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The Scholarly Activity Predictor Model among Counseling Psychology Doctoral Students: A Modification and Extension

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THE SCHOLARLY ACTIVITY PREDICTOR MODEL AMONG COUNSELING PSYCHOLOGY DOCTORAL STUDENTS: A MODIFICATION AND EXTENSION

by

Daniel M. Huber

A Dissertation Submitted to the Faculty of The Graduate College in partial fulfillment of the requirements for the Degree of Doctor of Philosophy Department of Counselor Education and Counseling Psychology Advisor: Eric M. Sauer, Ph.D.

Western Michigan University Kalamazoo, Michigan August 2010
The purpose of the current study was to help understand scholarly activity better among counseling psychology doctoral students. Two new variables were added to the previously created predictor model of scholarly activity: advisory working alliance and research competence. Three path analytic models were designed in the current study: (1) a primary hypothesized model, (2) an alternative model, and (3) a trimmed model. In the first model, grounded in social-cognitive career theory (SCCT) and the research training environment (RTE) theory, scholarly activity was hypothesized to be explained directly by research interests, research outcome expectations, research self-efficacy, research competence, and year in program. Through these mediator variables, it was expected that investigative interests, research training environment, and advisory working alliance would all indirectly explain scholarly activity. Data from 459 counseling psychology doctoral students were used to test the three path models. Model 1 was shown to be a "good fit" to the data and explained 17% of the variance in scholarly activity.

Model 2 was designed to provide a better understanding of where research competence belongs in the model. In Model 2, research competence was transitioned from an exogenous variable, as it was in Model 1, to an endogenous variable. Path analysis results revealed that Model 2 was a "poor fit" to the data. Because Model 1
was a better fit than Model 2, findings from Model 1 were used to create a trimmed model. The trimmed model was shown to be a better fit to the data than Model 1. Overall, the model explained 55% of the variance in research self-efficacy, 16% in research outcome expectations, 62% in research interests, and 18% in scholarly activity. Results provided strong support for SCCT and mixed support for RTE theory. Implications are discussed within the context of research training, and future research is suggested.
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TABLE OF CONTENTS

ACKNOWLEDGMENTS .................................................................................................................. ii

LIST OF TABLES ......................................................................................................................... x

LIST OF FIGURES ....................................................................................................................... xi

CHAPTER

I. STATEMENT OF THE PROBLEM ............................................................................................ 1

   Introduction .............................................................................................................................. 1

   Purpose of Study ...................................................................................................................... 3

   Theoretical Background .......................................................................................................... 4

      Social-Cognitive Career Theory .......................................................................................... 4

      Research Training Environment Model ............................................................................... 5

      Scholarly Activity Predictor Model .................................................................................... 7

   Current Hypothesized Scholarly Activity Predictor Model .................................................. 10

      Investigative Personality: A Predictor Variable ................................................................. 12

      Research Training Environment: A Predictor Variable .................................................... 13

      Advisory Working Alliance: A Predictor Variable ............................................................. 13

      Research Competence: A Predictor Variable ..................................................................... 14

      Year in Program: A Predictor Variable .............................................................................. 14

      Research Self-Efficacy: A Mediating Variable ................................................................... 15

      Research Outcome Expectations: A Mediating Variable .................................................. 16

      Research Interest: A Mediating Variable ............................................................................ 16
<table>
<thead>
<tr>
<th>SECTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scholarly Activity: The Outcome Variable</td>
<td>17</td>
</tr>
<tr>
<td>Outline of Hypothesized Interrelationships among Factors</td>
<td>18</td>
</tr>
<tr>
<td>II. LITERATURE REVIEW</td>
<td>23</td>
</tr>
<tr>
<td>Introduction</td>
<td>23</td>
</tr>
<tr>
<td>Variables that Provide a Framework for Research Training</td>
<td>24</td>
</tr>
<tr>
<td>Personality Characteristics</td>
<td>24</td>
</tr>
<tr>
<td>Underpinnings of personality characteristics</td>
<td>24</td>
</tr>
<tr>
<td>Personality characteristics of counseling psychology students</td>
<td>27</td>
</tr>
<tr>
<td>Empirical findings on personality characteristics</td>
<td>28</td>
</tr>
<tr>
<td>Research Training Environment</td>
<td>28</td>
</tr>
<tr>
<td>Underpinnings of research training environment</td>
<td>28</td>
</tr>
<tr>
<td>Empirical findings on the research training environment</td>
<td>32</td>
</tr>
<tr>
<td>Other Predictor Variables: Working Alliance, Research Competence, and Year in Program</td>
<td>34</td>
</tr>
<tr>
<td>Working Alliance</td>
<td>34</td>
</tr>
<tr>
<td>Underpinnings of the advisory working alliance</td>
<td>35</td>
</tr>
<tr>
<td>Empirical findings on the advisory working alliance</td>
<td>36</td>
</tr>
</tbody>
</table>
Table of Contents—continued

CHAPTER

Research Competence ......................................................... 38
  Underpinnings of research competence ............................... 38
  Empirical findings on research competence ......................... 39

Year in Doctoral Program ................................................. 39
  Underpinnings of year in doctoral program ......................... 39
  Empirical findings on year in doctoral program ................... 39

Variables that Serve as Mediators ........................................ 40

Research Self-Efficacy ....................................................... 40
  Underpinnings of research self-efficacy .............................. 40
  Empirical findings on research self-efficacy ....................... 40

Research Outcome Expectations ......................................... 41
  Underpinnings of research outcome expectations ................... 41
  Empirical findings on research outcome expectations ............ 42

Research Interests ............................................................ 43
  Underpinnings of research interests ................................ 43
  Empirical findings on research interests ............................ 43

Outcome Variable: Scholarly Activity ................................. 44
  Underpinnings of Scholarly Activity ................................ 44
  Empirical Findings on Scholarly Activity ........................... 45
CHAPTER

III. METHOD .......................................................................................................................... 48

Participants .......................................................................................................................... 48

Power Analysis ..................................................................................................................... 48

Preliminary Pool of Participants ......................................................................................... 48

Demographic Information of the Final Sample ................................................................... 49

Measures ............................................................................................................................... 51

Background Questionnaire ................................................................................................. 51

Investigative Interests .......................................................................................................... 52

Research Training Environment ......................................................................................... 53

Advisory Working Alliance—Student Version .................................................................... 55

Research Competence Scale .............................................................................................. 56

Self-Efficacy Research Measure—Short Version ................................................................ 57

Research Outcome Expectations Questionnaire ............................................................... 58

Interest in Research Questionnaire .................................................................................... 59

Scholarly Activity Scale ....................................................................................................... 60

Pilot Study ............................................................................................................................ 61

Procedure .............................................................................................................................. 61

IV. RESULTS ......................................................................................................................... 63

Introduction ........................................................................................................................ 63

Means, Standard Deviations, and Group Differences ......................................................... 63

Table of Contents—continued
## Table of Contents—continued

### CHAPTER

- Investigative interests .................................................. 65
- Research training environment ........................................ 65
- Advisory working alliance ............................................. 66
- Research competence .................................................. 67
- Research self-efficacy .................................................. 67
- Research outcome expectations ...................................... 68
- Research interests ..................................................... 69
- Scholarly activity ..................................................... 69

**Description of Analysis, Multivariate Normality, and Goodness of Fit Measures** .................................................. 71

**Test of Model 1** .......................................................... 74

**Test of Model 2: An Alternative Model** .......................... 77

**Model 3: A Trimmed Scholarly Activity Model via Post Hoc Analysis** .................................................. 79

### V. DISCUSSION ................................................................. 83

- Introduction ............................................................... 83
- Main Findings of Current Scholarly Activity Predictor Model .......... 83
- The Modified and Extension Variables .................................. 86
  - Research Competence .............................................. 86
  - Advisory Working Alliance ........................................ 88
Table of Contents—continued

CHAPTER

Findings from Current Models in Context of Theory ....................... 89
Social Cognitive Career Theory ............................................. 89
Research Training Environment ............................................. 91
Future Research, Limitations, and Implications .......................... 94
Future Research .................................................................. 94
Limitations ......................................................................... 95
Implications ....................................................................... 96
Conclusion .......................................................................... 98

APPENDICES

A. Letter to American Psychological Association ....................... 100
B. Background Questionnaire ................................................ 102
C. Human Subjects Institutional Review Board Approval Letter .... 104
D. Informed Consent ............................................................. 105
E. First Reminder Letter ........................................................ 107
F. Second Reminder Letter .................................................. 108

BIBLIOGRAPHY .................................................................... 109
LIST OF TABLES

1. Frequencies, Percentages, Means, and Standard Deviations for Scholarly Activity ................................................................. 70

2. Correlation Table for Variables in the Model 1, Model 2, and Model 3 .................................................................................................. 73
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Proposed Scholarly Activity Predictor Model: Primary Hypothesis</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>Alternative Scholarly Activity Predictor Model: Secondary Hypothesis</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>Model 1: Parameter Estimates among Exogenous Variables</td>
<td>74</td>
</tr>
<tr>
<td>4</td>
<td>Model 2: An Alternative Theoretical Model</td>
<td>78</td>
</tr>
<tr>
<td>5</td>
<td>Parameter Estimates for the Trimmed Model</td>
<td>80</td>
</tr>
</tbody>
</table>
CHAPTER I
STATEMENT OF THE PROBLEM

Introduction

Nearly six decades ago, in Boulder, Colorado, the scientist-practitioner (S–P) or the “Boulder” model of training was established as the ideal framework for training clinical psychology doctoral students (Baker & Benjamin, 2000; Corrie & Callahan, 2000; Frank, 1984; Maddux & Riso, 2007; Munley, Duncan, McDonnell, & Sauer, 2004; Overholser, 2007; Sauer & Huber, 2007). At the Boulder conference, clinical psychologists contended that science and practice should both receive equal attention in graduate training and be integrated by researchers and practitioners in their respective careers (Vespia & Sauer, 2006). Shortly after the Boulder conference, the field of counseling psychology endorsed the S–P model of training during its first major conference at Northwestern University (American Psychological Association, 1952). Since the Northwestern conference, the field of counseling psychology has either implicitly or explicitly reaffirmed its commitment to the Boulder model at all major counseling psychology conferences (Vespia & Sauer), including at the Greyston Conference in 1964 (Thompson & Super, 1964), the Atlanta Conference in 1987 (Gelso, Betz, Friedlander, Helms, Paton, Super, et al., 1988; Meara, Schmidt, Carrington, Davis, Dixon, et al., 1988), the Houston Conference in 2001 (Fouad, McPherson, Gerstein, Bluestein, Elman, et al., 2004), and the Chicago International Conference in 2008 (Neimeyer, 2008).

Despite the longstanding connection between the S–P model and counseling psychology, the model has been a source of much controversy since its onset, with most
of the controversy surrounding the viability of training students to be both practitioners and researchers (Gelso, 1979, 1993; Gelso, Raphael, Black, Rardin, & Skalkos, 1983). Given that the practice side of the S–P model is what tends to draw students to the field of counseling psychology and is more systematically taught than science (Gelso), it is no surprise that the majority of counseling psychology students are more interested in becoming practitioners than scientists (Betz & Taylor, 1982; Cassin, Singer, Dobson, & Altmaier, 2007; Fitzgerald & Osipow, 1988). Consequently, counseling psychologists generally spend more time practicing than conducting research after their doctoral training (Fitzgerald & Osipow, 1986; Krebs, Smither, & Hurley, 1991; Munley, Pate, & Duncan, 2008). When considering these two trends (i.e., practice draws students to the field and is more systematically taught than science), it makes sense that counseling psychology students, on average, publish less than one article while in school (Cassin et al.; Mallinckrodt & Gelso, 2002) and few counseling psychologists publish upon graduation, with a median and mode of zero (Barlow, 1981; Barrom, Shadish, & Montgomery, 1988; Brems, Johnson, & Gallucci, 1996; Krebs et al.; Royalty & Magoon, 1985).

Due to the low levels of research productivity, Gelso and his colleagues (1979, 1993, 1997; Gelso et al., 1988) have asserted for the past three decades that a need within the field of counseling psychology is to enhance practice and ensure the viability of the field by increasing the quality and quantity of research. Despite this longstanding assertion, only a relatively small amount of attention has been given to the research training of counseling psychology doctoral students (Gelso et al.; Kahn, 2001; Kahn & Scott, 1997). From the relatively few studies on research training, three studies could be
found that examined predictor models of scholarly activity among counseling psychology doctoral students (Hollingsworth & Fassinger, 2002; Kahn; Kahn & Scott). Out of these scholarly activity predictor models, the most comprehensive model only explained 17% of scholarly activity (Kahn). Therefore, 83% of the variation in scholarly activity among counseling psychology doctoral students remains unexplained.

