self-efficacy expectations for behavior. If a person believes he or she has the ability to successfully complete a given behavior, then that person is more likely to engage in that behavior. These beliefs are called self-efficacy expectations. A person's level or magnitude of self-efficacy is related to whether or not that person will attempt a particular behavior, while strength of self-efficacy is related to persistence at some behavior despite failure and setbacks. Self-efficacy
expectations also differ along the dimension of generality. Some self-efficacy expectations may be quite specific while others may generalize to other related behaviors and situations. Bandura distinguishes between self-efficacy expectations and expectancy outcomes by suggesting that self-efficacy expectations are beliefs about a person's abilities to successfully complete a given behavior while expectancy outcomes are beliefs about the likely consequences of a given behavior.

Self-efficacy expectations are affected by four factors. First and most important are a person's previous experiences. If the person has been successful in completing a particular behavior in the past, then she or he is more likely to hold higher self-efficacy expectations. Second, if the person has seen another person successfully model a particular behavior, then he or she is more likely to hold higher self-efficacy expectations with regard to that behavior. Self-efficacy expectations also are affected by verbal persuasion and encouragement from others. Thus, a person's self-efficacy should increase with encouragement from others that she or he is capable of successfully completing a given behavior. Finally, emotional factors also affect a person's self-efficacy expectations. Thus, anxiety and fear which is associated with a given behavior typically decreases a person's self-efficacy expectations for that behavior.

Bandura (1977) suggests that these four factors have differing abilities to affect or change a person's self-efficacy expectations. Direct experience produces the strongest self-efficacy expectations that are most resistant to change followed by modeling, and finally by verbal persuasion and encouragement. The strength of physiological arousal to
affect or change a person's self-efficacy expectations will depend on that person's cognitive appraisal of the arousal. Physiological arousal that is appraised as fear will more likely be debilitating while arousal that is defined as excitement will more likely be motivating. These four factors may affect self-efficacy expectations in an interactive manner as well as independently.

Bandura (1977) also notes other factors which will affect a person's behavior. First, a person must have the skill required to complete a given behavior. If the required skill is missing, the person's self-efficacy expectations will not create successful behavioral accomplishment, regardless of how strong they are. Second, the person must have some incentive to perform a given behavior. Other factors that affect behavior acquisition, maintenance, and change include the cognitive attributions that a person makes concerning the causes of success or failure. Attributing success to external factors or attributing failure to internal factors will obviously not contribute to the formation of strong self-efficacy expectations. Finally, the manner in which a person's self-efficacy expectations are affected by a model or by someone giving verbal encouragement will be related to that person's evaluation of the model or of the person giving encouragement.

Self-Efficacy Research

Self-efficacy theory has been applied to at least two areas in the field of counseling psychology with promise (i.e., academic achievement in college students; Lent, Brown, & Larkin, 1984, 1986, 1987; academic achievement and persistence in elementary, high school, and college
students; Multon, Brown, & Lent, 1991; women's career development; Betz & Hackett, 1981; Hackett & Betz, 1981). To illustrate the potential of self-efficacy theory for the area of research training in counseling psychology, selected studies in the application of self-efficacy theory to academic achievement and career development will be reviewed.

In the area of women's career development, Betz and Hackett (1981) studied undergraduate students' self-efficacy expectations with regard to occupations traditionally dominated by women and those traditionally dominated by men. They reported significant differences between women's and men's self-efficacy expectations for occupations traditionally dominated by men. Women were more likely to have lower self-efficacy expectations for occupations traditionally dominated by men than for those traditionally dominated by women. These results were not accounted for by differences in ability as no gender differences were reported in ability as measured by students' ACT math and English scores. Furthermore, self-efficacy expectations also were related to the range of career options perceived by men and women.

Self-efficacy also has been a useful construct in the prediction of academic performance in college students. In a one-year longitudinal study of college students in science and engineering fields, Lent, Brown, and Larkin (1984) reported that higher self-efficacy expectations led to higher grades and increased persistence in scientific and technical majors. In a correlational study, academic performance, persistence, and range of career options were also significantly predicted by self-efficacy expectations for the same sample of students (Lent, Brown, & Larkin, 1986). Again using the same sample of students, Lent, Brown and
Larkin (1987) reported that self-efficacy expectations contributed unique predictive variance to academic achievement and persistence while two other theoretically derived variables, interest congruence and consequence thinking, did not. While interest congruence also predicted range of perceived career options, self-efficacy expectations was the stronger of the two predictors.

In meta-analytic studies of the relationships between self-efficacy and academic achievement and self-efficacy and academic persistence, Multon, Brown, and Lent (1991) found support for the hypotheses of self-efficacy theory. Using data from 36 studies to calculate an unbiased effect size estimate of .38, the authors found support for a positive relationship between self-efficacy expectations and academic achievement across a variety of samples including elementary, high school, and college students. Analyses of heterogeneity of effect size variance suggested that this relationship was stronger for subjects had been given some type of treatment to raise their self-efficacy, subjects who were of lower achievement status, subjects who were older, and subjects whose performance was measured using specific tasks rather than general tests. Using data from 18 studies to calculate an unbiased effect size estimate of .34, the authors found support for a positive relationship between self-efficacy expectations and academic persistence again across a variety of samples. Analyses of effect size variance for this relationship also suggested that the manner in which persistence was measured affected the strength of the relationship such that the relationship was stronger for subjects whose persistence was
measured by number of items attempted or completed versus the amount of time spent on the task.

Thus far, many of the studies in the application of self-efficacy theory to academic achievement and career development have been correlational due to their exploratory nature. In an experimental study on self-efficacy expectations, Hackett, Betz, O'Halloran, and Romac (1990) reported that direct experiences of success or failure on both math and verbal tasks respectively raised or lowered students' self-efficacy expectations as predicted by self-efficacy theory. While performance on these tasks did not generalize to career-related self-efficacy expectations, it did generalize to self-efficacy expectations on both an irrelevant task and overall ratings of math and verbal abilities.

**Interrelationships Between Research Training and Self-Efficacy**

To gain admission to graduate school in counseling psychology, students generally have various qualifications, skills, and experiences in addition to undergraduate degrees. Furthermore, they are knowingly entering programs in which research and science are integral parts. Thus, it seems reasonable to suggest that most graduate students in counseling psychology have adequate levels of self-efficacy in the area of research to at least attempt behaviors related to research. As a result, it seems wise to focus specifically on those factors which might affect the strength of graduate students' self-efficacy expectations in order to maximize the probabilities that they will persist in research activities throughout and hopefully beyond their graduate education.
Betz (1986) suggests several ways in which the literature on research training in counseling psychology is related to self-efficacy theory. She suggests that not only do improvements in the research training environment affect actual research competencies, but also self-perceived research competencies, or self-efficacy expectations. Early and active involvement in research is equivalent to direct performance accomplishment, the most important factor in determining self-efficacy expectations according to self-efficacy theory. Betz points to the need for more coursework in research design and statistics as important to providing direct and successful student involvement in research.

Appropriate role modeling of the research process is the equivalent of the second factor affecting self-efficacy expectations, vicarious learning and reinforcement. In addition, students' self-efficacy will be affected by the attributions which they make for their successes and failures in the area of research. Students who are naive to the processes and the politics of research may make faulty attributions which lower their self-efficacy and lead to behavioral avoidance in the future. Thus, appropriate faculty modeling of the research process may influence student self-efficacy.

Verbal persuasion and encouragement, the third factor in determining self-efficacy expectations, are akin to faculty reinforcement, support, and relationships. Several studies in the research training literature have pointed to the importance of social relationships in students' attitudes toward research (Galassi, et al., 1986; Geiso, et al., 1983; Mallinckrodt, et al., 1990; Royalty, et al., 1986). Students' direct experiences with research also may interact with the quality of the
relationships they have with the faculty. Likewise, the evaluations that students make of their role models will affect the ability of those role models to affect students' self-efficacy expectations. Finally, the fourth factor which is hypothesized to have an impact on self-efficacy expectations, the emotional responses of students to research, has been only infrequently mentioned by scholars in the area of research training in counseling psychology as an important factor in determining attitudes toward research.

Conclusions

It has been recommended that graduate training in the field of counseling psychology be conducted from a scientist-practitioner model. Following concerns about the lack of corresponding research productivity among students and graduates, the issues of research training began to be explored. The resultant bodies of theoretical and empirical literature on research training in counseling psychology suggest that there are elements within the research training environment that have differential effects on students' interest, skills, and confidence in doing research as well as their research productivity. Bandura's self-efficacy theory is a cognitive theory of behavior acquisition, maintenance, and change that has been applied with promise to the areas within of women's career development and academic achievement and persistence. Many of the elements in the research training environment that have been identified as being associated with beneficial effects on students in the area of research are theoretically consistent with self-efficacy theory. However, the relationships between the constructs of self-efficacy,
research training, and productivity have yet to be explored empirically. Because an understanding of such relationships may provide partial answers to the questions surrounding research productivity in the field of counseling psychology, this study was conducted.
CHAPTER III

METHODS

Participants

Participants were 132 graduate students and interns in at least 12 different American Psychological Association (APA) approved doctoral programs in counseling psychology. The exact number of programs is unknown because the method of solicitation of participants included the distribution of materials to counseling centers at which interns and graduate students from a variety of programs in counseling psychology were employed. The distribution of participants by year-in-program showed that 28 (22.4%) were first year students, 28 (22.4%) were second year students, 25 (20%) were fourth year students, 18 (14.4%) were Interns, and 26 (20.8%) were non-Intern students beyond their fourth year. The mean age reported by participants was 29.6 with a standard deviation of 5.2. 39 (31.2%) of the participants were male and 93 (68.8%) were female. The majority of the participants reported being Caucasian (80.0%). Other self-reported ethnic backgrounds included African-American (10.4%), Asian-American (1.6%), and Hispanic-American (6.4%). Two participants reported being of "other"
ethnicity. Frequencies of participants' self-reported backgrounds are presented in Table 1.

Table 1 FREQUENCIES OF PARTICIPANTS' SELF-REPORTED ETHNIC BACKGROUNDS

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>African-American</td>
<td>13</td>
<td>10.4%</td>
</tr>
<tr>
<td>Asian-American</td>
<td>2</td>
<td>1.6%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>100</td>
<td>80.0%</td>
</tr>
<tr>
<td>Hispanic-American</td>
<td>8</td>
<td>6.4%</td>
</tr>
<tr>
<td>Native-American</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

Instruments

Participants were given the Self-Efficacy in Research Measure, the Research Training Environment Scale (Royalty, et al, 1986) and a demographic questionnaire which included a measure of research productivity. These three measures were administered to all participants. All measures were pilot tested on seven third year graduate students from the graduate program at Ohio State University who did not participate in the actual study. Slight revisions were made
to one instrument (the Self-Efficacy in Research Measure) on the basis of feedback received.

To avoid threats to internal validity due to the order in which the measures were administered, the researcher selected two orders in which the measures were given. In both instances, the demographic questionnaire was given last. The decision to administer the demographic questionnaire last was made because of the potential for participants' perceptions of their research training environments as well as their feelings of self-efficacy to be influenced by thinking about and quantifying their research productivity. Thus, half of the participants received the Self-Efficacy in Research Measure first and the Research Training Environment Scale second, and half received the Research Training Environment Scale first and the Self-Efficacy in Research Measure second.

**Research Training Environment Scale.** Participants' perceptions of their research training environments were assessed using the Research Training Environment Scale (RTES; Royalty, et al, 1986; see Appendix A). The RTES is a 45-item inventory assessing the research training environment based on nine of the ten ingredients comprising effective research training as hypothesized by Gelso (1979). Thus, nine subscales exist corresponding to these nine ingredients. The number of items per subscale varies with the amount of attention that Gelso gave to each in his original formulation. Presenting the number of items per subscale in parentheses, the nine subscales include: faculty modeling of appropriate scientific behavior (8), reinforcement of student research (7), early
involvement in research (5), untying of statistics and research (4), facilitating students’ “looking inward” for research ideas (5), science as a partly social experience (5), teaching that all experiments are flawed and limited (4), focus on varied styles of investigation (4), and wedding of science and clinical practice (3). In completing the RTES, participants are asked to indicate the extent of their agreement or disagreement with each of the items along a 5 point Likert scale. Equal numbers of items are stated in a negative way as in a positive way to control for potential response bias. Reverse scoring is then used on those items. The scores of items for each subscale are summed and then divided by the total number of items in that subscale. The sum of these adjusted scores then comprises the total RTES score. Higher scores indicate more positive perceptions of the research training environment while lower scores indicate more negative perceptions of the research training environment.

Preliminary reliability data for the RTES was generated two ways (Royalty, et al., 1986). Cronbach's alpha equalled .92 for the total RTES score and test-retest reliability using a sample of 20 subjects with a two to four week interval was good (r = .83). Cronbach's alpha and test-retest correlations follow in parentheses for each of the subscales: teaching that all experiments are flawed (alpha = .24, r = .57), untying statistics and research (alpha = .43, r = .57), early involvement in research (alpha = .59, r = .57), wedding of science and clinical practice (alpha = .62, r = .74), facilitating students' “looking inward” for research ideas (alpha = .64, r = .77), and science as a partly social experience (alpha = .66, r = .86), reinforcement of student research (alpha = .71, r = .77), focus on varied investigative styles (alpha = .72, r = .47), and
faculty modeling ($\alpha = .82, r = .84$). Thus, reliability of the overall scale is acceptable. While the reliabilities for the majority of the subscales are not acceptable for research purposes (Groth-Marnat, 1984), these subscales will not be included in the major data analyses for this investigation. No validity data was reported for the RTES.

**Self-Efficacy in Research Measure.** Based on a procedure suggested by Bandura (1977) and employed regularly in the literature on self-efficacy in other areas (Betz & Hackett, 1981; Lent, Brown, & Larkin, 1984, 1986, 1987; Long, 1989; Matsui, Ikeda, & Ohnishi, 1989), self-efficacy in research was measured using a 33 item questionnaire (see Appendix B). The Self-Efficacy in Research Measure (SERM) was developed by the researcher using the Survey of Research Training (SORT; Royalty & Reising, 1986) as a partial foundation.

The SORT is an assessment of counseling psychologists' research skills and their perceptions of the impact which their graduate training had on these skills. A factor analysis of the original 23 research skills resulted in the following four principal factors: (a.) research design skills, (b.) practical research skills, (c.) quantitative and computer skills, and (d.) writing skills (Royalty and Reising, 1986). Items for the SERM were generated in several ways. First, a few items were taken directly from the SORT for the SERM. Other items developed by the researcher for the SERM were theoretically consistent with the aforementioned four categories. In addition, the researcher developed specific items from a list of tasks and skills generated informally by graduate students in counseling psychology at The Ohio State University.
These students were asked to identify as many tasks and skills as possible which they associated with doing research. Items were randomly ordered to avoid potential response biases. Based on feedback received during pilot testing of the instruments, slight revisions were made in the wording of two items on the Self-Efficacy in Research Measure. Both changes consisted of adding examples of different types of designs for items referring to traditional versus non-traditional research methodologies.

For the study itself, participants were asked to indicate their level of confidence in successfully performing each task, or in their belief that they possess the skill for each item. Level of confidence was measured along a scale from 0 to 9 with 0 indicating no confidence and 9 indicating total confidence. The sum of the number of items to which participants indicate that they could successfully perform the task or possessed the skill (indicated by a score of one or above) was the measure of level of overall self-efficacy. The sum of the confidence ratings for all items provided the measure of strength of overall self-efficacy. Only the measure of strength of overall self-efficacy was used in data analysis because of the advanced level of graduate students as well as because of the method of measurement of self-efficacy. Because they have been accepted to graduate school, it is assumed that they will attempt research activities. Furthermore, it was assumed that a total absence of self-efficacy would be admitted by few participants in a paper and pencil measure. It was felt that participants would be biased toward indicating that they at least had some belief that they could perform the research tasks. Therefore, it was felt that the strength of
their self-efficacy expectations was a more applicable measure of research self-efficacy.

Self-efficacy scores were similarly calculated for each of the four subscales, with the exception that the total subscale scores were divided by their respective number of items. Appendix C presents which items comprise each of the four subscales. Prior to conducting the present study, reliability and validity data on the SERM were not available.

**Demographic questionnaire.** The demographic questionnaire asked participants to identify their age, gender, ethnicity, year in graduate school, and research productivity (see Appendix D). Previous research on graduate students has defined research productivity as the number of publications and number of presentations at professional conferences (Galassi, et al., 1986). The construct of Research productivity was operationally defined in a broad manner. This decision was made because graduate students are in the infancy of their careers and thus are less likely to have been published, and because of convincing arguments in the literature to operationalize research productivity broadly (Cesari, 1986; Ward & Kafowitz, 1986). In addition to publications and presentations at professional conferences, research productivity in this study included other research related activities as well. Such activities included thesis and dissertation research, membership on an active research team, and submission of articles for publication. A qualitative question asking participants to indicate other research activities which may have
been overlooked in the other questions on the measure also was included for future reference in constructing measures of research productivity.

To quantify research productivity, a weighted scoring system was developed by the researcher (see Appendix E). Participants were given points for engaging in various research activities. Point values were assigned on the basis of judgements about relative productivity made by the researcher. No points were assigned for responses indicating no involvement in any of the research activities. A point value of one was assigned for thesis or dissertation research in progress, being a member of an active research team, presenting papers at regional or national professional conferences, and submitting articles for publication in scholarly journals. A point value of two was assigned to having completed the thesis, having completed the dissertation, and having articles published in scholarly journals. The total sum of points was the research productivity score with higher scores indicating more productivity. While this scoring system is subjective in nature, it seemed more appropriate than merely counting number of publications as an indicator of research productivity.

Procedure

Graduate students who were in their first, second, and fourth or beyond years were solicited to participate in the investigation. No third year students were solicited to participate as developmental differences were to be examined in the data analyses and a sample of students both early and late in their graduate school careers was sought. Furthermore, third year students were to be used in pilot testing of the measures.
Programs and internship sites surveyed were located across the continental United States. A complete listing of the sites appears in Table 2. Students from the following six graduate programs received 181 of the 219 (82.6%) surveys distributed: Michigan State University, Ohio State University, State University of New York at Albany, University of Florida, University of Iowa, and University of Maryland.

For the majority of sites, the researcher initially contacted a principle person by telephone to request that person's assistance in soliciting participants and collecting data. Contact people included current faculty members of graduate programs and current staff persons at university counseling centers. The researcher sent the requisite number of individual packets of materials to the contact person who distributed them to students. Contact people were asked to distribute surveys to students in APA-approved graduate programs in counseling psychology only. At one site, the researcher distributed and collected surveys herself. At another site, the researcher sent surveys directly to students enrolled in that program. In recognition of the many demands on graduate students' time and energies, materials were distributed early in the academic quarter or semester. Surveys were distributed to programs on the quarter system by the fifth week of Winter Quarter and to programs on the semester system by the ninth week of Spring Semester.