**Purpose of Study**

The purpose of the current study was to gain a better understanding of the low amounts of scholarly activity among counseling psychology doctoral students by modifying and extending the most comprehensive scholarly activity model (i.e., Kahn, 2001). To serve this purpose, in the three sections that compose Chapter 1, I present a broad overview of the theoretical underpinnings that this dissertation draws from as well as the factors that are hypothesized to influence scholarly activity. First, to help understand low levels of research activity among counseling psychology doctoral students and to form the current hypothesized scholarly activity predictor model, theoretical underpinnings are discussed. Specifically, in this dissertation, I draw from social-cognitive career theory (SCCT; Brown & Lent, 1996; Lent & Brown, 1996; Lent, Brown, & Hackett, 1994), the research training environment model (RTE; Gelso, 1979, 1993, 1997), and the scholarly activity predictor model literature (e.g., Kahn & Scott, 1997). Second, predictor variables as well as the outcome variable are discussed and hypotheses for variables are described. Third, the interrelationships among factors for the hypothesized scholarly activity predictor model are outlined. In Chapter 2, I provide an extended review of the literature. Chapter 3 discusses the methods section for this study and Chapter 4 involves the results section. Finally, in Chapter 5, I situate the findings
from the current study in the context of the current literature as well as provide implications for research training in counseling psychology doctoral programs.

Theoretical Background

Social-Cognitive Career Theory

SCCT is grounded in Bandura's (1986) social cognitive theory and provides a conceptual model to help understand career and academic interests as well as behaviors (Lent et al., 1994). According to Bandura's theory, personal attributes (e.g., cognitions), the environment (e.g., peers around the individual), and human behavior (e.g., conversations the individual has with peers around him or her) mutually interact with one another to influence outcomes. Within this mutually interactive system, Bandura indicates that there are a variety of important psychosocial concepts (e.g., self-reflective processes) that influence outcomes.

Of these important psychological concepts, SCCT emphasizes four factors that are most pertinent to career and academic behaviors (e.g., research productivity): self-efficacy expectations, outcome expectations, interests, and goals (Lent et al., 1994). Self-efficacy expectations have been described as the beliefs about one's own ability to complete certain tasks (e.g., the confidence in one's ability to run a statistical analysis properly; Bandura, 1986; Lent et al.); outcome expectations involve the expected consequences of engaging in a certain task (e.g., having an expectation that publishing a manuscript will help your career; Bandura; Lent et al.); interests describe an individual's preferences for certain activities (Bandura); and goals are used to sustain behavior over time and are described as the decision to behave in a certain way or to influence an outcome (Bandura; Lent et al.). In relation to academic behaviors, in particular scholarly
activity levels, SCCT stipulates that individual and environmental factors interact and contribute to research self-efficacy and research outcome expectations, which ultimately impact scholarly activity (Lent et al.). Specifically, SCCT posits that: (a) students will have positive research outcome expectations if they perceive high levels of self-efficacy in their ability to complete research; (b) positive research outcome expectations will contribute to higher levels of research interests; in turn, (c) higher levels of research interest and research self-efficacy will contribute to goal setting that involves scholarly activity, and ultimately obtaining these scholarly activity goals (Kahn, 2001; Lent et al.). Whereas SCCT is a dynamic model focusing on the person-environment interaction (Lent, 2005), the next primary model that I draw from in this dissertation is called the research training environment (RTE) model and focuses solely on the training environment.

Research Training Environment Model

Gelso (1979, 1993, 1997) has conceptualized the RTE model to be all of the factors within the graduate training program, department, and academic institution that may influence students' research self-efficacy, research interests, and research productivity. For the past three decades, Gelso has theorized that students' research self-efficacy, interests, and productivity will increase to the extent that certain ingredients are implemented in the research training process of counseling psychology doctoral programs. Based on empirical research and experience, Gelso asserts that environmental factors (e.g., faculty modeling research behavior within the training environment) explain a much smaller percentage of scholarly activity than individual factors (e.g., investigative interests). Despite this assertion, Gelso reasons that it is still important to understand
even the small percentage that environmental factors contribute to a worthwhile outcome such as scholarly activity. To shape research attitudes, Gelso originally proposed ten ingredients in the RTE that are vital to the training process in graduate programs. More than a decade after creating the original list of training ingredients (see Chapter 2 for a list of the original ingredients), Gelso modified his RTE theory, based on empirical research (e.g., Royalty et al., 1986) and personal experience, resulting in nine vital ingredients (see Chapter 2 for a list of the modified ingredients).

Before researchers had much of an opportunity to examine and test the modified version of the RTE, Gelso (1997) modified the ingredients once again and presented the revised ingredients during the 1995 Leona Tyler Award Address (i.e., an award given by Division 17 to reward research and professional accomplishments). In the most recent version of the RTE model, based on factor analytic research (Kahn & Gelso, 1997), Gelso theorized that the research training environment is composed of nine key ingredients. Interpersonal and instructional factors were both found to be higher order factors for the nine ingredients (Kahn & Gelso). Interpersonal ingredients include: (a) faculty modeling appropriate research behavior; (b) students being positively reinforced for research endeavors; (c) minimally threatening research opportunities being offered early in programs; and (d) an emphasis on social aspects of research for individuals with social personalities. Instructional ingredients involve the: (a) emphasis on all studies being imperfect; (b) teaching of various research approaches; (c) importance of seeking research questions internally when students are developmentally prepared; (d) connection between science and practice; and (e) teaching of statistical and research design courses in a relevant manner (Gelso). Overall, the RTE has been an important variable in the
three scholarly activity predictor models that are outlined in the following section (e.g., Hollingsworth & Fassinger, 2002).

**Scholarly Activity Predictor Model**

Counseling psychologists began examining scholarly activity predictor models (i.e., models that include research-related variables that predict scholarly activity) a little more than a decade ago. Kahn and Scott (1997) originally examined the low levels of scholarly activity among 267 counseling psychology doctoral students. In their original model, predictor variables were: investigative interests (i.e., the student either likes or dislikes occupations that require investigative skills; e.g., chemist; Holland, 1997), social interests (i.e., the student either likes or dislikes occupations that require social skills; e.g., youth camp director; Holland), students perceptions of the RTE (Gelso, Mallinckrodt, & Judge, 1996), gender, and year in doctoral program; mediator variables were research interests (i.e., the student's interest in research; Kahn & Scott) and research self-efficacy (Kahn & Scott); outcome variables were research-related career goals (i.e., the student’s interest in pursuing a career in a research-related area; Kahn & Scott) and scholarly activity (i.e., the level of past and current involvement in research; Kahn & Scott).

Through the utilization of structural equation modeling, Kahn and Scott (1997) determined that the scholarly activity predictor model was a “very good fit” to the data (p. 58). In this original scholarly activity predictor model, there were many interrelationships among predictor, mediator, and outcome variables. First, higher scores on research self-efficacy expectations were directly and positively predicted by students’ stronger perceptions of the RTE, year in doctoral program, and gender (with men scoring...
higher than women). Second, higher scores on research interests were directly predicted by higher scores on measures of investigative interests, students' perceptions of the RTE, and research self-efficacy expectations. Third, higher scores on research interests predicted career goals that involved research. Fourth and most importantly, higher scholarly activity scores were explained by higher scores on measures of research interests, career goals, and year in doctoral program; 57% of the variation in scholarly activity was explained in this original predictor model.

Although the data from Kahn and Scott's (1997) scholarly activity predictor model were a good fit to the model, a few years later, Kahn (2001) determined that the model was missing some important constructs and that some of the constructs in the model were not important. Based on empirical evidence (e.g., Bishop & Bieschke, 1998), Kahn revised and refined the original scholarly activity predictor model with a sample of 149 counseling psychology doctoral students to create a more comprehensive predictor model. In this modified model, (a) predictor variables included investigative interests, perceptions of the RTE, relationship with mentor, and year in doctoral program; (b) mediator variables were research outcome expectations, research self-efficacy, and research interest; and (c) the outcome variable was scholarly activity. Like the original scholarly activity predictor model, results suggested the data from this model "provided a good overall fit" (Kahn, 2001, p. 351).

Similar to the original scholarly activity predictor model (i.e., Kahn & Scott, 1997), there were many indirect and direct relationships among predictor, mediator, and outcome variables in Kahn's (2001) modified model. First, results suggested that higher research self-efficacy expectation scores directly predicted stronger perceptions of the
RTE. Second, higher research outcome expectation scores directly predicted stronger perceptions of the RTE and higher scores on the measures of research self-efficacy and investigative interests. Third, higher research interest scores were directly predicted by stronger perceptions of the RTE and higher scores on measures of investigative interests and research outcome expectations. Fourth, mentoring relationship was the only variable that did not contribute to any research-related variables. Fifth, there was an indirect and positive relationship between RTE and scholarly activity through the mechanisms of research self-efficacy expectations and research interests. Sixth, research self-efficacy indirectly and positively predicted scholarly activity through the mechanism of research interests. Seventh, there was an indirect, positive relationship between investigative interests and research interests, with the primary mediating variable being research outcome expectations. Eighth, there was an indirect, positive relationship between RTE and research interests, with the primary mediating mechanism being research outcome expectations. Ninth, and most importantly, higher scores of scholarly activity were directly predicted by higher scores on measures of research interests, research self-efficacy, and year in doctoral program; the model explained 17% of the variation on scholarly activity. Although Kahn's model explained much less variance than the original model, the main difference is due to the fact that career goals were removed from the most-recent model since the variable was not conceptualized to fit within the scholarly activity predictor model.

In an attempt to gain a better understanding of the contributions that predictor variables had on scholarly activity, Hollingsworth and Fassinger (2002) more recently examined 194 counseling psychology students in their third or fourth year of their
doctoral program. Predictor variables of scholarly activity included in analyses were mentoring relationships along with gender, perceptions of the RTE, research mentoring experiences, research self-efficacy, and past attitudes toward research. Hierarchical regression analyses showed that stronger perceptions of the RTE as well as higher scores on measures of research self-efficacy and past research attitudes directly predicted scholarly activity. Furthermore, mentoring experiences mediated the relationship between perceptions of the RTE and scholarly activity. The hypothesized scholarly activity predictor model for the current dissertation is rooted in these three scholarly activity predictor models, with an emphasis on Kahn’s (2001) comprehensive model, as well as Gelso’s (1979, 1993, 1997) RTE theory and SCCT.

**Current Hypothesized Scholarly Activity Predictor Model**

The hypothesized predictor model in the current study was similar to Kahn’s (2001) comprehensive model, with the exception of two variables—one predictor variable was modified (i.e., mentoring relationship was replaced by the advisory working alliance) and another variable was added (i.e., research competence). Because not all students have a mentoring relationship and the mentoring relationship did not contribute to the most comprehensive predictor model to date (see Kahn, 2001), the mentoring relationship was replaced by the advisory working alliance, as every student has an advisor and qualitative data suggest the advising relationship is important to the research training process (Gelso, 1997). The concept of the advisory working alliance is an extension of the therapeutic and supervisory working alliances and has been defined as the “portion of the [advising] relationship that reflects the [interpersonal] connection
between advisor and advisee that is made during work toward common goals” (Schlosser & Gelso, 2001, p. 158).

Furthermore, counseling psychologists (Gelso & Lent, 2000; Heppner, Wampold, & Kivlighan, 2008; Kahn, 2001) have suggested that research competence, described as advisees’ research skills such as their ability to write, design a research study, and run statistical analyses, is the “missing construct” in Kahn’s most comprehensive scholarly activity predictor model (Heppner et al., p. 44); thus, research competence is a central research variable and was included in the current scholarly activity predictor model. Both advisory working alliance and research competence are central factors that may help explain variation in scholarly activity, ultimately helping us better understand low levels of scholarly activity among counseling psychology doctoral students.

With the exception of the added variable (i.e., research competence) and modified variable (i.e., advisory working alliance), predictor variables in the current hypothesized model were consistent with Kahn’s (2001) comprehensive scholarly activity predictor model. Specifically, predictor variables in the currently hypothesized model included students’ investigative interests, perceptions of the research training environment, year in doctoral program, advisory working alliance, and research competence; mediator variables included students’ research outcome expectations, research self-efficacy, and research interests; the outcome variable was students’ scholarly activity. A study of this nature is unique in three ways: first, the current study appears to be the first to examine the contributions of the advisory working alliance and research competence on scholarly activity. Second, this study appears to evaluate the most comprehensive scholarly activity predictor model to date in counseling psychology. Third, the study is the first
that involves a randomly collected sample of participants from most to all APA-accredited counseling psychology doctoral programs rather than recruiting participants from a selected number of programs.

Factors in the current hypothesized scholarly activity predictor model have received various amounts of empirical attention. A brief description of each factor is provided and hypotheses that are consistent with previous scholarly activity models (e.g., Kahn, 2001), SCCT, and RTE theory are delineated in the next section.

**Investigative Personality: A Predictor Variable**

Individuals with an investigative personality, as defined by Holland (1986, 1997), have an ability and interest in scientific and mathematic activities. Examples of adjectives that are used to describe individuals with investigative personalities include analytical, cautious, complex, critical, curious, and intellectual (Spokane & Cruza-Guet, 2005). Individuals who score higher on investigative measures have been shown to score higher on measures of research self-efficacy (Kahn, 2001; Kahn & Scott, 1997; Szymanski et al., 2007), research outcome expectations (Bishop & Bieschke, 1998; Kahn), research interests (Bishop & Bieschke; Kahn; Kahn & Scott; Szymanski et al.), and research productivity (Krebs et al., 1991; Mallinckrodt & Gelso, 2002; Mallinckrodt et al., 1990; Royalty & Magoon, 1985; Szymanski et al.). Despite the fact that previous studies have shown that higher levels of investigative personalities contribute to more research productivity (e.g., Mallinckrodt & Gelso), investigative personalities did not directly contribute to research activity in previous scholarly activity predictor models (e.g., Kahn & Scott). Drawing from this impressive body of literature as well as SCCT, I hypothesized that higher scores on investigative interests would be directly related to...
higher scores on measures of research self-efficacy, research outcome expectations, and research interests. In turn, research self-efficacy, research outcome expectations, and research interests were hypothesized to mediate the effects of investigative interests on scholarly activity.

**Research Training Environment: A Predictor Variable**

As previously described, the research training environment includes all of the ingredients in the training program, department, and academic institution that influence students’ research involvement (Gelso, 1979, 1993, 1997). In support of the RTE model, stronger perceptions of the RTE have been found to be directly related to higher scores on measures of research self-efficacy (Bishop & Bieschke, 1998; Hollingsworth & Fassinger, 2002; Kahn, 2001; Kahn & Scott, 1997; Phillips & Russell, 1994), research outcome expectations (Bishop & Bieschke; Kahn), and research interests (Bishop & Bieschke; Kahn; Kahn & Scott). In addition, perceptions of the RTE have been found to indirectly relate to research productivity through the mechanisms of research self-efficacy, research outcome expectations, and research interests (Hollingsworth & Fassinger; Kahn; Kahn & Scott). Drawing from these findings, I hypothesized that stronger perceptions of the RTE would be directly related to higher scores on measures of research self-efficacy, research outcome expectations, and research interests. In turn, research self-efficacy, research outcome expectations, and research interests were predicted to mediate the effects of perceptions of the RTE on scholarly activity.

**Advisory Working Alliance: A Predictor Variable**

The advisory working alliance concerns the degree to which advisees and advisors experience rapport in the relationship, advisees identify with or individuate from
advisors, and advisors mentor advisees (Schlosser & Gelso, 2001). In the few studies that have been done on the advisory working alliance, advisees’ perspectives of the working alliance has been found to be related to research self-efficacy, research interests, advising satisfaction, and desire to change advisors (Rice, Choi, Zhang, Villegas, Ye, Anderson, et al., 2009; Schlosser & Gelso; Schlosser & Kahn, 2007). Based on RTE theory and a small amount of empirical findings (e.g., Schlosser & Kahn), it is reasonable to expect that higher advisory working alliance scores directly contribute to higher scores on measures of research self-efficacy and research outcome expectations. In turn, research self-efficacy and research outcome expectations were expected to mediate the effects of advisory working alliance on research interests.

**Research Competence: A Predictor Variable**

Research competence has been described as the degree in which individuals have research skills and the ability to consume, conduct, and produce quality research (Heppner et al., 2008). When considering SCCT in the context of the academic training environment, research competence is theorized to enhance research self-efficacy and increase positive research outcome expectations, ultimately leading to more scholarly activity (Lent et al., 1994). Because research competence is such an important component in conducting research, I hypothesized that higher scores on research competence would directly contribute to higher scores on measures of research self-efficacy, research outcome expectations, research interests, and scholarly activity.

**Year in Program: A Predictor Variable**

Because students who are further along in their graduate studies have had more time to participate in research activities and develop more research competencies than
beginning students, it seems likely that they would have engaged in more research activity. This assertion has been supported in three studies that focused on counseling psychology doctoral students (Kahn, 2001; Kahn & Scott, 1997; Phillips & Russell, 1994). In particular, number of years in doctoral training was positively related to research productivity (Kahn; Kahn & Scott). Similarly, Phillips and Russell found that fourth and fifth year counseling psychology students produced more research than students in their first and second year. Drawing from these findings, I hypothesized that year in the doctoral program would positively and directly contribute to higher scores on scholarly activity.

**Research Self-Efficacy: A Mediating Variable**

In his social cognitive theory, Bandura (1977, 1986) describes self-efficacy as beliefs about one's own ability to complete certain tasks (e.g., the confidence in one's ability to run a statistical analysis properly). Furthermore, Gelso (1979, 1993, 1997) has theorized that students' research self-efficacy will be increased to the extent that key ingredients are implemented in the research training environment. In support of SCCT and the RTE model, psychologists have found that research self-efficacy mediates the relationships between perceptions of the RTE and (a) research interests (Kahn & Scott, 1997) as well as (b) scholarly activity (Hollingsworth & Fassinger, 2002). In accord with these findings and theories, I hypothesized that individuals with higher scores on investigative interests, stronger perceptions of the RTE, higher advisory working alliance scores, and higher scores on research competence would directly contribute to stronger research self-efficacy expectations. In turn, stronger research self-efficacy expectations
were predicted to directly contribute to higher scores on measures of: (a) research outcome expectations, (b) research interests, and (c) scholarly activity.

**Research Outcome Expectations: A Mediating Variable**

Whereas research self-efficacy concerns individuals' beliefs about their ability to successfully complete a research task, research outcome expectations involve the expected consequences of engaging in a research task (e.g., having an expectation that publishing a manuscript will help your career; Lent et al., 1994). In accord with SCCT, stronger perceptions of the RTE and higher scores on investigative interests have been found to contribute to more positive research outcome expectations (Bishop & Bieschke, 1998; Kahn, 2001). In turn, more positive research outcome expectations have been found to directly impact higher scores on measures of research interests and scholarly activity (Bishop & Bieschke; Kahn). Drawing from the SCCT and the small amount of research that has been conducted on research outcome expectations, I hypothesized that higher scores on investigative interests, perceptions of the RTE, advisory working alliance, research competence, and research self-efficacy would directly contribute to more positive research outcome expectations. In turn, more positive research outcome expectations were expected to directly contribute to higher scores on measures of research interest and scholarly activity.

**Research Interest: A Mediating Variable**

In his RTE theory, Gelso (1979, 1993, 1997) posited that a strong training environment will enhance research interests. Furthermore, SCCT stipulates that research interests are positively influenced by higher research self-efficacy expectations and more positive research outcome expectations, ultimately leading to higher levels of scientific...
behavior (Bishop & Bieschke, 1998; Gelso & Lent, 2000). Empirical evidence has found that stronger perceptions of the RTE directly predicts higher scores on research interests (Mallinckrodt, Gelso, Royalty, 1990) and higher research interests have been found to directly contribute to more involvement with scholarly activity (Kahn & Scott, 1997). Furthermore, research interests have been found to mediate the relationship between research self-efficacy and scholarly activity among counseling psychology doctoral students (Kahn & Scott). Based on empirical findings, the RTE model as well as SCCT, I hypothesized that higher scores on investigative interests, perceptions of the RTE, advisory working alliance, research competence, research self-efficacy expectations, and research outcome expectations would contribute to higher research interest scores; in turn, higher research interests scores were expected to directly contribute to more scholarly activity.

**Scholarly Activity: The Outcome Variable**

In the RTE model, Gelso (1993) had theorized that increasing research interest and research self-efficacy among counseling psychology students and graduates should result in more scholarly activity. Similarly, SCCT stipulates that enhancing research self-efficacy and research outcome expectations will ultimately lead to stronger levels of research performance through the mediating variable of research interests. In support of RTE and SCCT, Kahn (2001) found that higher scores on scholarly activity were explained by higher scores on research interest, research self-efficacy expectations, and year in doctoral program. Furthermore, research self-efficacy expectations, research outcome expectations, and research interests have all been found to mediate the relationship between perceptions of the RTE and scholarly activity (Hollingsworth &
Based on empirical findings, the RTE model, and SCCT, I hypothesized that higher scores on measures of research self-efficacy, research outcome expectations, research interests, and year in program would directly contribute to higher scores on scholarly activity. Although no research could be found concerning the contributions of research competence on scholarly activity, I expected that higher research competence scores would also directly contribute to higher scholarly activity scores. In the following section, the hypothesized scholarly activity predictor model for this dissertation is outlined.

Outline of Hypothesized Interrelationships among Factors

As suggested by Kline (2005), path analytic studies require researchers to delineate exogenous and endogenous variables. Exogenous variables are not predicted by any other variable whereas endogenous variables are dependent upon other variables in the particular model. In the current comprehensive scholarly activity predictor model, exogenous variables were: (a) investigative personality characteristics, (b) research training environment, (c) advisory working alliance, (d) research competence, and (e) year in program. The investigative personality characteristic was included in the model based on theory (Holland, 1986) and because there is a large body of literature that suggests higher scores on investigative interests are directly associated with higher scores on research-related variables (e.g., research self-efficacy; Szymanski et al., 2007). Similarly, students' perceptions of the research training environment was included based on Gelso's (1979, 1993, 1997) RTE model and because it has also been found to be positively associated with other research-related variables (e.g., research outcome expectations; Hollingsworth & Fassinger, 2002). Advisory working alliance replaced the
mentoring relationship variable that was used in a previous predictor model (Kahn, 2001) because: (a) the mentoring relationship did not contribute to mediating variables or scholarly activity; (b) all students have an advisor (whereas not all students have a mentor); and (c) the advising relationship has been shown to be an important part of the research training process for students in previous qualitative research (Gelso, 1997).

Research competence was included in the predictor model based on SCCT and because it has been deemed the "missing construct" in research training literature (Heppner et al., 2008, p. 44). Furthermore, year in program was chosen for this study because it has been found to predict research related-variables in past scholarly activity predictor models (e.g., Kahn; Kahn & Scott, 1997).

Endogenous variables included in the current predictor model were: (a) research self-efficacy expectations, (b) research outcome expectations, (c) research interests, and (d) scholarly activity. Research self-efficacy expectations, research outcome expectations, and research interests were included as mediating variables because they have been theorized and empirically found to mediate the relationships between perceptions of the research training environment and scholarly activity (Gelso, 1993, 1997; Kahn & Scott, 1997). Scholarly activity was the outcome variable in the model and is hypothesized to be explained directly and indirectly by predictor variables.

Drawing from a comprehensive literature review, I hypothesized that higher scores on the measure of investigative interests would directly explain higher scores on (a) research self-efficacy expectations, (b) research outcome expectations, and (c) research interests; more positive perceptions of the research training environment were expected to directly explain higher scores on measures of (a) research self-efficacy expectations,
(b) research outcome expectations, and (c) research interests; higher advisory working alliance scores were predicted to directly contribute to higher scores on measures of (a) research self-efficacy expectations and (b) research outcome expectations; higher scores on research competence were expected to directly contribute to higher scores on measures of (a) research self-efficacy expectations, (b) research outcome expectations, (c) research interests, and (d) scholarly activity; and year in doctoral program was hypothesized to directly and positively explain scholarly activity (see Figure 1).