A cover letter to participants was included with the materials (see Appendix F for representative text). The cover letter indicated that this study was on research training in counseling psychology and attitudes toward research. It also stressed that responses were anonymous and that data would not be analyzed by individual programs. Such
Table 2  NUMERICAL REPRESENTATION OF THE DISTRIBUTION TO AND RETURN OF SURVEYS FROM EACH SITE

<table>
<thead>
<tr>
<th>Site</th>
<th>* Sent</th>
<th>* Returned</th>
<th>Return Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan State University</td>
<td>30</td>
<td>10</td>
<td>30%</td>
</tr>
<tr>
<td>Ohio State University</td>
<td>44</td>
<td>37</td>
<td>84%</td>
</tr>
<tr>
<td>Ohio State University*</td>
<td>5</td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>Pennsylvania State University*</td>
<td>6</td>
<td>3</td>
<td>50%</td>
</tr>
<tr>
<td>State University of New York at Albany</td>
<td>37</td>
<td>20</td>
<td>54%</td>
</tr>
<tr>
<td>University of Akron*</td>
<td>8</td>
<td>5</td>
<td>63%</td>
</tr>
<tr>
<td>University of California at San Diego*</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>University of Florida</td>
<td>25</td>
<td>16</td>
<td>64%</td>
</tr>
<tr>
<td>University of Iowa</td>
<td>20</td>
<td>9</td>
<td>45%</td>
</tr>
<tr>
<td>University of Maryland</td>
<td>26</td>
<td>13</td>
<td>50%</td>
</tr>
<tr>
<td>University of Texas*</td>
<td>10</td>
<td>7</td>
<td>70%</td>
</tr>
<tr>
<td>University of Utah*</td>
<td>6</td>
<td>5</td>
<td>83%</td>
</tr>
</tbody>
</table>

Note. Asterisks (*) denote counseling centers.
precautions served to guard against the possibility that individuals might have favorably biased their responses to make their respective programs look better.

The researcher used several strategies to increase the probability that surveys were returned. First, self-addressed stamped envelopes were given to participants to return their surveys. When possible, a follow-up letter was sent to participants thanking those subjects who had completed the study and reminding those who had not yet done so of the importance of their cooperation. Letters were carefully stated to reflect the researcher's understanding of the many demands of graduate school and to emphasize the importance of participating in research to further the body of knowledge which would contribute to better research training (see Appendix G for representative text). Return rates from the different programs were assessed through examination of postal marks.

The researcher gave each participant a self-addressed stamped postcard to return to the researcher to request a summary of the results of the study. 68 participants returned the postcards with their addresses on them and were subsequently mailed a two page summary of the rationale, the methods, and the major findings of the study.

Specific Hypotheses

Specific hypotheses were as follows:

1. It was hypothesized that there would be a significant positive correlation between self-efficacy and the research training environment across all participants.
2. It was hypothesized that this correlation would be stronger for participants who were at a later point in their graduate school careers (e.g. students in their fourth years and beyond) than for those who were early in their graduate school careers (e.g. students in their first and second years).

3. It was hypothesized that there would be a significant positive correlation between research productivity and research self-efficacy across all participants.

4. It was hypothesized that there would be a significant positive correlation between research productivity and perceptions of the research training environment.

5. It was hypothesized that both research self-efficacy in research and perceptions of the research training environment would significantly predict research productivity.

Data Analysis

Three principle analyses were made. First, correlational analyses of the relationships between self-efficacy, the research training environment, and research productivity were conducted across all participants.

Second, research productivity was predicted as a function of self-efficacy in research and perceptions of the research training environment using multiple regression analysis across all participants.

Finally, developmental differences between participants early and late in their graduate school careers were analyzed in two ways. First, correlational analyses between the variables of interest were conducted
separately for the two groups. Second, participants' self-efficacy, perceptions of their research training environments, and productivity were assessed using analyses of variance. Participants in their first and second years in graduate school comprised the early group while participants on internship and in their fourth years and beyond comprised the late group.

Additional analyses also were implemented. First, the possibility that demographic factors may have contributed to the hypothesized relationships amongst variables was examined. Differences due to gender and ethnicity were assessed using analysis of variance. Second, the possibility that the order of presentation of the instruments affected participants' responses was analyzed using analysis of variance. Reliability data was also generated using Cronbach's alpha for all instruments, including their respective subscales. Finally, the qualitative question from the measure of productivity was content analyzed to identify salient themes which emerged.
CHAPTER IV
RESULTS

This chapter presents the results of the statistical analyses performed on the data in four major sections. These sections include: (a.) preliminary analyses of the data, (b.) relationships between the variables of interest for all participants, (c.) developmental differences on the variables of interest, and (d.) reliability of the instruments utilized. Finally, a summary is presented following these major sections.

Preliminary Analyses
Order effects. Two analyses of variance showed no statistically significant differences on the total score of the Research Training Environment Scale ($F = 1.16, p > .28$) or on the total score of the Self-Efficacy in Research Measure ($F = .02, p > .90$) as a function of the order of the presentation of the instruments. These results suggest that the order of the presentation of the instruments had no effect on how participants responded. Thus, data were collapsed across both orders for all remaining analyses.
Descriptive data. 132 of the 219 surveys sent out were returned for an overall response rate of 60%. Seven surveys were returned from third year students and these data were omitted from the analyses. Using postmarks as an indication of the origin of surveys, the return rates for individual sites are presented in Table 2 (see Methods section).

Means and standard deviations for the Research Training Environment Scale and the Self-Efficacy in Research Measure and their respective subscales are shown in Table 3. The mean of the total score of the Research Training Environment Scale was 31.2 out of a possible score of 45 with a standard deviation of 5.1. Total RTES scores ranged from a low of 15.95 to a high of 40.35. While subscale means for the RTES are comparable to those reported by Royalty, et al. (1986), total RTES scores have not been reported in the literature.

The mean of the total score on the Self-Efficacy in Research Measure was 190.02 out of a possible 297 with standard deviation of 45.69. Self-efficacy scores ranged from a low of 41 to a high of 282. The means and standard deviations on the subscales of the SERM were as follows; research design skills ($M = 5.85$, $SD = 1.42$), practical research skills ($M = 6.02$, $SD = 1.27$), quantitative and computer skills ($M = 4.80$, $SD = 1.97$), and writing skills ($M = 6.29$, $SD = 1.65$). The mean productivity score was 4.58 with a standard deviation of 4.20. Productivity scores ranged from a low of 0 to a high of 19.

A total of 54 participants responded to the qualitative question concerning other research activities in which they were currently involved or in which they had previously been involved. The most frequently cited activity was previous involvement in research projects
<table>
<thead>
<tr>
<th>Instrument/Subscale</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTES Total</td>
<td>31.24</td>
<td>5.07</td>
</tr>
<tr>
<td>RTES Faculty Modeling of Appropriate Research Behavior</td>
<td>3.70</td>
<td>.85</td>
</tr>
<tr>
<td>RTES Reinforcement of Student Research</td>
<td>3.06</td>
<td>.78</td>
</tr>
<tr>
<td>RTES Early Involvement In Research</td>
<td>3.20</td>
<td>.78</td>
</tr>
<tr>
<td>RTES Untying of Statistics and Research</td>
<td>3.18</td>
<td>.63</td>
</tr>
<tr>
<td>RTES Facilitating Students' &quot;Looking Inward&quot; for Research Ideas</td>
<td>3.61</td>
<td>.73</td>
</tr>
<tr>
<td>RTES Science as Partly Social Experience</td>
<td>3.71</td>
<td>.88</td>
</tr>
<tr>
<td>RTES Teaching that all Experiments are Flawed and Limited</td>
<td>3.72</td>
<td>.62</td>
</tr>
<tr>
<td>RTES Focus on Varied Investigative Styles</td>
<td>3.48</td>
<td>.88</td>
</tr>
<tr>
<td>RTES Wedding of Science and Clinical Practice</td>
<td>3.62</td>
<td>1.01</td>
</tr>
<tr>
<td>SERM Total</td>
<td>190.02</td>
<td>45.69</td>
</tr>
<tr>
<td>SERM Research Design Skills</td>
<td>5.85</td>
<td>1.42</td>
</tr>
<tr>
<td>SERM Practical Research Skills</td>
<td>6.02</td>
<td>1.27</td>
</tr>
<tr>
<td>SERM Quantitative and Computer Skills</td>
<td>4.80</td>
<td>1.97</td>
</tr>
<tr>
<td>SERM Writing Skills</td>
<td>6.29</td>
<td>1.65</td>
</tr>
</tbody>
</table>
and data collection at the undergraduate and graduate levels (n = 22). Next, 16 participants held current or past paid research assistantships. Nine participants reported experiences in research projects through consultation to outside businesses and agencies. Current independent research projects that were earmarked for presentation or publication were reported by seven participants. Six participants reported writing book proposals, book chapters, and other literature review projects while four participants reported writing grant proposals or receiving grant awards. Finally, five participants reported involvement in various types of student support groups for conducting research and one participant reported involvement in editorial duties and manuscript review for a journal.

**Effect of demographic variables.** Three analyses of variance found no statistically significant differences on the total scores of the Research Training Environment Scale ($E = 1.37, p > .25$), the Self-Efficacy in Research Measure ($E = 2.66, p > .11$), or the measure of productivity ($E = .44, p > .51$) using gender as an independent variable. The means and standard deviations on each of these measures for men and women are presented in Table 4.