Furthermore, I hypothesized that higher scores of research self-efficacy expectations would directly contribute to higher scores on measures of research outcome expectations, research interests, and scholarly activity; higher research outcome expectation scores were predicted to directly contribute to higher scores on measures of research interests and scholarly activity; and higher research interest scores were expected to directly explain higher scholarly activity scores.
Figure 1. Proposed Scholarly Activity Predictor Model: Primary Hypothesis

Given that path analytic procedures enable researchers to easily test for parsimony by comparing alternative models to the hypothesized model (Kline, 2005), an alternative model was proposed in this dissertation. In this alternative scholarly activity predictor model, research competence was transitioned from an exogenous variable to an endogenous, mediating variable (see Figure 2). As a result, direct and indirect predictors of scholarly activity were adjusted and are detailed in Figure 2.
Consistent with Kahn and Scott's (1997) scholarly activity predictor model, a final modified model was tested to "present the data in a succinct manner" after analyzing both the hypothesized and alternative scholarly activity predictor models (p. 55). The first two tested models were primary hypotheses whereas the third model was based on post hoc analyses.
CHAPTER II
LITERATURE REVIEW

Introduction

The field of counseling psychology has endorsed the scientist-practitioner (S–P) model of training since the Northwestern conference in 1952 (American Psychological Association, 1952). Although embracing the S–P model implies that science should receive an equal amount of time as practice in counseling psychology training programs and the two should be integrated in respective careers, a large body of evidence shows that counseling psychology doctoral students are more interested in practice (Cassin, Singer, Dobson, & Altmaier, 2007) and spend more time practicing than conducting research after graduating (Fitzgerald & Osipow, 1986; Krebs, Smither, & Hurley, 1991; Munley, Pate, & Duncan, 2008). Consequently, counseling psychology students, on average, publish less than one article while in graduate school (Cassin et al., 2007; Mallinckrodt & Gelso, 2002) and a small percentage of counseling psychologists publish after graduating (Barlow, 1981; Barrom, Shadish, & Montgomery, 1988; Brems, Johnson, & Gallucci, 1996; Krebs et al., 1991; Royalty & Magoon, 1985).

Given the low levels of research involvement found in counseling psychology training programs, Gelso (1979, 1993, 1997) has asserted for more than 30 years that the field of counseling psychology needs to enhance the research training environment (RTE) in order to increase the quality and quantity of research among counseling psychology students and graduates. Subsequently, Kahn and Scott (1997) created the original scholarly activity predictor model more than a decade ago to better understand the low levels of scholarly activity among counseling psychology students. Since the original
scholarly activity predictor model was devised, Kahn (2001) modified the original model and created a more comprehensive model. Shortly thereafter, Hollingsworth and Fassinger (2002; see Chapter 1 for results) examined the contributions of many research-related variables on scholarly activity—they were particularly interested in the influence of the mentor-mentee relationship on scholarly activity.

Given the fact that the most comprehensive scholarly activity model (i.e., Kahn, 2001) only predicted 17% of the variation in scholarly activity and research is needed to ensure the viability of the field, an updated model is desperately needed to better understand how research-related variables contribute to scholarly activity among counseling psychology doctoral students. Therefore, in this dissertation, I extended Kahn's comprehensive model by adding research competence and substituting mentoring relationships with advisory working alliance. To provide a thorough understanding of the literature concerning the current scholarly activity predictor model, predictor variables, mediating variables, and the outcome variable are reviewed in the present chapter.

Variables that Provide a Framework for Research Training

Personality Characteristics

Underpinnings of personality characteristics. John Holland has been writing about and conducting research on the person-environment fit in the field of vocational psychology for the past 50 years (i.e., Holland, 1959). In his theory, Holland (1997) described how individuals have personality characteristics that interact with environmental characteristics, resulting in individuals choosing and changing occupations based on a fit with the environment. Although Holland (1997) argued that most individuals bear resemblance to more than one personality characteristic, he suggested
individuals predominantly have one of the following six personality types: realistic, investigative, artistic, social, enterprising, or conventional. According to Holland, individuals with a particular personality type are described in the following manner: individuals with a realistic personality type are described as having mechanical abilities but they are usually lacking social skills; individuals with an investigative personality type are described as having strong mathematical and scientific abilities, but they often lack leadership ability; individuals with an artistic personality type are often musically and artistically inclined, but they often lack clerical skills; individuals with a social personality type often have strong interpersonal skills, but they usually lack the ability to engage in mechanical and scientific skills; individuals with an enterprising personality are often strong in leadership and speaking areas, but they lack scientific abilities; individuals with a conventional personality type are usually strong in clerical and arithmetic abilities but they lack artistic abilities. Because personality characteristics have been shown to have such a strong impact on research interests and productivity (e.g., Kahn, 2001), to increase research productivity among students, some psychologists argue that counseling psychology departments should only consider personality characteristics when selecting incoming students (e.g., Holland, 1986).

In accordance with Holland’s vocational psychology theory, the field of counseling psychology has a certain environment and attracts students with a consistent personality type (Holland, 1986). Specifically, Holland suggested that “counseling psychology has a clear identity—most people are service-oriented practitioners and trainers who have love-hate relationships with research activities” (p. 123). According to Holland, low research activity among counseling psychology students is explained by the
following four main functions. First, counseling psychology programs have been created by counseling psychologists who mainly have social personalities. Second, counseling psychology faculty mostly attract newer faculty members who have social personalities and some faculty members with enterprising and artistic personalities. Third, faculty members promote an atmosphere that is conducive to their own personality interests; that is, they generally promote social interests and not investigative interests. Fourth, counseling psychology faculty members attract students who mainly have social personality characteristics; therefore, students engage in mostly social activities during the program and seek careers that involve mostly service activities with little research demands. Based on these four functions and the fact that individuals with higher investigative interests are more likely to get involved with research (Kahn & Scott, 1997), it seems evident that something needs to change if counseling psychology students are going to produce more research.

To increase research interests and productivity, Holland (1986) asserted that counseling psychology programs “could simply reduce the number of students headed for service activities and increase the number with research interests and potential at entrance” (p. 124). In other words, if counseling psychology faculty members want students to engage in more scholarly activity, Holland suggests that most of the students who they admit should have investigative personality characteristics. Consistent with Holland’s suggestions, there has been an extensive amount of empirical evidence that indicates students with investigative personality characteristics engage in more research-related activities than students who predominantly have other personality characteristics (e.g., Mallinckrodt & Gelso, 2002). Given that the purpose of the current study was to
examine counseling psychology doctoral students, two articles concerning the personality characteristics of counseling psychology doctoral students are briefly described before reviewing empirical findings on investigative personalities in the research training literature.

**Personality characteristics of counseling psychology students.** As suggested by Holland (1986), the field of counseling psychology attracts students with certain personality characteristics. Betz and Taylor (1982) administered the Strong-Campbell Interest Inventory (SCII; Campbell, 1977 as cited in Betz & Taylor), a measure of personality characteristics, to 114 counseling psychology students. Results suggested that half of the students had predominately artistic personality characteristics, 30% had social personalities, 10% had investigative personalities, 8% had enterprising personalities, and 2% had realistic or conventional personality characteristics. In addition to the 10% of students who predominately had investigative personality characteristics, 50% of the students had investigative personality characteristics as either their second or third highest personality type. In a more recent study, Mallinckrodt, Gelso, and Royalty (1990) administered the Vocational Preference Inventory—Form B (Holland, 1978), another measure of personality characteristics, to 358 counseling psychology doctoral students. Paralleling the results of Betz and Taylor’s study, Mallinckrodt and his colleagues found that artistic personality characteristics were most common among counseling psychology doctoral students; social personality characteristics were the second most common followed by investigative personality characteristics. Hence, probably for a variety of reasons, it appears as though counseling psychology programs
are accepting more students with artistic and social personality characteristics than investigative personality characteristics.

**Empirical findings on personality characteristics.** Drawing from studies on personality characteristics (i.e., conventional, investigative, artistic, enterprising, social and realistic), there is an impressive body of literature that has shown that counseling psychology doctoral students with investigative interests score higher on many research-related measures (e.g., Krebs, Smither, & Hurley, 1991). Specifically, higher scores on measures of investigative interests have been shown to be directly related to higher scores on measures of research self-efficacy (Kahn, 2001; Kahn & Scott, 1997; Szymanski et al., 2007), research outcome expectations (Bishop & Bieschke, 1998; Kahn), research interests (Bishop & Bieschke; Kahn; Kahn & Scott; Szymanski et al.), research productivity (Krebs et al.; Mallinckrodt & Gelso, 2002; Mallinckrodt et al., 1990; Royalty & Magoon, 1985; Szymanski et al.), and more research-related coursework (Betz & Taylor, 1982). In contrast, higher scores on measures of social (Krebs et al.) and artistic interests (Bishop & Bieschke) have been found to be directly related to lower scores of research productivity. Given that investigative personality characteristics have consistently been shown to relate to research-related activities, it has been the primary personality characteristic included in previous scholarly activity predictor models (e.g., Kahn).

**Research Training Environment**

**Underpinnings of research training environment.** In contrast to Holland's argument concerning the selection of counseling psychology applicants based on personality characteristics, Gelso (1993) argues that the pool of applicants with
investigative personalities is quite small and it is not feasible for most students to have investigative personality characteristics. Furthermore, given that counseling psychology programs are seeking scientists as well as practitioners, Gelso and other counseling psychologists (e.g., Mallinckrodt, 1997) suggested that the student selection process is much more complex than simply choosing students with investigative qualities. Therefore, Gelso and Fretz (2001) asserted that students with a variety of personalities should be admitted to doctoral programs and "faculty who train counseling psychologists should do everything possible in the training situation to promote students continuing their research after obtaining the doctorate." (p. 56).

Despite Gelso and Fretz's (2001) assertion concerning student involvement in research, ambivalence about research activity and research capabilities among counseling psychology students and professionals has long been a concern for the field of counseling psychology (Gelso, 1979, 1993, 1997). According to Gelso (1979), most students believe they are interested in research activities when they begin doctoral programs, but they have not participated in enough research to be certain; in contrast, few students have a clear sense of their capability to conduct research. Due to these ambivalent feelings, Gelso posits that graduate school is the ideal setting to increase research interests and productivity by shaping students' attitudes in positive ways about research. If students adopt a more positive attitude about research during graduate school, Gelso asserts they will be more likely to engage in the research process throughout their careers.

To reduce ambivalence toward research and increase research interest, self-efficacy, and productivity, Gelso (1979, 1993, 1997) declared that major changes are needed within the research training environment. In 1979, Gelso theorized that attitudes
concerning research will be enhanced to the extent that: (a) appropriate scientific behavior is modeled by faculty; (b) scientific behaviors among students are positively reinforced; (c) non-threatening research is available early in the training program; (d) research design is taught independently from statistics; (e) students seek and develop research ideas internally; (f) faculty convey the social aspects of research that compliment the private aspects; (g) students understand that all studies are imperfect; (h) students learn a variety of research methodologies; (i) students connect research to practice; and (j) students learn about research in the context of psychological agencies (e.g., community mental health). With these ingredients in mind, researchers began empirically examining the impact of the graduate training environment on research-related factors (e.g., research interests) among students in counseling psychology departments (e.g., Royalty, Gelso, Mallinckrodt, & Garrett, 1986).

After Gelso (1979) proposed that these ingredients in the RTE are central to increasing research involvement, counseling psychologists compared the impact of students' perceptions of RTEs on scientific attitudes in ten counseling psychology programs (Royalty et al., 1986). Of the ten programs, two programs had research environments that positively impacted students' research attitudes (i.e., current interests in research and value placed on research throughout careers) significantly more than the other eight programs in five major areas. In these two programs with positive training environments, (a) faculty did a better job of modeling scientific behavior, (b) students were more positively reinforced for research, (c) scholarly work was less threatening and started earlier, (d) students had a better understanding that all studies are imperfect, and (e) science was more strongly connected to practice. In addition to these five ingredients
found to be important in the study done by Royalty and his colleagues, in 1993, Gelso added the following four ingredients in his modified RTE theory: (a) various research methodological approaches should be taught; (b) students should be taught to look inward for research questions when they are developmentally prepared, (c) programs should teach students how scholarly activity is conducted in practice settings; and (d) the interpersonal aspects of research are openly discussed with students who predominately have social interests.