Three analyses of variance found no statistically significant differences on the total scores of the Research Training Environment Scale ($E = 1.64, p > .17$), the Self-Efficacy in Research Measure ($E = 1.26, p > .29$), or the measure of productivity ($E = 1.43, p > .23$) using ethnicity as an independent variable. Means and standard deviations on each of these measures for the different ethnic groups are presented in Table 5.
Table 4 MEANS AND STANDARD DEVIATIONS ON TOTAL SCORES OF 3 MEASURES BY GENDER

<table>
<thead>
<tr>
<th></th>
<th>Women (n = 86)</th>
<th></th>
<th>Men (n = 39)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Self-Efficacy in</td>
<td>185.6</td>
<td>46.8</td>
<td>199.8</td>
<td>42.1</td>
</tr>
<tr>
<td>Research Measure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Training</td>
<td>30.87</td>
<td>5.52</td>
<td>32.03</td>
<td>3.88</td>
</tr>
<tr>
<td>Environment Scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity</td>
<td>4.41</td>
<td>4.50</td>
<td>4.95</td>
<td>4.07</td>
</tr>
</tbody>
</table>

Table 5 MEANS AND STANDARD DEVIATIONS OF 3 MEASURES BY ETHNICITY

<table>
<thead>
<tr>
<th></th>
<th>Research Training Environment Scale</th>
<th>Self-Efficacy in Research</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>African American</td>
<td>32.12</td>
<td>5.2</td>
<td>172.69</td>
</tr>
<tr>
<td>n = 13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian American</td>
<td>24.99</td>
<td>8.5</td>
<td>178.00</td>
</tr>
<tr>
<td>n = 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anglo American</td>
<td>31.29</td>
<td>4.8</td>
<td>192.77</td>
</tr>
<tr>
<td>n = 100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic American</td>
<td>29.52</td>
<td>6.8</td>
<td>175.75</td>
</tr>
<tr>
<td>n = 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>36.40</td>
<td>1.4</td>
<td>234.00</td>
</tr>
<tr>
<td>n = 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
numbers of participants in the cells for each of the different ethnic backgrounds. Data were subsequently collapsed across all ethnic minority group members and then compared with the Anglo majority group. No statistically significant differences were found on the total scores of the Research Training Environment Scale ($E = .04, p > .84$) or the Self-Efficacy in Research Measure ($E = 1.83, p > .18$). A statistically significant difference was found for productivity ($E = 5.02, p < .05$). A comparison of the means for both groups indicates that productivity was higher for the Anglo majority group ($M = 5.0, \text{Std Err} = .41$) than for the combined ethnic minority group ($M = 2.9, \text{Std Err} = .83$). Least square means and standard errors of the least square means for the total scores on all instruments of participants in the Anglo majority group and in the combined ethnic minority group are presented in Table 6.

**Relationships Between Variables of Interest**

**Correlational analyses.** The results of correlational analyses between the three variables of interest across all participants are presented in Table 7. First, the Pearson product moment correlation between the total scores on the Self-Efficacy in Research Measure and the measure of research productivity was statistically significant in the positive direction ($r = .39, p < .001$) accounting for 15.0% of the variance. Second, the Pearson product moment correlation between the total scores on the Self-Efficacy in Research Measure and the Research Training Environment Scale was statistically significant in the positive direction ($r = .39, p < .001$) accounting for 15.3% of the variance. Finally, the Pearson product moment correlation between the total score on the
Table 6 LEAST SQUARE MEANS AND STANDARD ERRORS OF LEAST SQUARE MEANS ON TOTAL SCORES OF 3 MEASURES BY ETHNICITY

<table>
<thead>
<tr>
<th></th>
<th>Anglo Majority (n = 100)</th>
<th>Ethnic Minority (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>STD ERR</td>
</tr>
<tr>
<td>Self-Efficacy in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Measure</td>
<td>192.8</td>
<td>9.1</td>
</tr>
<tr>
<td>Research Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment Scale</td>
<td>31.29</td>
<td>.52</td>
</tr>
<tr>
<td>Productivity</td>
<td>5.0</td>
<td>.41</td>
</tr>
</tbody>
</table>

Table 7 CORRELATION MATRIX FOR TOTAL SCORES ON SELF-EFFICACY IN RESEARCH MEASURE, RESEARCH PRODUCTIVITY MEASURE, AND RESEARCH TRAINING ENVIRONMENT SCALE

<table>
<thead>
<tr>
<th></th>
<th>Self-Efficacy in Research</th>
<th>Research Productivity</th>
<th>Research Training Environment Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy in</td>
<td>0.39*</td>
<td>0.39*</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity</td>
<td></td>
<td></td>
<td>0.10</td>
</tr>
</tbody>
</table>

Note. Correlations marked with an asterisk are statistically significant at p < .0001.
Research Training Environment Scale and the measure of research productivity was not statistically significant ($r = .10$, $p > .30$).

Due to their correlational nature, these results cannot be interpreted in a causal manner. However, the associational relationships between the variables of interest can be specified from the results. These results suggest that graduate students in counseling psychology who are high in research self-efficacy also tend to be more productive in research, while those who are low in self-efficacy tend to be less productive. These results also suggest that graduate students in counseling psychology who have more positive perceptions of their research training environments also tend to be high in research self-efficacy, while those who have less positive perceptions of their research training environments tend to be low in self-efficacy. Finally, these results suggest the absence of a relationship between graduate students' perceptions of their research training environments and their productivity in research.

**Multiple regression analysis.** A multiple regression analysis using the total scores on the Research Training Environment Scale and the Self-Efficacy in Research Measure to predict productivity indicated that self-efficacy made an independent contribution to predicting productivity ($B = .04$, $F = 19.00$, $p < .001$), but that perceptions of the research training environment did not ($B = -.05$, $F = 1.24$, $p > .27$).
Developmental Differences on Variables of Interest

Correlational analyses. To analyze developmental differences between participants early and late in their graduate school careers, correlational analyses between the variables of interest were conducted separately for the two groups. For the early group, comprised of students in their first and second years, the Pearson product moment correlation between the total scores on the Self-Efficacy in Research Measure and the measure of research productivity was statistically significant in the positive direction ($r = .28, p < .05$) accounting for 7.8% of the variance. Second, the Pearson product moment correlation between the total scores on the Self-Efficacy in Research Measure and the Research Training Environment Scale was statistically significant in the positive direction ($r = .36, p < .01$) accounting for 13.0% of the variance. Finally, the Pearson product moment correlation between the total score on the Research Training Environment Scale and the measure of research productivity was not statistically significant ($r = .14, p > .33$).

For the late group, comprised of interns and students in their fourth years and beyond, the Pearson product moment correlation between the total scores on the Self-Efficacy in Research Measure and the measure of research productivity was statistically significant in the positive direction ($r = .44, p < .001$) accounting for 19.4% of the variance. Second, the Pearson product moment correlation between the total scores on the Self-Efficacy in Research Measure and the Research Training Environment Scale was statistically significant in the positive direction ($r = .50, p < .001$) accounting for 25.0% of the variance. Finally, the
Pearson product moment correlation between the total score on the Research Training Environment Scale and the measure of research productivity was not statistically significant ($r = .20, p > .11$).

A comparison of these correlation coefficients is shown in Table 8. These results suggest that the absolute values of the correlation coefficients between the variables of interest are higher for graduate students who are later in their graduate school careers than for graduate students who are earlier in their graduate school careers. However, no statistically significant differences were found between these two samples for the correlations between the SERM and the measure of productivity ($z = .1, p > .05$), the SERM and the RTES ($z = .76, p > .05$), or the RTES and the measure of productivity ($z = .32, p > .05$).

**Analyses of variance.** Participants' self-efficacy, perceptions of their research training environments, and productivity also were assessed using analysis of variance. Statistically significant differences emerged between the early group and the late group for the total score on the Self-Efficacy in Research Measure ($F = 4.01, p < .05$) and on the measure of productivity ($F = 32.78, p < .001$). A comparison of the means and standard deviations for participants in these two groups on these two measures is presented in Table 9. Examination of these means suggests that graduate students who are later in their careers exhibit more productivity and feel more self-efficacious in the area of research. No statistically significant differences emerged between the early group and the late group on the total score of the Research Training Environment Scale ($F = 1.46, p > .23$).
Table 8  COMPARISON OF CORRELATION COEFFICIENTS BETWEEN VARIABLES OF INTEREST FOR PARTICIPANTS EARLY AND LATE IN THEIR GRADUATE SCHOOL CAREERS

<table>
<thead>
<tr>
<th></th>
<th>Early Group (n = 56)</th>
<th>Late Group (n = 69)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERM and Productivity</td>
<td>( r = .28 ) ( p &lt; .05 )</td>
<td>( r = .44 ) ( p &lt; .01 )</td>
</tr>
<tr>
<td>SERM and RTES</td>
<td>( r = .36 ) ( p &lt; .01 )</td>
<td>( r = .50 ) ( p &lt; .01 )</td>
</tr>
<tr>
<td>RTES and Productivity</td>
<td>( r = .14 ) ( p &gt; .33 )</td>
<td>( r = .20 ) ( p &gt; .11 )</td>
</tr>
</tbody>
</table>

Table 9  MEANS AND STANDARD DEVIATIONS ON SELF-EFFICACY IN RESEARCH MEASURE AND MEASURE OF RESEARCH PRODUCTIVITY FOR PARTICIPANTS EARLY AND LATE IN THEIR GRADUATE SCHOOL CAREERS

<table>
<thead>
<tr>
<th></th>
<th>Early Group (n = 56)</th>
<th>Late Group (n = 69)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy in Research Measure</td>
<td>181.0 6.03</td>
<td>197.3 5.44</td>
</tr>
<tr>
<td>Productivity Measure</td>
<td>2.45 .50</td>
<td>6.30 .45</td>
</tr>
</tbody>
</table>
Reliability Data on Instruments

Research Training Environment Scale. Reliability data were generated for all instruments using Cronbach's alpha. For the total score on the Research Training Environment Scale, Cronbach's alpha indicated good reliability (alpha = .92). Cronbach's alphas follow in parentheses for each of the subscales: teaching that all experiments are flawed (alpha = .32), untying statistics and research (alpha = .20), early involvement in research (alpha = .62), wedding of science and clinical practice (alpha = .77), facilitating students' "looking inward" for research ideas (alpha = .61), and science as a partly social experience (alpha = .75), reinforcement of student research (alpha = .74), focus on varied investigative styles (alpha = .70), and faculty modeling (alpha = .86). These results are generally comparable to those reported by Royalty, et al. (1986). However, whereas only three of the subscales showed adequate reliability for research purposes in that study according to suggestions by Groth-Marnat (1985), 5 of the 9 subscales showed adequate reliability in the present study.