Before researchers had much of an opportunity to examine and test the revised RTE theory, Gelso modified the ingredients once again in 1995 and discussed the reformulated ingredients during the 1995 Leona Tyler Award Address (i.e., an award given by Society of Counseling Psychology to acknowledge research and professional accomplishments; Gelso, 1997). Based on factor analytic research, Kahn and Gelso (1997) found that two higher order factors, interpersonal and instructional, comprise the most recently proposed ingredients of the RTE theory. Interpersonal ingredients of the reformulated model include: (a) faculty modeling appropriate research behavior; (b) students being positively reinforced for research endeavors; (c) minimally threatening research being offered early in programs; and (d) an emphasis on social aspects of research for students who predominately have social interests. Instructional ingredients involve: (a) an emphasis of all studies being imperfect, (b) teaching of various research methodologies, (c) the importance of seeking research questions internally rather than externally when students are developmentally prepared, (d) connecting science to practice, and (e) teaching statistical and research design courses in a relevant manner (Gelso, 1997). There is a growing body of literature in the field of counseling
psychology that has examined the impact of the RTE on students’ research self-efficacy expectations, outcome expectations, interests, and involvement (e.g., Kahn, 2001).

**Empirical findings on the research training environment.** The RTE theory has received an impressive amount of empirical attention over the past 30 years (e.g., Mallinckrodt et al., 1990). In the original scholarly activity predictor model, Kahn and Scott (1997) administered many research-related measures (e.g., research self-efficacy) to 287 counseling psychology doctoral students and found that stronger perceptions of the RTE directly contributed to higher scores on measures of research self-efficacy expectations and research interests and indirectly related to scholarly activity. In a more recent scholarly activity predictor model, Kahn (2001) administered many research-related measures to 149 counseling psychology doctoral students and found that stronger perceptions of the RTE directly contributed to higher scores on measures of research self-efficacy expectations, outcome expectations, and interests and indirectly contributed to scholarly activity. Based on these two models, it is clear that RTE positively influences scholarly activity and is an important variable to include in the currently hypothesized scholarly activity predictor model.

The specific ingredients of the RTE have received various levels of empirical support over the past 30 years. Royalty et al. (1986) administered an older version of the RTE instrument that measured the nine original ingredients to 358 students who were enrolled in ten counseling psychology doctoral programs. When considering students’ perceptions of the research training environment on an individual level, students who found the following ingredients to be more present in their training environment reported higher scores on a measure of research interest: (a) science is a partly social experience,
(b) all experiments are understood to be imperfect, and (c) science and practice are connected. More than 15 years later, Mallinckrodt and Gelso (2002) used archival data from Royalty et al.'s study concerning perceptions of the RTE and then entered the students' names into the PsycLIT database. After obtaining the number of current publications for the students who were involved in Royalty et al.'s study, Mallinckrodt and Gelso examined whether perceptions of the RTE during graduate school predicted current levels of research productivity. When including both men and women in the sample and controlling for students' research interests upon entering the doctoral program, the following ingredients predicted current research productivity: (a) reinforcement of student research, (b) science as a partly social experience, and (c) untying statistics from research. When gender was collapsed into female and male categories, (a) faculty modeling and (b) science as a partly social experience predicted research productivity for males whereas untying statistics from research predicted research productivity for females.

Shortly after Gelso (1993) revised the RTE theory, he and his colleagues (Gelso, Mallinckrodt, & Judge, 1996) created the Research Training Environment—Revised (RTE—R) to examine the revised set of ingredients. They administered the RTE—R, a research self-efficacy measure, and a research attitudes measure (i.e., a measure that examines research interests and value placed on conducting research in the future) to 173 graduate students from counseling, clinical, and school psychology doctoral programs. Gelso and his colleagues found that stronger perceptions in the training program for the following nine RTE ingredients were positively correlated with research self-efficacy as well as attitudes toward research: (a) faculty model scientific behavior, (b) students’
research involvement is positively reinforced, (c) students get involved with research early in the program in a minimally threatening way, (d) students look inward for research questions when developmentally prepared, (e) students are taught that science can be a social activity, (f) students are taught that all experiments are imperfect, (g) various research methodologies are taught, (h) science is connected to practice, and (i) students are taught that scholarly activity can be accomplished in all practice settings.

Despite the fact that Gelso revised the RTE ingredients once again in 1995 and an instrument was created to measure the most up-to-date version (Kahn & Gelso, 1997), no studies could be found that reported the correlations between the nine most current ingredients and research-related variables.

Based on the abundance of research on the RTE, it is becoming increasingly clear that the key ingredients only account for a small to moderate amount of variation in scholarly activity (Mallinckrodt & Gelso, 2002). Thus, researchers have begun examining other variables that may help predict scholarly activity levels (e.g., year in doctoral program) as well as variables that may mediate the relationship between RTE and scholarly activity (e.g., research self-efficacy expectations).

Other Predictor Variables: Working Alliance, Research Competence, and Year in Program

Working Alliance

The term working alliance was first used by Greenon in 1967, who agreed with Freud that positive collaborative efforts between the client and therapist is one of strongest contributors to therapeutic success. More than a decade later, Bordin (1979) broadened the psychoanalytic concept of the working alliance to encompass all psychotherapy relationships as well as other professional relationships (e.g., teacher-
student). The conceptualization of the working alliance focuses on (a) the emotional bond that is developed during collaborative work, (b) an agreement of goals, and (c) collaborative tasks that are completed to reach goals (Bordin). Shortly after developing his therapeutic working alliance model, Bordin (1983) created a supervision model that consisted of the same components as the therapeutic model. Over the past three decades, Bordin's conceptualization of the working alliance has been one of the most frequently researched topics in counseling psychology (Safran & Muran, 2006). Drawing from the numerous studies on the working alliance, the therapeutic working alliance has been linked to positive therapeutic outcome (for meta analyses, see Horvath & Symonds, 1991; Martin, Garske, & Davis, 2000). Similarly, the supervisory working alliance has been linked to supervisees' satisfaction with supervision (Inman, 2006) and counselor self-efficacy (Hanson, 2006). Within the past decade, Bordin’s concept of the working alliance has been generalized to the advisor-advisee relationship and is called advisory working alliance (Schlosser & Gelso, 2001).

Underpinnings of the advisory working alliance. Prior to 2001, the student-faculty relationship was mostly studied in terms of mentoring (Carden, 1990; Cronan-Hillix, Gensheimer, Cronan-Hillix, & Davidson, 1986; Willis & Diebold, 1997) rather than advising. The term mentor naturally has a positive connotation whereas the advisor role can be perceived as both positive and negative (Schlosser, Knox, Moskovitz, & Hill, 2003). After reviewing the definitions of mentor, Schlosser and Gelso (2001) did not believe that any adequately described the specific role of an advisor; therefore, they developed their own definition. Advisor has been defined as “the faculty member who
has the greatest responsibility for helping guide the advisee through the graduate program” (Schlosser & Gelso, p. 158).

Defining the term advisor paved the way for the advising relationship to be studied objectively and in a uniform manner. Because Schlosser and Gelso (2001) were interested in studying the specific component of the advising relationship that revolves around collaborative advisor-advisee efforts, they used Bordin’s (1979) theoretical contributions to help conceptualize the advisory working alliance. Given that an advisor and supervisor are both involved in a psychology training relationship (Efstation, Patton, & Kardash, 1990), the supervisor working alliance was used to guide the development of the advisory working alliance (Schlosser and Gelso). Therefore, paralleling the supervisory working alliance, the advisory working alliance is a construct that focuses on the agreement of goals between an advisor and advisee and collaborative efforts involved in achieving those goals. Rooted in this conceptualization, students’ perceptions of the advisory working alliance are composed of three components: rapport, apprenticeship, and identification-individuation (Schlosser & Gelso). Rapport reflects students’ perceptions of the interpersonal bond that is developed through collaborative efforts. Apprenticeship reflects the extent to which students perceive that their advisors are interested in enhancing their professional development. Identification-individuation reflects the extent in which students identify with their advisors. To date, only a few researchers have empirically examined the advisory working alliance (e.g., Schlosser & Kahn, 2007).

Empirical findings on the advisory working alliance. Although the advisory working alliance is an important research training variable, only a few studies could be
identified that examined advisees’ perceptions of the working alliance. In the first study, Schlosser and Gelso (2001) created the Advisory Working Alliance Inventory—Student version (AWAI—S). After creating the AWAI—S, they examined the relationships between advisees’ perceptions of the advisory working alliance, advisees’ research variables (e.g., research interests), and advisor qualities (e.g., trustworthiness) among 281 counseling psychology doctoral students. In this original study, Schlosser and Gelso found that advisees’ perceptions of the working alliance was positively related to advisors’ attractiveness, expertness, and trustworthiness; attitudes about research; research interests; and research self-efficacy. In the second study, Schlosser and Kahn (2007) measured both advisors’ and advisees’ perceptions of the working alliance as well as many other research-related variables among 47 advisor-advisee counseling psychology dyads. Advisees’ perceptions of the working alliance were positively related to advisors’ perceptions of the working alliance, the smoothness and quality of the past three advising meetings, and research self-efficacy expectations. Furthermore, advisees’ perceptions of the working alliance were positively related to advisors’ perceptions of (a) the benefits of advising and (b) students’ research competence; in contrast, advisees’ perceptions of the working alliance were negatively related to the advisors’ perceptions of the cost of advising (Schlosser & Kahn).

Given that the advisees’ perceptions of the working alliance were linked to positive research outcomes (e.g., research self-efficacy, Schlosser & Kahn, 2007), in the third study, Huber, Sauer, Mrdjenovich, and Gugiu (in press) attempted to gain a better understanding of advisees’ perceptions of the working alliance by examining the contributions of four predictor variables (i.e., anxious attachment, avoidant attachment,
frequency of meetings, and advisor-advisee pairing methods) on the working alliance among 109 counseling psychology doctoral students. Results from a mixed model regression analysis suggested that lower advisee anxiety attachment scores, lower advisee avoidance attachment scores, and advisees choosing their advisors (rather than being assigned) all contributed to stronger perceptions of the advisory working alliance from advisees' perspectives. Finally, in a fourth study, international students' perspectives of the working alliance were related positively to advising satisfaction and negatively to wanting to change advisors (Rice et al., 2009).

Research Competence

Underpinnings of research competence. Research competence has been described as the degree in which students have skills and the ability to consume, conduct, and produce high quality research (Heppner et al., 2008). To increase students' research competence and quality of research, Wampold (1986) suggested that counseling psychology students should be required to gain research experience in a systematic manner. First, Wampold suggested that students should be required to observe ongoing research projects. Second, students should take a research practicum course in which they practice research procedures with confederates. Third, Wampold suggested students should conduct their own research while being supervised. Fourth and finally, Wampold suggested that students should perform their own research and may seek out a post-doctorate experience to gain more specialized research experience. Given that research skills and ability are important for getting involved with research and the fact that only one study in the research training literature could be identified that examined research competence (e.g., Schlosser & Kahn, 2007), it is not surprising that research competence
has been considered the “missing construct” in the research training literature (Heppner et al., p. 44). In the context of the academic training environment, according to SCCT, increasing research competence will lead to higher levels of research self-efficacy and more positive outcome expectations.

Empirical findings on research competence. Although research competence has been theorized to be an important component of the research training environment (Heppner et al., 2008), only one study could be identified that examined research competence. In this identified study, Schlosser and Kahn (2007) created the Research Competence Scale to measure counseling psychology advisors’ perceptions of their advisees’ research competence. Research competence was found to be related to advisors’ and advisees’ perceptions of the advisory working alliance. Although little research has been conducted on research competence, it is crucial to insert this variable into the scholarly activity predictor model to better understand low levels of scholarly activity.

Year in Doctoral Program

Underpinnings of year in doctoral program. Students further along in their doctoral studies have had more time to get involved with research and develop research competencies. Hence, year in doctoral program has been included in previous predictor models of scholarly activity (e.g., Kahn & Scott, 1997). Year in program is most frequently assessed with a single self-report, continuous item that ranges from 1 (First year) to 5 (Fifth year and beyond).

Empirical findings on year of doctoral program. Year in doctoral program was included in two previous scholarly activity predictor models (e.g., Kahn & Scott,
In the original scholarly activity predictor model, year in program positively predicted higher scores on measures of research self-efficacy and scholarly activity (Kahn & Scott). Similarly, in Kahn's (2001) more recent scholarly activity model, year in program positively predicted higher scores on scholarly activity; however, it did not predict higher scores on research self-efficacy. In the next section, mediating variables are described that have been found to serve as a mechanism to connect predictor variables to scholarly activity.