Self-Efficacy in Research Measure. Overall reliability for the Self-Efficacy in Research Measure was good (alpha = .96). Reliability was also good for each of the four subscales on this instrument. Cronbach's alpha is given in parentheses for each of the following subscales; research design skills (alpha = .90), practical research skills (alpha = .83), quantitative and computer skills (alpha = .93), and writing skills (alpha = .94).
**Measure of productivity.** Reliability data for the measure of productivity using Cronbach's alpha was just below adequate (alpha = .68) for research purposes according to guidelines presented by Groth-Marnat (1984). Table 10 presents the correlation matrix for the items of the measure of productivity and the total productivity score. Correlations between 5 of 6 of the individual productivity items and the total productivity score were statistically significant in the positive direction. These Pearson product moment correlations ranged from $r = .55$ to $r = .79$ and were all significant at the $p < .001$ level. The Pearson product moment correlation between the item concerning participation on an active research team and the total productivity score was not statistically significant ($r = .05, p > .57$). Omitting this item from the measure of productivity resulted in higher reliability (alpha = .78). The data were subsequently reanalyzed omitting this item from the measure of productivity.

**Major analyses using revised measure of productivity.** Slight differences emerged for the major analyses using the revised measure of productivity. Table 11 compares the correlational relationships among variables of interest using the original and revised measures of productivity. The pattern of correlational relationships among the variables of interest over all participants remained the same. The Pearson product moment correlation between the SERM and the revised measure of research productivity was statistically significant in the positive direction ($r = .45, p < .001$) accounting for 20.6% of the variance. This represented an additional 5.6% of the variance. Finally, the Pearson
Table 10  CORRELATION MATRIX FOR ITEMS ON PRODUCTIVITY MEASURE

<table>
<thead>
<tr>
<th></th>
<th>Thesis</th>
<th>Dissertation</th>
<th>Research Team</th>
<th>Articles Submitted</th>
<th>Articles Published</th>
<th>Presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>( r = .62 )</td>
<td>( r = .55 )</td>
<td>( r = .05 )</td>
<td>( r = .71 )</td>
<td>( r = .79 )</td>
<td>( r = .76 )</td>
</tr>
<tr>
<td></td>
<td>( p &lt; .01 )</td>
<td>( p &lt; .01 )</td>
<td>( p &gt; .57 )</td>
<td>( p &lt; .01 )</td>
<td>( p &lt; .01 )</td>
<td>( p &lt; .01 )</td>
</tr>
<tr>
<td><strong>Thesis</strong></td>
<td>( r = .60 )</td>
<td>( r = -.13 )</td>
<td>( r = .39 )</td>
<td>( r = .31 )</td>
<td>( r = .43 )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( p &lt; .01 )</td>
<td>( p &gt; .19 )</td>
<td>( p &lt; .01 )</td>
<td>( p &lt; .01 )</td>
<td>( p &lt; .01 )</td>
<td></td>
</tr>
<tr>
<td><strong>Dissertation</strong></td>
<td>( r = -.22 )</td>
<td>( r = .37 )</td>
<td>( r = .30 )</td>
<td>( r = .43 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( p &lt; .05 )</td>
<td>( p &lt; .01 )</td>
<td>( p &lt; .01 )</td>
<td>( p &lt; .01 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Research Team</strong></td>
<td>( r = .13 )</td>
<td>( r = -.03 )</td>
<td>( r = -.05 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( p &gt; .15 )</td>
<td>( p &gt; .71 )</td>
<td>( p &gt; .60 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Articles Submitted</strong></td>
<td>( r = .52 )</td>
<td>( r = .42 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( p &lt; .01 )</td>
<td>( p &lt; .01 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Articles Published</strong></td>
<td>( r = .46 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( p &lt; .01 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 11  COMPARISON OF CORRELATIONAL RELATIONSHIPS USING THE ORIGINAL AND THE REVISED MEASURES OF PRODUCTIVITY

<table>
<thead>
<tr>
<th>Measures</th>
<th>Sample</th>
<th>Original</th>
<th>Revised</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERM and Productivity</td>
<td>All Participants</td>
<td>$r = .39$</td>
<td>$r = .45$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$p &lt; .001$</td>
<td>$p &lt; .001$</td>
</tr>
<tr>
<td>RTES and Productivity</td>
<td>All Participants</td>
<td>$r = .10$</td>
<td>$r = .13$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$p &gt; .30$</td>
<td>$p &gt; .30$</td>
</tr>
<tr>
<td>SERM and Productivity</td>
<td>Early Group</td>
<td>$r = .28$</td>
<td>$r = .33$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$p &lt; .05$</td>
<td>$p &lt; .05$</td>
</tr>
<tr>
<td>RTES and Productivity</td>
<td>Early Group</td>
<td>$r = .14$</td>
<td>$r = .11$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$p &gt; .33$</td>
<td>$p &gt; .47$</td>
</tr>
<tr>
<td>SERM and Productivity</td>
<td>Late Group</td>
<td>$r = .44$</td>
<td>$r = .50$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$p &lt; .001$</td>
<td>$p &lt; .001$</td>
</tr>
<tr>
<td>RTES and Productivity</td>
<td>Late Group</td>
<td>$r = .20$</td>
<td>$r = .29$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$p &gt; .11$</td>
<td>$p &lt; .05$</td>
</tr>
</tbody>
</table>
product moment correlation between the RTES and the measure of research productivity was still statistically nonsignificant ($r = .13, p > .30$). A multiple regression analysis using the revised measure of productivity indicated that self-efficacy continued to make an independent contribution to predicting productivity ($B = .04, F = 22.99, p < .001$), and that perceptions of the research training environment did not ($B = -.03, F = 1.80, p > .18$).

An analysis of variance suggested that the statistically significant difference remained between the early group and the late group with the revised measure of productivity ($F = 32.07, p < .001$). The pattern of correlational relationships among the variables of interest remained the same when the early group was analyzed with the revised measure of productivity. The Pearson product moment correlation between the SERM and the measure of research productivity was statistically significant in the positive direction ($r = .33, p < .05$) accounting for 10.9% of the variance. This represents an additional 3.1% of the variance. Finally, the Pearson product moment correlation between the RTES and the measure of research productivity was still statistically nonsignificant ($r = .11, p > .47$).

The pattern of correlational relationships among the variables of interest was slightly different when the late group was analyzed with the revised measure of productivity. The Pearson product moment correlation between the SERM and the revised measure of research productivity statistically significant in the positive direction ($r = .50, p < .001$), accounting for 25% of the variance. This accounted for an additional 5.6% of the variance. One noteworthy change was the Pearson
product moment correlation between the RTES and the revised measure of research productivity which became statistically significant ($r = .29$, $p < .05$) accounting for 8.4% of the variance. This correlation was the only one that changed from nonsignificant to significant using the revised measure of productivity.

Summary

Two analyses of variance showed no statistically significant differences on the total score of the Research Training Environment Scale ($F = 1.16$, $p > .28$) or on the total score of the Self-Efficacy in Research Measure ($F = .02$, $p > .90$) as a function of the order of the presentation of the instruments. Three analyses of variance found no statistically significant gender differences on the total scores of the RTES ($F = 1.37$, $p > .25$), the SERM ($F = 2.66$, $p > .11$), or the measure of productivity ($F = .44$, $p > .51$). A comparison of Anglo majority group members and combined members of ethnic minority groups suggested no statistically significant differences on the RTES ($F = .04$, $p > .84$) or the SERM ($F = 1.83$, $p > .18$). A statistically significant difference was found for productivity ($F = 5.02$, $p < .05$) indicating higher productivity for the Anglo majority group ($M = 5.0$, Std Err = .41) than for the combined ethnic minority group ($M = 2.9$, Std Err = .83).

Results of correlational analyses over all participants suggested statistically significant relationships in the positive direction between the SERM and research productivity ($r = .39$, $p < .001$) and between the SERM and the RTES ($r = .39$, $p < .001$). No statistically significant relationship was found between the RTES and the measure of
productivity ($r = .10, p > .30$). A multiple regression analysis suggested that self-efficacy made an independent contribution to predicting productivity ($B = .04, E = 19.00, p < .001$), but that perceptions of the research training environment did not ($B = -.05, E = 1.24, p > .27$).

This pattern of results remained the same when participants were divided into two groups of students, those early in their graduate school careers and those late in their graduate school careers. The relationship between the SERM and productivity was statistically significant for both the early group ($r = .28, p < .05$) and the late group ($r = .44, p < .001$), as was the relationship between the SERM and the RTES ($r = .36, p < .01$ for the early group, and $r = .50, p < .001$ for the late group). No statistically significant relationships were found between the RTES and productivity for either the early group ($r = .14, p > .33$) or the late group ($r = .20, p > .11$). Statistically significant differences between participants early and late in their graduate school careers were found using analyses of variance on the SERM ($E = 4.01, p < .05$) and on the measure of productivity ($E = 32.78, p < .001$), but not on the RTES ($E = 1.46, p > .23$).

Cronbach's alpha indicated good reliability for the total RTES score ($\alpha = .92$) and adequate reliability for 5 of 9 subscales for research purposes (alphas ranging from .20 to .86). Cronbach's alpha indicated good reliability for the total SERM score ($\alpha = .96$) as well as for the four subscales (alphas ranging from .83 to .94). Cronbach's alpha for the measure of productivity indicated just below adequate reliability ($\alpha = .68$) for research purposes according to guidelines presented by Groth-Marnat (1984). Omitting the item that referred to participation on an
active research team, Cronbach's alpha increased to an acceptable level of reliability (alpha = .78) for research purposes.

Slight differences emerged when data were reanalyzed using this revised measure of productivity. In general, correlations that were statistically significant using the original measure of productivity remained statistically significant with the revised measure of productivity. Only one correlation that had previously been nonsignificant became statistically significant using the revised measure of productivity. This correlation was for the relationship between the RTES and productivity for the group of students late in their graduate school careers ($r = .29, p < .05$). Finally, results of the multiple regression analysis remained unchanged using the revised measure of productivity.
CHAPTER V
DISCUSSION

The purpose of this study was to examine the relationships between students' research self-efficacy, perceptions of the research training environment, and research productivity in counseling psychology. This chapter is divided into four sections. First, the results of this study as they relate to the hypotheses and to previous research and theory will be discussed. Second, limitations of the study will be presented. Third, directions for future research will be considered. Finally, implications for research training in counseling psychology will be discussed.

Results of the Present Study
As presented previously, a significant relationship was observed between students' research self-efficacy and their perceptions of the research training environment. This relationship was significant when the data were analyzed for all participants, as well as when the data were analyzed separately for students early and late in their graduate school careers. Thus, the hypothesis that a significant positive relationship between research self-efficacy and perceptions of the
research training environment would be observed was supported. Furthermore, the hypothesis that this relationship would be stronger for students later in their graduate school careers than for students early in their graduate school careers was partially supported in that more variance was accounted for by the correlation for the late group of students than by the correlation for the early group of students. However, these correlations were not statistically significantly different from each other.

A significant relationship also was observed between students' research self-efficacy and their research productivity. Again, this relationship was significant when the data were analyzed for all participants, as well as when the data were analyzed separately for students early and late in their graduate school careers. Thus, the hypothesis that a significant positive relationship would be observed between research self-efficacy and research productivity was supported. Again, the hypothesis that this relationship would be stronger for students later in their graduate school careers than for students early in their graduate school careers was partially supported in that more variance was accounted for by the correlation for the late group of students than by the correlation for the early group of students. Again, these correlations were not statistically significantly different from each other.

Finally, a significant relationship was not observed between students' perceptions of the research training environment and their productivity. This nonsignificant finding was observed across all participants, as well as among students both early and late in their graduate school careers.
Using a standard medium effect size of $r = .30$, 84 participants were necessary to reach a conventional level of power of .80 for the correlational analyses (Cohen & Cohen, 1983). Thus, the non-significant finding across all participants was not explained by lack of power due to small sample size in the analysis. However, the reliability of the original measure of productivity was questionable. Thus, the nonsignificant results may have been due to measurement error, rather than to the fact that a relationship between these two variables did not exist. However, when the data were reanalyzed using a revised measure of productivity with adequate reliability, the relationship between research training and productivity remained nonsignificant across all participants and for students who were early in their graduate school careers. It is interesting to note that this relationship became significant for students who were late in their graduate school careers. While this correlation was statistically significant at the $p < .05$ level, it only accounted for a small amount of the variance. Thus, the hypothesis that a significant positive relationship would be observed between the variable of research productivity and the variable of research training environment was partially supported.

Based on these correlations, it is not surprising that multiple regression analyses suggested that across all participants, self-efficacy made an independent contribution to the prediction of productivity using both the original and the revised measure of productivity, but that perceptions of the research training environment did not. Thus, the hypothesis that students' research productivity would be significantly predicted both by their perceptions of the research training environment
and by their research self-efficacy was not supported. The finding that research self-efficacy was a significant predictor of productivity is consistent with previous literature that reported that self-efficacy was a significant predictor of academic achievement and persistence (Lent, Brown, & Larkin, 1984; 1986; 1987; Multon, Brown, & Lent, 1991) and range of perceived career options (Betz & Hackett, 1981).

The aforementioned results partially support previous research and theory in the area of research training in counseling psychology. The call for the application of self-efficacy theory to the area of research training (Betz, 1986; Gelso, et al., 1988) was supported by the data from this study. Not only was the concept of research self-efficacy significantly related to research training, it also had a significant relationship to productivity. Interestingly, the research training environment appeared to have no significant relationship to productivity, except when the data were reanalyzed using the revised measure of productivity, and then only for the late group of students. Thus, this finding was partially in opposition to previous research (Galassi, et al., 1986; Royalty & Magoon, 1985) and theory (Gelso, 1979; Magoon & Holland, 1984) that suggested that research productivity is associated with certain aspects of the research training environment.

Other developmental differences observed involved significant differences between students early in their graduate school careers and those late in their graduate school careers on the variables of research self-efficacy and productivity. As expected, students in the late group reported higher research productivity. Students in the late group also reported higher research self-efficacy. Making the assumption that
students in the late group have had more direct experiences with research and have had more opportunities to see the research process modeled for them, these findings were consistent with predictions that would be made by self-efficacy theory (Bandura, 1977). Self-efficacy theory would predict that these direct experiences with research would lead to higher research self-efficacy. Higher research self-efficacy would, in turn, lead to the increased probability that students would engage in behaviors associated with research.

In addition to the major data analyses, this study generated reliability data for each of its measures. First, reliability data generated for the Self-Efficacy In Research Measure suggested good internal consistency for the overall measure and for the four subscales. These data suggest the potential utility of this measure in future research and training, pending the results of validation studies. While internal consistency on the original measure of productivity fell just below an acceptable level for research, the revision of the measure by omitting the one item which did not correlate positively with the total score or with any of the other items raised the level of reliability to an acceptable range. Apparently, membership on an active research team was not related to other the indices of productivity which included research involving the thesis or dissertation, the submission and publication of articles in scholarly journals, and the presentation of research at professional conferences. Again, these data suggest the potential utility of this measure in future research on graduate students. These data also support previous literature in the area of research training that advocated a broad operationalization of the construct of
research productivity (Cesari, 1986; Ward & Kaflowitz, 1986). Furthermore, the results of the content analyses of the qualitative question concerning participants' research activities suggested that previous participation in data collection, holding or having held a research assistantship, and research consulting with outside agencies might be potential items to include for evaluation in future measures of productivity.

Reliability data generated in this study for the Research Training Environment Scale and its nine subscales were predominately consistent with data previously reported (Royalty, et al., 1986). The results from this study suggested that reliability for the overall score on the RTES was good and that reliability was acceptable for research purposes for the following subscales: wedding of science and clinical practice, science as a partly social experience, reinforcement of student research, focus on varied investigative styles, and faculty modeling. However, reliability on the following subscales was unacceptable: teaching that all experiments are flawed, untying statistics and research, early involvement in research, and facilitating students' "looking inward" for research ideas. Whereas only 3 of the 9 subscales in the Royalty, et al. (1986) study had Cronbach's alphas above .70, five of the subscales in this study achieved this level of reliability. Based on these results, the further revision and refinement of the RTES subscales is warranted if they are to be used in data analyses of future studies on research training.

This study also explored the possibility that differences due to gender and ethnicity might exist on the three variables of interest. No
differences were observed on the variables of research training as measured by the RTES, self-efficacy as measured by the SERM, or productivity as a function of gender. This finding was consistent with previous literature in the area of research training which reported no gender differences in students' perceptions of their research training environments (Royalty, et al., 1986) and adds knowledge about the nature of gender differences to research that did not report analysis of such differences (Gelso, et al., 1983).

While differences were not observed on the variables of self-efficacy or research training as a function of ethnicity, significant differences were observed on the measure of productivity with the Anglo majority group reporting more productivity than the combined ethnic minority group. This difference may be due to the fact that 64% of the ethnic minority students were in the early group of students while only 40% of the Anglo majority students were in the early group. Thus, the productivity of the ethnic minority group would be expected to be lower due to the fact that they had not been in graduate school long enough to complete their theses and dissertations or to have completed research projects to submit for publication, to publish, or to present. The difference in numbers of ethnic minority students and Anglo majority students in the late group also warrants consideration. This difference might have been due either to recent efforts at the recruitment of ethnic minority graduate students or to decreased rates of retention of ethnic minority students over the years.

Finally, no differences were observed on the variables of research training as measured by the Research Training Environment Scale or
self-efficacy as measured by the Self-Efficacy in Research Measure as a function of the order in which participants completed those measures. Thus, order effects were not a plausible alternative explanation for any of the findings.

Limitations

The results of this study must be interpreted in light of its potential limitations. One limitation is that the variables of ability and interest were not accounted for. It is possible that the observed relationships between perceptions of the research training environment, research self-efficacy, and research productivity were mediated by differential abilities and/or differential interests of students in the area of research. Previous research suggested that personality type and interests are related to current research interest, perceptions of research training, and "all but dissertation" status in graduate school (Mallinckrodt, et al., 1990) and several authors have suggested that the problem of low research productivity in counseling psychology is a function of the predominance of people with Social interests rather than Investigative interests in the field (Holland, 1986; Osipow, 1979).

Another limitation is a result of the sample of students surveyed. Threats to validity due to selection and sampling methods may exist (Cook & Campbell, 1979). It is not known if the students who volunteered to complete this study are representative of all students in counseling psychology for at least two reasons. First, perhaps only students who were either very high or very low on the variables of interest volunteered for this study. 60% of the students surveyed
returned the completed measures. It is not known if these participants differed in relevant ways from those students who did not participate.

Second, a threat to external validity may exist because of the quality of programs surveyed. While the number of programs actually surveyed is relatively high (at least 20% of all counseling psychology programs in country; APA, 1990), the majority of these programs also tend to have solid reputations among professionals in the field. In addition, caution is advised in generalizing from the results of this study to any individual program.

The results concerning the developmental differences between graduate students early and late in their graduate school careers must also be interpreted with caution due to ambiguity in the wording of the demographic questionnaire. The questionnaire asked participants what year they were in graduate school. Because some of the respondents may have been in more than one program in the past, the lines of demarcation between the classification of early and late may have been blurred. For example, a student who had received a master’s degree at another school may have marked either second year student (in his or her current program) or fourth year student (in graduate school overall).