**Variables that Serve as Mediators**

**Research Self-Efficacy**

**Underpinnings of research self-efficacy.** In his social cognitive theory, Bandura (1977, 1986) described self-efficacy expectations as the beliefs about one's own ability to complete certain tasks (e.g., complete a literature review). These beliefs are moderated by outcome expectations, or the imagined consequence of engaging in a certain task (Lent et al., 1994). Taken together, Bandura suggested that people engage in behavior based on their perceived abilities to complete a certain task and the imagined consequence that stems from engaging in a certain behavior. Hence, students may be more likely to get involved with research activities when they believe they have the ability to complete certain research tasks (e.g., a literature review) and will be positively reinforced for their behavior (e.g., a publication in a professional journal).

**Empirical findings on research self-efficacy.** Research self-efficacy expectations have been found to mediate the relationship between perceptions of the RTE and scholarly activity among counseling psychology students (Bishop & Bieschke, 1998; Brown, Lent, Ryan, & McPartland, 1996; Hollingsworth & Fassinger, 2002; Szymanski
et al., 2007). Furthermore, higher research self-efficacy expectation scores have been found to be directly related to other variables among counseling psychology students, including research interests (Bishop & Bieschke; Kahn & Scott, 1997), gender (i.e., men reported higher self-efficacy scores than women; Kahn & Scott), and year in program (Kahn & Scott). Similarly, in a study that focused on counseling and clinical psychologists, higher research self-efficacy expectations were found to be directly related to higher scores on measures of research interests and research outcome expectations (Szymanski et al.). Given that SCCT discusses research self-efficacy in connection with research outcome expectations, it is important to include both of them in the scholarly activity predictor model. Thus, research outcome expectation was included and is the next mediating variable to be reviewed.

**Research Outcome Expectations**

**Underpinnings of research outcome expectations.** Outcome expectations, in general, involve the costs and benefits an individual expects for engaging in a certain behavior (Bandura, 1977, 1986). Thus, in accord with SCCT in the context of research training, research outcome expectations concern the expected outcome of engaging in a particular research task (Lent et al., 1994). For example, if students believe they will be positively reinforced (e.g., receiving a research award) for submitting a manuscript to a journal, they will theoretically be more likely to submit the manuscript to the journal. Thus, it is ideal for counseling psychology programs to enhance positive research outcome expectations among students to increase research involvement. As previously mentioned, students' beliefs about their capability to complete a manuscript are related to outcome expectations and influence their behavior around submitting a manuscript to a
journal (Lent et al., 1994). Furthermore, SCCT also stipulates that research outcome expectations and research self-efficacy expectations will combine together to predict research interests better than either variable alone. Although research self-efficacy expectations has received more empirical attention in the research training literature than research outcome expectations, there is a growing body of literature on research outcome expectations (e.g., Kahn, 2001).

**Empirical findings on research outcome expectations.** Bishop and Bieschke (1998) conducted one of the original studies on research outcome expectations within the research training literature. With a sample of 184 counseling psychology doctoral students, Bishop and Bieschke examined investigative interests, perceptions of the RTE, research self-efficacy expectations, research outcome expectations, and research interests. Among other findings that are beyond the scope of this dissertation, Bishop and Bieschke found higher scores on measures of investigative interests, research self-efficacy expectations, and perceptions of the RTE directly predicted higher scores on research outcome expectations; in turn, higher scores on research outcome expectations predicted higher scores on interest in research. Similarly, in Kahn's (2001) comprehensive scholarly activity predictor model, students' perceptions of the RTE, investigative interests, and research self-efficacy expectations combined together to predict 20% of the variance in research outcome expectations. In turn, higher scores on research outcome expectations predicted higher scores on research interest, which is another important variable included in the currently hypothesized scholarly activity predictor model.
Research Interests

Underpinnings of research interests. Research interests have been conceptualized as an outcome variable (e.g., Bishop & Bieschke, 1998) as well as a mediating variable between other research-related variables (e.g., research training environment; Kahn, 2001) and scholarly activity (Gelso & Lent, 2000). Both the RTE model and SCCT suggest certain variables lead to stronger research interests. In his RTE theory, Gelso (1979, 1993, 1997) has asserted that research interests will be strengthened to the extent that specific ingredients in the research training environment (e.g., faculty modeling positive research behavior) are enhanced. In the context of SCCT, research self-efficacy expectations as well as positive outcome expectations are expected to lead to stronger research interests; in turn, stronger research interests are expected to contribute to more involvement with scholarly activity (Lent et al., 1994). To date, there has been an extensive amount of research that tests the contributions of research interests on other research-related variables.

Empirical findings on research interests. Research interests have been shown to directly and indirectly relate to many research-related variables among counseling psychology students (Gelso & Lent, 2000). For example, Bishop and Bieschke (1998) found higher scores on five variables directly predicted higher scores on research interests among counseling psychology students: (a) research outcome expectations, (b) research self-efficacy expectations, (c) investigative interests, (d) artistic interests, and (e) age. In the same study, three factors were indirectly related to research interests through the mechanism of research self-efficacy expectations: (a) research training environment, (b) investigative interests, and (c) year in program. Furthermore, in the original scholarly
activity predictor model (Kahn & Scott, 1997), higher scores on research interests were predicted by higher scores on investigative interests, perceptions of the RTE, and research self-efficacy expectations; in turn, higher research interest scores predicted scholarly activity. In Kahn's (2001) more recent scholarly activity predictor model, higher scores on investigative interests, perceptions of the RTE, and research outcome expectations predicted higher scores on research interests; in turn, higher research interest scores predicted more scholarly activity. Furthermore, research interests have been shown to mediate the relationships between the following predictor variables on scholarly activity: (a) perceptions of the RTE, (b) research self-efficacy expectations, (c) research outcome expectations, and (d) investigative interests (Kahn; Kahn & Scott). When considering these previous findings as well as SCCT and the RTE model, interests in research is an important variable to increase when attempting to promote research involvement in counseling psychology training programs.

**Outcome Variable: Scholarly Activity**

**Underpinnings of Scholarly Activity**

There are two commonly used outcome variables in the research training literature—research productivity and scholarly activity. The term *research productivity* has a narrow focus and has been conceptualized as either researchers’ number of professional publications (Krebs et al., 1991; Mallinckrodt & Gelso, 2002) or the number of publications in combination with professional presentations (Galassi, Brooks, Stoltz, & Trexler, 1986; Cassin et al., 2007). In contrast to this narrow conceptualization, *scholarly activity* has a broader conceptualization that encompasses researchers’ past and current research involvement (Barrom, Shadish, & Montgomery, 1988; Hollingsworth &
Fassinger, 2002; Kahn & Scott, 1997; Phillips & Russell, 1994). Past involvement includes a student's number of professional presentations and publications, whereas current involvement includes any work that is being completed to prepare a presentation or publication (e.g., collecting data; Kahn, 2001). A thorough review of the literature suggests that research productivity is most often used when measuring the productivity of counseling psychologists (e.g., Mallinckrodt & Gelso) whereas scholarly activity is more commonly used for samples of counseling psychology students (e.g., Kahn & Scott). Because the currently hypothesized scholarly activity predictor model involves counseling psychology doctoral students, scholarly activity was measured rather than research productivity.

**Empirical Findings on Scholarly Activity**

Within the research training literature, there have been a handful of studies conducted on either scholarly activity or research productivity of counseling psychology students (e.g., Hollingsworth & Fassinger, 2002). In one of these studies, Phillips and Russell (1994) measured the research self-efficacy expectations, perceptions of the research training environment, and research productivity of 125 counseling psychology doctoral students. Results from their study suggested that higher scores on research self-efficacy expectations predicted more research productivity and research-self-efficacy mediated the relationship between perceptions of the research training environment and research productivity. In addition, Phillips and Russell found that advanced doctoral students produced more research than beginning doctoral students. A few years later, Kahn and Scott (1997) created the original scholarly activity predictor model. In this original model, 57% of the variance in scholarly activity was explained by research
interests, career goals, and year in doctoral program. Shortly thereafter, Kahn (2001) created a more comprehensive model of scholarly activity. In the updated model, 17% of the variation in scholarly activity was explained by year in doctoral program, research interests, and research self-efficacy. In another study that focused on scholarly activity among counseling psychology doctoral students, Hollingsworth and Fassinger (2002) found that higher scores on measures of research self-efficacy expectations, past research attitudes, and research mentoring experiences directly predicted more involvement with scholarly activity. Furthermore, research self-efficacy and research mentoring experiences served as mediators between perceptions of the RTE and scholarly activity (Hollingsworth & Fassinger).

In addition to examining research productivity and scholarly activity on an individual level, researchers have examined these variables on a counseling psychology program level. Galassi and his colleagues (1986) compared programs that had students who produced high levels of research (based on number of publications and conference presentations) to programs that had students who produced low levels of research. Out of 41 counseling psychology programs, the 10 high research-producing programs in the study had a mean of 40.3% for students who presented posters at a conference and 26.9% who published manuscripts over a 1-year time span. In contrast, the 10 low research-producing programs had a mean of 6.5% for presented posters and 4.2% for publishing manuscripts. When comparing specific training areas between the high and low research-producing programs, Galassi and his colleagues found that the students in high research-producing programs reported higher scores on the following ingredients of the training environment: (a) the level of early research involvement; (b) the participation in research
teams; (c) the encouragement of scholarly work; and (d) the emphasis on the philosophy of science.

In a more recent study that was previously described in an earlier section, Mallinckrodt and Gelso (2002) compared the number of publications produced by counseling psychology graduates who attended a program that was placed in one of three research producing categories: low producing programs (i.e., two lowest research producing programs out of ten), moderate producing programs (i.e., next four producing programs), and high producing programs (i.e., highest four producing programs). In general, moderate research producing programs had students who reported higher scores than low producing programs on four ingredients found in the RTE: (a) faculty modeling, (b) positive reinforcement for research efforts, (c) early experience with research, and (d) teaching that all research is imperfect. When Mallinckrodt and Gelso compared high research producing programs to moderate producing programs, graduates from the high producing programs reported higher scores on the following ingredients of the RTE: (a) encouraging students to look internally for research questions, (b) disconnecting research from statistics, and (c) teaching a variety of investigative techniques. Based on these program evaluation studies, it seems clear that students who graduate from programs that effectively implement certain ingredients in the research training environment generally produce more research after graduating.
CHAPTER III

METHOD

Participants

Power Analysis

A power analysis was conducted to estimate the number of participants that were needed in the current study to ensure adequate power without collecting data from an unnecessary number of participants. Consistent with Kahn and Scott's (1997) original scholarly activity predictor model, effect sizes that were found in the literature ranged from small to large, with the smallest $R^2$ being .08. According to Cohen (1992), 91 participants are needed to detect a medium effect size when power is set at .80 for a five-predictor regression model (i.e., the maximum number of predictors in the current structural equation modeling) whereas 645 participants are needed to detect a small effect size. In addition, when considering adequate power in the context of path analytic studies, Kline (2005) suggested that the number of needed participants depends on the complexity of the model, but in general, a medium sample size is 100 and a large sample size for a complex model is at least 200 participants. When considering Cohen's and Kline's sample size guidelines concerning adequate power, I intended to recruit at least 300 participants to ensure adequate power without obtaining an unnecessary number of participants.

Preliminary Pool of Participants

Because response rates vary greatly for studies with methodologies that are similar to the current study (e.g., 51.7% in a study with a similar methodology concerning counseling psychology doctoral students; Huber et al., in press), I intended to ensure that
I obtained data from at least 300 participants by asking for many more participants than were needed. Thus, I originally asked the Research Office of the American Psychological Association (APA) for a randomly generated list of 1,000 names and addresses of counseling psychology doctoral students (see Appendix A for letter to APA). Shortly after receiving the original list of names, a second randomized list of counseling psychology doctoral students was requested, eventually leading to a total of 1300 potential participants, in order to ensure an adequate number of responses (i.e., at least 300) to analyze data.

Of the 1300 potential participants, responses were received from 547 individuals. Eighty-eight out of the 547 respondents were ineligible for one of the following reasons: 20 had graduated, 19 were attending non-APA accredited programs, 18 were enrolled in another subfield of psychology other than counseling (e.g., clinical), 13 were undeliverable, 9 were missing at least a page of data, 6 were reportedly ineligible and did not provide a reason, and 3 formally withdrew from their program. When removing the ineligible respondents, the final sample consisted of 459 doctoral students. After ineligible respondents from the preliminary list of 1300 individuals were removed, the response rate for the current study was 37.87%. This response rate is lower than response rates from studies with similar methodologies (48.5%; Levine & Schmelkin, 2006; 51.7%; Huber et al., in press).