Other limitations of the present study relate to the reliability and validity of the measures used to assess the constructs of research self-efficacy, research training environment, and productivity. Both the measures of self-efficacy and productivity were developed by the researcher. However, reliability data indicated that performance on the Self-Efficacy in Research Measure was not due to error. While reliability of the original measure of productivity was just below an
adequate level, using the revised measure of productivity changed the observed relationships little. Also, if nonsignificant results had been observed, the conclusion might be drawn that measurement error was unacceptably high. However, this was not the case for the majority of the results. Finally, these measures have yet to be validated through research involving convergent or discriminant validity (Campbell & Fiske, 1959).

While the Research Training Environment Scale has demonstrated acceptable full scale reliability, neither its validity nor the reliability of all of its subscales have been established. Also, the RTES measures students' perceptions of the research training environment rather than the actual environment itself. Differences between the students' perceptions and the faculty's perceptions of the research training environment conceivably could exist. Thus, the results of this study are applicable only to students' perceptions of the research training environment.

Another limitation of the study is related to its correlational design. No conclusions can be drawn about causal relationships among the variables of interest (Campbell & Stanley, 1963). We can only speculate about whether the quality of research training causes students' research self-efficacy to be high or whether students' level of self-efficacy influences their perceptions of the research training environment. Similarly, we can only speculate about whether students' research self-efficacy levels cause them to be high or low in productivity or whether students' productivity levels cause them to be high or low in self-efficacy. However, as Campbell and Stanley (1963) note, the significant
results do support the hypothesis that a causal relationship may exist because a disconfirmation of that hypothesis through nonsignificant results was not observed.

**Directions for Future Research**

Several directions for future research in this area appear to exist. First, the present study should be replicated using a more representative sample of counseling psychology graduate students. Choosing a more representative sample could be conducted two ways. First, programs to be solicited for participation might be chosen randomly from a complete list of all APA approved counseling psychology programs. A second alternative for choosing programs might be to first classify programs along dimensions such as quality of reputation, degree of emphasis on science versus practice, productivity of faculty, or productivity of students and then select programs that represent the full spectrums of these dimensions.

Future research should also clarify the nature of the causal relationships between the variables. Experimental studies in which the variables of self-efficacy and research training are manipulated would clarify their relationships to productivity. However, the ethics of manipulating a student's research self-efficacy such that it is lowered might be questionable. Experimental studies on the effects of different types of research training experiences on students' research self-efficacy certainly could be conducted in which no-treatment control groups received the treatments at later dates. Knowledge of which components of research training are most influential on students' self-
efficacy would lead to the design of improved research training and potentially higher research productivity. The nature of causal relationships also might be explored using more advanced statistical techniques such as path analysis in the event that experimental studies are unrealistic.

Future research should focus on the relationships between the various subcomponents associated with research training and with research self-efficacy. Previous research has reported that specific aspects of the research training environment had specific effects on research interests and skills (Royalty, et al., 1986; Royalty & Reising, 1986). Thus, it is possible that specific aspects of the research training environment differentially affect specific aspects of research self-efficacy. Considering that quantitative and computer skills were associated with higher productivity (Royalty & Reising, 1986) and that of the four SERM subscales, students in the present study reported the lowest self-efficacy on the subscale assessing quantitative and computer skills, it would be prudent to focus on these skills specifically.

Furthermore, specific hypotheses generated from self-efficacy theory (Bandura, 1977) should be tested in the area of research training and research productivity. Future research should focus on how factors in the research training environment are related to factors that raise research self-efficacy. The four factors specified by Bandura (1977) should be investigated. For example, students with higher research self-efficacy would be expected to have had more direct experiences with research that were successful, to have had appropriate modeling of the research process, to have had verbal encouragement, and to have felt
little fear and anxiety associated with research. From a student's perspective, it seems wise to investigate the role that physiological arousal and emotions play in students' research self-efficacy. In addition, mitigating factors such as students' attributions for success and failure and their evaluations of and relationships to their role models and to the people providing encouragement should be explored.

Future research in the area of the relationships between research self-efficacy, the research training environment, and research productivity should also focus on how other variables such as ability and interest moderate these relationships. Thus, the effect of interest in and ability to do research on the variables of research self-efficacy, the research training environment, and research productivity and on the relationships between these variables should be examined.

Validation also studies should be conducted to assess the utility of the instruments used. For example, the Self-Efficacy in Research Measure should be compared with global measures of self-confidence in an effort to assess the degree to which it is measuring research self-efficacy as a construct separate from a general sense of self-confidence. The relationship between students' scores on the measure of productivity used in this study and their subsequent research productivity defined as number of publications and presentations in the initial phases of their careers could also be explored as a means for assessing the measure's construct validity. Validity and reliability studies are also needed for the Research Training Environment Scale. Many of the RTES subscales have not demonstrated adequate reliability. Because an instrument's reliability will place restrictions on its validity, the validity of these
subscales is also assumed to be suspect (Walsh & Betz, 1985). Thus, future research warrants revision of these subscales if they are to be used in data analyses.

Finally, future research in the area of research self-efficacy, research training, and productivity in counseling psychology also should focus on issues related to individual differences. A follow-up study on research training and research self-efficacy of ethnic minority students should be conducted to explore the reasons behind the lower levels of productivity that were observed in this study.

Implications for Research Training

Firm conclusions from this study and corresponding suggestions for research training are difficult to make for two reasons. First, because the relationships between specific components of the research training environment and research self-efficacy currently are undetermined, specific implications for research training also must remain undetermined. Second, the correlational nature of this study precludes suggestions for changing research training to causally affect research self-efficacy and productivity. However, the relationships between research self-efficacy and both overall perceptions of the research training environment and productivity do have some implications for research training. Faculty of counseling psychology graduate programs should recognize the relationships of the construct of research self-efficacy to both research training and productivity. One suggestion for research training involves the assessment of students' research self-efficacy upon entrance to graduate programs in counseling psychology.
This assessment could serve as a method for identifying areas that will require future attention in order to meet students' training needs more specifically. More explicit suggestions for research training will depend on the results of future research. If it is shown that the research training environment affects students' research self-efficacy which in turn affects their productivity, then factors in the research training environment that will increase students' self-efficacy can be determined. Thus, an optimal research training environment can be developed and the research productivity of the field of counseling psychology hopefully will be enhanced.

The implications of this study for admitting students to graduate programs in counseling psychology might appear to be to admit those students who have demonstrated high research self-efficacy in their previous education. However, the lack of structured research experience in undergraduate education does not lend itself to the acquisition of high research self-efficacy for most students. Furthermore, most students applying for graduate school are not purely investigative types. For these reasons, it would be wise for graduate programs to continue admitting students who demonstrate potential in both research and practice and to develop training programs that engender high research self-efficacy in students.

In conclusion, this study has contributed to the body of knowledge in the area of research training in counseling psychology graduate programs by confirming the hypothesized relationships between the construct of research self-efficacy and both perceptions of the research training environment and research productivity. Developmental differences
between students early and late in their graduate school careers on these three variables were identified, as were developmental differences in the hypothesized relationships between the variables of interest. Finally, reliability data were generated which added to the bodies of knowledge about the Research Training Environment Scale and the measurement of research productivity, and which provided an initial method for the assessment of research self-efficacy.
LIST OF REFERENCES


APPENDIX A

RESEARCH TRAINING ENVIRONMENT SCALE
Please note: We define research broadly. "Research" when used in this survey includes the following types of activities: designing and executing research projects, preparing manuscripts of a theoretical nature or a critical review of the literature, conducting program evaluations or needs assessments, making presentations at professional conferences, participating as a member of a research team engaged in any of the above activities, and advising the research projects of others.

Please respond to the following statements in terms of the doctoral program in which you are currently receiving your training. (Note: If you are currently on internship, please rate the program in which you were previously trained.) Consider each statement using the following scale:

1 disagree 2 somewhat disagree 3 neutral 4 somewhat agree 5 agree

PLACE YOUR RATING IN THE BLANK TO THE LEFT OF EACH ITEM.

1. In my graduate training program there are opportunities to be a part of research teams.

2. I was encouraged to get involved in some aspects of research early in my graduate training.

3. Our faculty seems interested in understanding and teaching how research can be related to counseling practice.

4. This training environment seems to promote the idea of science as a lonely and socially isolating experience.

5. Some of the faculty teach students that during a phase of the research process, it is important for the researchers to "look inward" for interesting research ideas.
6. Students in our program feel that their personal research ideas are squashed during the process of collaborating with faculty members, so that the finished project no longer resembles the student's original idea.

7. Many of our faculty do not seem to be very interested in doing research.

8. Choosing an advisor in this program also determines the methodology of one's study (e.g., field, laboratory, or survey), since faculty members are largely unwilling to consider alternatives to their preferred methodology.

9. In my research training, the focus has been on understanding the logic of research design and not just statistics.

10. I feel that I need to choose a research topic of interest to my advisor.

11. I have gotten the impression in my graduate training that my research work has to be of great value in the field to be worth anything.

12. In general, my relationship with my advisor is both intellectually stimulating and interpersonally rewarding. (If your advisor has been newly assigned or chosen, respond in terms of what you expect the relationship to be.)

13. Most faculty do not seem to really care if students are genuinely interested in research.

14. The faculty does what it can to make research requirements such as the thesis and dissertation as rewarding as possible.

15. Faculty members often invite graduate students to be responsible collaborators in the faculty member's own research projects.
16. When first or second year students collaborate with faculty or advanced students in research, they seem to end up doing much of the "dirty work" in the project.

17. My advisor is able to oscillate between the roles of thoughtful critic, on the one hand, and consultant/colleague who allows appropriate autonomy on the other.

18. Often it seems that our faculty does research mainly because it is a requirement for promotion, tenure, and/or pay raises at the University.

19. Faculty members in our counseling psychology program are willing to let students know about their struggles and failures in research and publication.