**Demographic Information of the Final Sample**

The final sample consisted of 459 doctoral students who were attending APA-accredited counseling psychology programs that were located across the United States. Demographic information for the final sample in the current study was similar to
previous samples involving counseling psychology doctoral students (e.g., Kahn, 2001; Kahn & Scott, 1997). In the final sample, 354 (77.1%) students identified as a woman, 104 (22.7%) identified as a man, and 1 (.2%) identified as transsexual. The majority of students identified as Caucasian (313; 68.2%), 43 (9.4%) identified as African American, 42 (9.2%) identified as Asian/Pacific Islander, 34 (7.4%) identified as Latino or Latina, 25 (5.4%) identified as either biracial or multiracial, 1 (.2%) identified as American Indian/Alaska Native, and 1 did not specify her race. The majority of students identified as heterosexual (385; 83.9%), 39 (8.5%) identified as lesbian or gay, 20 (4.4%) identified as bisexual, 14 (3.1%) students preferred not to categorize themselves, and 1 (.2%) did not specify her sexual orientation. Age of participants ranged from 22 to 54 years old, and the average age was nearly 30 years old ($M = 29.9; SD = 5.6$).

Of the 459 participants, 40 students (8.7%) were in their first year of the doctoral program, 87 (19%) in the second year, 110 (24%) in the third year, 89 (19.4%) in the fourth year, 69 (15%) in the fifth year, and 64 (13.9%) beyond the fifth year. The majority of students had already earned their master’s degree (348; 75.8%), 91 (19.8%) were earning their doctoral degree without earning a master’s degree, and 19 (3.9%) were earning a master’s degree en route to the doctoral degree. In terms of relationship status, 200 (43.6%) students reported being single (i.e., never been married and not living with a partner), 169 (36.8%) were married, 75 (16.3%) were partnered (i.e., living together and not married), 13 (2.8%) were divorced, and 2 (.4%) were separated from their partner. More than half of the sample (66.7%) were student members of Division 17 (i.e., the division of Counseling Psychology), 150 students were not members (32.7%), 2 (.4%) did not specify, and 1 (.2%) was unsure.
Measures

Measures that were included in this dissertation all had adequate to strong reliability and validity, and they have all been used in previous studies on research training. Whenever possible, the measures that were used in Kahn and Scott's (1997) study were used in the current study for comparison purposes. The following measures were administered to participants: (a) background questionnaire (see Appendix B), (b) the Investigative subscale of the Vocational Preference Inventory—Form B (VPI—B; Holland, 1985), (c) Research Training Environment—Revised—Short Form (RTE—R—S; Kahn & Miller, 2000), (d) Advisory Working Alliance Inventory—Student Version (AWAI—S; Schlosser & Gelso, 2001), (e) a modified version of the Research Competence Scale (RCS; Schlosser & Kahn, 2007), (f) a brief version of the Self-Efficacy Research Measure (SERM; Phillips & Russell, 1994), (g) Research Outcome Expectations Questionnaire (ROEQ; Bishop & Bieschke, 1998), (h) Interests in Research Questionnaire (IRQ; Bishop & Bieschke), and (i) Scholarly Activity Scale (SAS; Kahn & Scott).

Background Questionnaire

The background questionnaire was used to ensure participants met criteria for the current study and to obtain demographic information. Background information included gender, age, ethnic identity, sexual orientation, and year in doctoral program. In addition, participants were asked if they have an advising relationship with a faculty member, if they were in a counseling psychology doctoral program, and if their program is APA-accredited.
Investigative Interests

The VPI–Form B (Holland, 1985) is a 42-item questionnaire that has been created to measure the degree to which six personality themes (i.e., realistic, social, conventional, enterprising, investigative, artistic) align with certain occupational descriptions. Of the personality themes, investigative personality characteristics have been theorized to be related to research training variables (Holland, 1986; Szymanski et al., 2007); consequently, the investigative subscale rather than other personality subscales is usually included in scholarly activity predictor models in counseling psychology studies (e.g., Kahn, 2001). The 7-items on the investigative subscale of the VPI–B require students to indicate whether or not they find investigative occupations, such as being a scientific research worker or chemist, interesting or appealing. Responses for the 7 items are scored as like or dislike. Therefore, the subscale has a possible range from 0 to 7, with higher scores representing stronger investigative interests.

Kucher-Richardson 20 (K-R 20) alpha coefficients for the investigative subscale have been found to range from .61 (Kahn & Scott, 1997) to .62 (Kahn, 2001) for counseling psychology doctoral students. In the current study, the K-R 20 alpha coefficient was .56, which is slightly lower than in previous studies. The mean investigative subscale score has been found to range from 2.39 (SD = 1.94, N = 184; Bishop & Bieschke, 1998) to 2.95 (SD = 2.17, N = 358; Mallinckrodt et al., 1990). The mean subscale score in the current study was 2.53 (SD = 1.70). Although no test-retest reliability coefficients could be found specifically for the investigative subscale, Mallinckrodt and his colleagues reported the test-retest reliability coefficients for the six personality subscales across a 2 week interval varied from .55 (Social) to .73 (Realistic).
The investigative subscale has been shown to discriminate between professionals (i.e., internal medicine residents) who preferred academic orientations versus practice orientations (Weil, Schleiter, & Tarlov, 1981). Furthermore, among counseling psychology doctoral students, higher scores on the investigative subscale of the VPI–B has been found to be related to higher scores on measures of research self-efficacy expectations, research outcome expectations, research interests, and research productivity (Bishop & Bieschke; Kahn; Kahn & Scott; Krebs, Smither, & Hurley, 1991).

**Research Training Environment**

The original Research Training Environment Scale (RTES; Royalty, Gelso, & Mallinckrodt, & Garrett, 1986) is composed of 45-items and was created to measure nine of the ten original ingredients (Gelso, 1979) that were proposed to impact students’ research interests and productivity. Since the original RTES was developed, the scale has been revised in 1991 (Gelso, Mallinckrodt, & Royalty, 1991), 1996 (Gelso, Mallinckrodt, & Judge, 1996), and 1997 (Kahn & Gelso, 1997) to reflect modifications in the RTE model. More recently, Kahn and Miller (2000) created a brief, 18-item measure of the RTES called the Research Training Environment—Revised—Short form (RTE-R-S).

Because efficient measurement was needed in the current study and the short form appears to be reliable and valid for counseling psychology students (Kahn & Miller, 2000), the RTES–R–S was administered to measure students’ perceptions of the research training environment. This short form has been found to predict 92% of the variation in the longer RTE scale and measures the nine most recently proposed training environment ingredients (Gelso, 1997). Specifically, the short form measures: (a) faculty modeling of
scientific behavior, (b) positive reinforcement of scholarly activities, (c) early involvement in research that is non-threatening, (d) seeing science as a social experience, (e) teaching relevant statistical and research design methods, (f) teaching students to look internally for research questions, (g) teaching that all studies are imperfect, (h) teaching a variety of investigative styles, and (i) connecting science to practice. Each ingredient is measured by 2-items and students are asked to rate the degree in which they perceive each item is occurring in their research training environment, with responses ranging from 1 (disagree) to 5 (agree). Scores from the items are summed and total scores can range from 18 to 90, with higher scores reflecting more positive perceptions of the research training environment. Sample items include: “Many of our faculty do not seem to be very interested in doing research” and “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.”

In samples of counseling psychology doctoral students, Cronbach’s alpha coefficients of the RTES-R-S have been found to range from .75 (Schlosser & Kahn, 2007) to .88 (Kahn & Miller, 2000). In the current study, Cronbach’s alpha coefficient for the RTES-R-S was .88 and the average composite score was 66.79 (SD = 12.24). Furthermore, in support of convergent validity, higher scores on the RTES-R-S have been found to be directly related to higher scores on measures of research self-efficacy, research interest, and investigative interests (Kahn; Kahn & Miller). In support of divergent validity, this short form of the RTES-R has been found to be unrelated to interests in practitioner activities (Kahn & Miller).
Advisory Working Alliance—Student Version

Drawing from the supervisory working alliance (Efstation, Patton, & Kardash, 1990), Schlosser and Gelso (2001) used factor analyses to create the Advisory Working Alliance—Student Version (AWAI–S). This scale is composed of 30-items and measures advisees’ perspectives of the core factors in the graduating advising process (Schlosser & Gelso). Consistent with the definition for advisor (Schlosser & Gelso), students were asked to rate their working alliance with the faculty member who assumed the greatest responsibility in guiding them through their graduate program. Responses range from 1 (Strongly disagree) to 5 (Strongly agree), with higher scores representing a stronger advisory working alliance. Composite AWAI–S scores can vary from 30 to 150. In addition to the total scale, there are three subscales: rapport (i.e., the degree to which the advisor and advisee have formed an interpersonal connection), apprenticeship (i.e., the extent in which the advisor facilitates the advisees’ professional development), and identification-individuation (i.e., the degree to which the advisee identifies with or individuates from the advisor). Sample items include: “My advisor welcomes my input into our discussions” and “My advisor is available when I need him/her.” Because I was only interested in the overall working alliance and not subscales in this dissertation, only the advisory working alliance composite score was included in data analyses.

The composite scale and its subscales have been shown to have high internal consistency (Huber et al., in press), with Cronbach’s alpha coefficients of .93 (composite scale), .89 (Rapport), .89 (Apprenticeship), and .80 (Identification-Individuation). In the current study, the composite scale had a Cronbach’s alpha coefficient of .95. Furthermore, each of the subscales have been shown to correlate moderately with one
another \( r = .62 \) to \( .72 \) and test-retest reliability coefficients for the composite scale has been found to be \( r = .92 \), with subscales ranging from \( r = .75 \) (Apprenticeship) to \( r = .92 \) (Identification-Individuation; Schlosser & Gelso, 2001). Convergent validity has been demonstrated among counseling psychology students, as evidenced by higher scores on the advisory working alliance from advisees’ perspectives being related to higher scores on measures of research self-efficacy, research attitudes, and smoothness and positivity of the past three advising sessions (Schlosser & Gelso; Schlosser & Kahn, 2007). In contrast, higher scores on the advisory working alliances have been found to be related to lower scores on a measure of advisors’ perceptions of advising costs (Schlosser & Kahn).

**Research Competence Scale**

Schlosser and Kahn (2007) created the Research Competence Scale (RCS) to measure advisors’ perspectives of advisees’ research competence. The RCS was derived from core research areas that counseling psychologists have theorized to be important for doctoral students such as research design and statistical areas (Forester, Kahn, & Hesson-McInnis, 2004; Heppner, Kivlighan, & Wampold, 1999; Wampold, 1986). Although the original RCS was created to measure advisors’ perceptions of advisees’ research competence, the scale can easily be modified to measure advisees’ perspectives (L. Z. Schlosser, personal communication, April 28, 2008). Thus, a slightly modified version of the RCS was used in the current study to measure advisees’ perceptions of their own research competence. Like the original RCS, the modified version is composed of 9-items that are rated on a 5-point scale ranging from 1 (Strongly disagree) to 5 (Strongly agree), with higher scores representing greater research competence. Composite scores
can range from 9 to 45. An example of an item is: “I have knowledge of qualitative research designs, such as grounded theory and consensual qualitative research.”

In a study that focused on counseling psychology doctoral students and advisors, the original RCS was shown to have strong internal consistency, with a Cronbach’s alpha coefficient of .86 (Schlosser & Kahn, 2007). Similar to the original RCS, which was designed to examine advisors’ perceptions of their students’ research competence, the Cronbach’s alpha coefficient for the current study, which examined students’ perceptions, was .77. The average research competence score from advisors’ perspectives (Schlosser & Kahn) was 34.9 ($SD = 5.4$) and the average research competence score in the current study was 35.2 ($SD = 4.77$). Based on this preliminary information, it appears as though the RCS may be modifiable to measure the advisees’ perspectives. In support of convergent validity, higher scores on the RCS have been found to be related to higher scores on measures of advisors’ and advisees’ perceptions of the advisory working alliance (Schlosser & Kahn).