20. The faculty here only seem to notice a few selected students in terms of reinforcing scholarly achievements.

21. Many different research styles (e.g., field vs. laboratory) are acceptable in my graduate program.

22. There seems to be a general attitude that there is one best way to do research.

23. In my program the faculty members believe that we must be highly knowledgeable about statistics in order to do research.

24. My graduate training program has enabled me to see the relevance of research ideas to clinical service.

25. There is informal sharing of research ideas and feelings about research ideas in my program.

26. My graduate program has a formal way of recognizing the scholarly achievements of the students (e.g., in program meetings, in program newsletter).
27. The faculty does not seem to value clinical experience as a source of ideas for research.

28. It is unusual for first year students in this program to collaborate with advanced students or faculty in research projects.

29. The faculty members here are quite open in sharing their research with students.

30. Students in the program who are "go getters" in terms of research are not very well-liked by their peers.

31. A fairly clear message in my doctoral training environment is that every piece of research originates from hypotheses derived from existing theory (as opposed to personal experience).

32. I feel that my advisor expects too much from my research project.

33. The faculty members of my graduate program show excitement about research and scholarly activities.

34. There is a general impression around here that research and statistics are almost synonymous.

35. The faculty members of my graduate program enjoy discussing ideas.

36. The faculty members of my graduate program encourage me to pursue the research question in which I am interested.

37. Much of the research we become involved in prior to the thesis is organized in a way that is highly anxiety provoking to students.
38. Much of the research we become involved in prior to the thesis is intellectually challenging and stimulating.

39. My graduate program provides concrete support for graduate student research (e.g., typing manuscripts, travel money for making presentations, or free postage for mailing surveys).

40. Students are given the impression in my program that the "cookbook" use of statistics is inappropriate.

41. The faculty in my graduate training program is involved in the conduct and publication of high quality research (or theory).

42. The general view in my training program is that knowledge is best advanced through programmatic research.

43. Faculty members here teach students that any single experiment is inevitably flawed and limited.

44. My graduate program rarely acknowledges the scholarly achievements of students.

45. Students generally feel here that they are able to follow their own methodological preferences in designing research (provided that their preferences fit the question being asked).
Scoring the Research Training Environment Scale

Subscale 1: Faculty modeling of appropriate scientific behavior
Items: 7*, 15, 18*, 19, 29, 33, 35, 41

Subscale 2: Positive reinforcement of scholarly activities
Items: 13*, 14, 20*, 26, 30*, 39, 44*

Subscale 3: Early, low-threat involvement in research activities
Items: 2, 16*, 28*, 37*, 38

Subscale 4: Untie research from statistics
Items: 9, 23*, 34*, 40*

Subscale 5: Teaching students to look inward for research ideas
Items: 5, 6*, 10*, 31*, 36

Subscale 6: Research activities as a social experience
Items: 1, 4*, 12, 17, 25

Subscale 7: All experiments are inevitably flawed
Items: 11*, 32*, 42, 43

Subscale 8: Focus on varied investigative styles
Items: 8*, 21, 22*, 45

Subscale 9: Science is wed to clinical services
Items: 3, 24, 27*

*Items which are negatively worded

Divide each subscale total by the number of items comprising that subscale. The sum of these nine adjusted scores is the total RTES score.
APPENDIX B

SELF-EFFICACY IN RESEARCH MEASURE
The following items are tasks related to research. Please indicate your degree of confidence in your ability to successfully accomplish each of the following tasks on a scale from 0-9 with 0 representing no confidence and 9 representing total confidence.

| Task                                                                 | Confidence
|----------------------------------------------------------------------|-----------
| 1. Selecting a suitable topic for study                            |           |
| 2. Knowing which statistics to use                                 |           |
| 3. Getting an adequate number of subjects                          |           |
| 4. Writing a research presentation for a conference                |           |
| 5. Writing the method and results sections for a research paper for publication |           |
| 6. Manipulating data to get it onto a computer system               |           |
| 7. Writing a discussion section for a thesis or dissertation        |           |
| 8. Keeping records during a research project                       |           |
| 9. Collecting data                                                  |           |
| 10. Designing an experiment using non-traditional methods           |           |
| e.g., ethnographic, cybernetic, phenomenological approaches         |           |
| 11. Designing an experiment using traditional methods              |           |
| e.g., experimental, quasi-experimental designs                     |           |
| 12. Making time for research                                       |           |
| 13. Writing the introduction and literature review for a dissertation |           |
| 14. Reviewing the literature in an area of research interest        |           |
| 15. Writing the introduction and discussion sections for a research paper for publication |         |
16. Contacting researchers currently working in an area of research interest

17. Avoiding the violation of statistical assumptions

18. Writing the method and results sections of a dissertation

19. Using simple statistics e.g., t-test, anova, correlation, etc.

20. Writing the introduction and literature review for a thesis

21. Controlling for threats to validity

22. Formulating hypotheses

23. Writing the method and results sections of a thesis

24. Utilizing resources for needed help

25. Understanding computer printouts

26. Defending a thesis or dissertation

27. Using multivariate statistics e.g., multiple regression, factor analysis, etc.

28. Using statistical packages e.g., SPSS-X, SAS, etc.

29. Selecting a sample of subjects from a given population

30. Selecting reliable and valid instruments

31. Writing statistical computer programs

32. Getting money to help pay for research

33. Operationalizing variables of interest
APPENDIX C
ITEMS COMPRISING SERM SUBSCALES
Items Comprising SERM Subscales

Research Design Skills: Items 1, 10, 11, 21, 22, 29, 30, 33

Practical Research Skills: Items 3, 8, 9, 12, 16, 24, 26, 32

Quantitative and Computer Skills: Items 2, 6, 17, 19, 25, 27, 28, 31

Writing Skills: Items 4, 5, 7, 13, 14, 15, 18, 20, 23
APPENDIX D

DEMOGRAPHIC QUESTIONNAIRE
Demographic Questionnaire

Gender  ___ Female    ___ Male

Ethnicity  ___ African American  ___ Asian American
          ___ Caucasian    ___ Hispanic American
          ___ Native American    Other, please specify

Age  ______

Year in graduate school  ___ First    ___ Second    ___ Third
          ___ Fourth    ___ Fifth    ___ Sixth
          ___ Seventh, or beyond    ___ Intern

Please respond to the following questions about your experiences in research.

1. Master's Thesis Research:

   What is the current status of your thesis?

   ___ have not started working on thesis
   ___ in progress
   ___ completed and defended

   If your thesis is complete, when did you finish it? ________ month, year

2. Dissertation Research:

   What is the current status of your dissertation?

   ___ have not started working on dissertation
   ___ in progress
   ___ completed and defended

   If your dissertation is complete, when did you finish it? ________ month, year
3. Are you currently a member of an active research team?
   __ Yes __ No

4. Please indicate the number of articles which you currently have submitted for publication.
   __ 0 __ 1 __ 2 __ 3
   __ 4 __ 5 or more

5. Please indicate the number of articles which you have had published in scholarly journals.
   __ 0 __ 1 __ 2 __ 3
   __ 4 __ 5 or more

6. Please indicate the number of research presentations you have made at regional or national professional meetings or conferences eg., American Psychological Association Convention.
   __ 0 __ 1 __ 2 __ 3
   __ 4 __ 5 or more

8. Please briefly describe any other activities related to research that you are or have been involved in.
APPENDIX E

SCORING SYSTEM FOR RESEARCH PRODUCTIVITY
1. Master's Thesis Research:

What is the current status of your thesis?

(0) not currently working on thesis
(1) in progress
(2) completed and defended

If your thesis is complete, when did you finish it? ____________ month, year

2. Dissertation Research:

What is the current status of your dissertation?

(0) not currently working on dissertation
(1) in progress
(2) completed and defended

If your dissertation is complete, when did you finish it? ____________ month, year

3. Are you currently a member of an active research team?

(1) Yes       (0) No

4. Please indicate the number of articles which you currently have submitted for publication.

(0) 0       (1) 1       (2) 2       (3) 3
(4) 4       (5) 5 or more
5. Please indicate the number of articles which you have had published in scholarly journals.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(2) 1</td>
<td>(4) 2</td>
<td>(6) 3</td>
<td>(8) 4</td>
<td>(10) 5 or more</td>
</tr>
</tbody>
</table>

6. Please indicate the number of presentations you have made at regional or national professional meetings or conferences.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(1) 1</td>
<td>(2) 2</td>
<td>(3) 3</td>
<td>(4) 4</td>
<td>(5) 5 or more</td>
</tr>
</tbody>
</table>

7. Please briefly describe any other activities related to research that you are or have been involved in.
APPENDIX F

REPRESENTATIVE TEXT FOR COVER LETTER TO PARTICIPANTS
Dear Participant:

I am conducting a study on research training in counseling psychology. I am interested in the factors affecting student attitudes toward research. I hope you will take time to participate in the study.

Please do not put your name on your materials. All responses are completely anonymous. While I am collecting data from a number of different programs, programs will not be compared to one another in any way during data analysis.

Materials take approximately 15-20 minutes to complete. A self-addressed, stamped envelope is enclosed for return of the materials to me. Knowing the many demands on graduate students' time and energy, I want to thank you in advance for your cooperation!

If you are interested in receiving a summary of the results of the study, please write your name and address on the enclosed postcard and send it in the mail.

Sincerely,

Julia Phillips
APPENDIX G

REPRESENTATIVE TEXT FOR FOLLOW-UP LETTER TO PARTICIPANTS
Dear Participant,

A short time ago I requested your participation in a study on research training in counseling psychology.

I am writing to thank those of you who have returned the materials and to ask those of you who have not yet done so to please consider taking some time to help a fellow graduate student complete her dissertation.

I realize that the demands of graduate study on your time and energies are great. Many thanks!

Sincerely,

Julia Phillips, M.A.
The Ohio State University