**Self-Efficacy Research Measure—Short Version**

The Self-Efficacy Research Measure—Short Version (SERM-S; Kahn & Scott, 1997) is a shortened version of the 33-item Self-Efficacy Research Measure (Phillips & Russell, 1994) and has been created for efficiency reasons. This shortened scale is composed of 12-items and measures students’ research self-efficacy. The SERM-S is composed of four subscales that are each measured by 3-items as well as a composite scale. Subscales for the SERM-S are: (a) research design skills, (b) practical research skills, (c) quantitative and computer skills, and (d) writing skills. Only the composite score was used in the current study. Students were asked to rate their confidence in their
ability to successfully perform each research task or their belief that they possess the skill
to perform each research task. Responses to items range from 0 (No confidence) to 9
(Total confidence), and higher scores represent greater research self-efficacy. Composite
scores can range from 0 to 108. The average composite score in the current study was
80.11 (SD = 15.08). Sample items ask students to rate their confidence in: “Writing the
introduction and literature review for a dissertation” and “Using statistical packages.”

The SERM–S has been found to have strong internal consistency in samples of
counseling psychology doctoral students, with Cronbach’s alpha coefficients that have
consistently been at or above .89 (Kahn, 2001; Phillips et al., 1994; Schlosser & Kahn,
2007). The SERM–R had a Cronbach’s alpha coefficient of .90 in the current study.
Evidence of convergent validity has been found in the form of positive Pearson
correlations with advisory working alliance, research outcome expectations, research
training environment, attitudes toward research, research interests, and scholarly activity
(Bishop & Bieschke, 1998; Hollingsworth & Fassinger, 2002; Kahn; Kahn & Scott, 1997;
Schlosser & Kahn).

**Research Outcome Expectations Questionnaire**

The Research Outcome Expectations Questionnaire (ROEQ; Bishop & Bieschke, 1998) is used to measure students’ expected outcomes when engaging in scholarly
activity. This scale is composed of 20-items, resulting in a composite score. Among
these 20-items, 18 reflect positive outcomes and 2 reflect negative outcomes. For each
item, students are asked to rate their level of agreement with outcomes that are related to
conducting research. Responses to each item range from 1 (Strongly disagree) to 5
(Strongly agree), with higher scores reflecting more positive outcome expectations.
Composite scores can range from 20 to 100. The average composite score for the current study was 72.98 (SD = 11.26). Sample items include: “Involvement in research will enhance my job/career opportunities” and “Research involvement is valued by significant people in my life.”

The ROEQ has been shown to have strong internal consistency, with Cronbach’s alpha coefficients ranging from .55 (Kahn, 2001) to .90 (Bieschke, Bishop, & Herbert, 1995). Cronbach’s alpha coefficient in the current study was .90. Furthermore, there is support for convergent validity, as shown by positive Pearson correlation coefficients with research training environment, research self-efficacy, interests in research, and investigative interests (Bishop & Bieschke, 1998; Kahn).

**Interest in Research Questionnaire**

The Interest in Research Questionnaire (IRQ; Bishop & Bieschke, 1998) is used to measure students’ interests in engaging in research and is composed of 16-items, resulting in a composite score. For each item, students are asked to rate the degree in which they are interested in engaging in a particular research activity, with responses ranging from 1 (*Very disinterested*) to 5 (*Very interested*). Composite scores can range from 16 to 80, with higher scores reflecting stronger research interests. The average composite score in the current study was 52.89 (SD = 13.16). Sample items include the extent to which students are interested in “Conceptualizing a research study” and “Developing a data analysis.”

Among samples of counseling psychology doctoral students, the IRQ has been shown to have strong internal consistency, with Cronbach’s alpha coefficients ranging from .89 (Bishop & Bieschke, 1998) to .93 (Kahn, 2001). Cronbach’s alpha coefficient
in the current study was .93. Furthermore, convergent validity has been evidenced in the form of positive Pearson correlations with investigative interests, research self-efficacy, research outcome expectations, and scholarly activity (Bishop & Bieschke; Kahn).

**Scholarly Activity Scale**

In the current study, scholarly activity was conceptualized from a broad perspective and was measured by the Scholarly Activity Scale (SAS; Kahn & Scott, 1997). The SAS is composed of 9 open ended items that ask students to report their past and current involvement in a broad range of research activities. Sample items include: “For how many research projects are you currently collecting data?” and “How many presentations have you made at local, regional, or national conventions?” Consistent with previous scoring procedures (Kahn, 2001; Kahn & Scott), responses were dichotomized to reduce problems with skew. Specifically, a score of 1 indicated the student has had some involvement in particular research activity whereas a score of 0 reflected no involvement in the particular research activity. The 9-items were summed to create a composite score of scholarly activity. Composite scores can range from 0 to 9, with higher scores reflecting higher levels of past and current involvement in scholarly activity. The average composite score in the current study was 5.55 (SD = 2.06).

The SAS has been shown to have adequate internal consistency among samples of counseling psychology doctoral students, with K-R 20 alpha coefficients ranging from .68 (Kahn & Scott, 1997) to .73 (Hollingsworth & Fassinger, 2002). The K-R 20 alpha coefficient in the current study was .61, which is slightly lower than in previous studies. Convergent validity has been evidenced, as shown by positive Pearson correlations with perceptions of the research training environment, research self-efficacy, research
interests, science-relatedness of career goals, and year in doctoral program (Hollingsworth & Fassinger; Kahn, 2001; Kahn & Scott).

**Pilot Study**

Prior to mailing out questionnaires to potential participants from the randomly generated APA list, three students in the counseling psychology doctoral program at Western Michigan University (WMU) were asked to complete the survey in the current study. They were each given an informed consent and were informed that the data from their survey would not be included in data analyses for this dissertation. In addition to filling out the survey, the three students were asked to provide feedback concerning any unclear directions or unclear items and to provide an estimate of the time it took to complete the survey. Based on feedback from the three students, minor changes (e.g., a spelling error) were made to the survey before mailing it out to potential participants. On average, it took students in the pilot study 14 minutes to complete the survey, with a time range of 12 to 18 minutes.

**Procedure**

This dissertation was approved by the WMU Human Subjects Institutional Review Board before starting data collection (see Appendix C). In the present study, I targeted counseling psychology doctoral students who were enrolled in an American Psychological Association (APA) accredited program. Similar to previous mailing studies (e.g., Huber et al., in press; Levine & Schmelkin, 2006), a packet of materials was mailed to potential participants through surface mail. For the present study, a packet was mailed on two separate occasions. Each packet contained an informed consent (see
Appendix D), a survey with all research measures (see Appendix B for the background questionnaire), and a postage-paid return envelope.

After the first round of packets was mailed to potential participants, all non-responders were mailed a reminder letter 2 weeks later (see Appendix E). Two weeks after the reminder letter, I mailed another full packet to all non-responders. Two weeks after mailing the second packet, I mailed a final reminder letter to all non-responders (see Appendix F). After participants responded, they were removed from future mailings and were given a code number to maintain anonymity by separating their name from the data.

One month after the final reminder letter was mailed, all of the data from eligible participants were included in data analyses. Each participant in the final sample was enrolled in an APA-accredited counseling psychology doctoral program in the United States and had a faculty advisor who was responsible for guiding him or her through the graduate process. Eighty-eight respondents who did not meet eligibility criteria for the current study were removed from data analyses.
Chapter 4 is comprised of three sections. In the first section, I provide means and standard deviations for each predictor and outcome variable. Furthermore, group differences are described across gender and stage of doctoral program. The second section describes the analyses and results that are connected to the primary and alternative hypotheses (i.e., the primary scholarly activity predictor model and the alternative scholarly activity predictor model; see Figure 1 and Figure 2 in Chapter 1). The results from the primary and alternative scholarly activity predictor models were used to create a scholarly activity predictor model that was a better fit to the data than the primary and alternative models. Hence, the third section is used to describe post hoc analyses and the results that are connected to the third scholarly activity predictor model in this dissertation.

Means, Standard Deviations, and Group Differences

In this section, means and standard deviations of each variable are presented for the entire sample (N = 459) and then data are collapsed to compare group differences for each variable across gender and stage of doctoral program. Variables are described in the following order: investigative interests, research training environment, advisory working alliance, research competence, research self-efficacy, research outcome expectations, research interests, and scholarly activity. To situate current findings within the context of the literature, means were compared to the following studies because the same instruments were used as in the current study: Bishop and Bieschke (1998);
Hollingsworth and Fassinger (2002); Kahn (2001); Kahn and Scott (1997); Schlosser and Kahn (2007); Schlosser and Gelso (2001); and Szymanski, Jovanovic-Ozegovic, Phillips, Briggs-Phillips (2007). T-tests were used to compare means from the current study to means from previous studies and a level of \( p < .05 \) was used to test for significance. Type I error was not controlled for in these tests because analyses were done for comparison reasons only and not to test hypotheses.

Analyses for group differences were not designed to test data for a group that involves one individual. Thus, before comparing group differences for gender, data for the one individual who identified as transsexual were removed to reduce large differences in cell size. To test group differences between women and men, a series of eight independent T-tests were employed and a Bonferroni adjusted alpha level of \( p < .006 \) was used to test for significance. A Bonferroni adjusted alpha level was used to control for Type I error.

Consistent with procedures in previous research (Kahn and Scott, 1997), for stage of doctoral program, the year of doctoral program variable was collapsed into three categories: Beginning, Intermediate, and Advanced. Students who were in the first or second year fell into the Beginning category (\( n = 127 \)); students in the third or fourth year fell into the Intermediate category (\( n = 199 \)); students in the fifth year or beyond fell into the Advanced category (\( n = 133 \)). To test group differences across stage of doctoral program, eight univariate analyses of variance (ANOVA) were employed and a Bonferroni adjusted alpha level of \( p < .006 \) was again used to test for significance. When an ANOVA was found to be significant, a Scheffe test was employed on that specific variable to better understand the specific differences between the stages of doctoral
program. To control for Type I error, an alpha level of $p < .017$ (i.e., .05/3) was used to test for significance connected to the Scheffe tests.

**Investigative interests.** For the Investigative subscale of the Vocational Preference Inventory—Form B (VPI–B; Holland, 1985), a measure of investigative personality characteristics, students in the current sample had a mean of 2.53 ($SD = 1.70$, lowest score (LS) = 0, highest score (HS) = 7). Means from previous studies for the investigative subscale were: 2.45 ($SD = 1.54$; $N = 223$; Szymanski et al., 2007); 2.48 ($SD = 1.80$, $N = 149$; Kahn, 2001), 2.39 ($SD = 1.94$, $N = 184$; Bishop & Bieschke, 1998), and 2.51 ($SD = 1.87$, $N = 287$; Kahn & Scott, 1997). The mean in the current sample was not significantly different than the reported means from other studies. Furthermore, in the present study, there were no statistically different means for investigative interests across gender and stage of doctoral program.

**Research training environment.** For the Research Training Environment–Revised–Short Form (RTE–R–S; Kahn & Miller, 2000), a measure of students’ perceptions of their graduate training program, students in the current sample had a mean of 66.79 ($SD = 12.24$, LS = 29, HS = 89). Means from previous studies for the RTE–R–S were: 65.78 ($SD = 11.60$, $N = 149$; Kahn, 2001), 66.60 ($SD = 12.24$, $N = 223$; Szymanski et al., 2007); and 69.75 ($SD = 8.49$, $N = 47$; Schlosser & Kahn, 2007). The mean of the current sample was not significantly different than the mean of the first two aforementioned studies (i.e., Kahn; Szymanski et al.); however, students’ perceptions of the research training environment was significantly lower ($t (67) = 2.17, p < .05$) in the current sample than in the study conducted by Schlosser & Kahn.
In the present study, no significant differences in means between men and women were found for students’ perceptions of the research training environment. However, results from a one-way ANOVA showed that there were significantly different means for perceptions of the research training environment across stages of doctoral program ($F(2, 456) = 14.28, p < .001$). Findings from post-hoc Scheffe tests revealed that students in the beginning stage of the doctoral program had significantly stronger perceptions of the research training environment than students in the intermediate or advanced stages. There was not a significant difference in students’ perceptions of the research training environment between students in the intermediate stage and students in the advanced stage.

**Advisory working alliance.** For the Advisory Working Alliance Inventory—Student Version (AWAI–S; Schlosser & Gelso, 2001), a measure of the advisory working alliance from students’ perspectives, students in the current sample had a mean of 115.46 ($SD = 20.06$, $LS = 33; HS = 148$). Means from previous studies for the AWAI–S were: 111.67 ($SD = 21.54$, $N = 268; Schlosser & Gelso$) and 128.09 ($SD = 10.33$, $N = 47; Schlosser & Kahn, 2007$). The mean in the current sample was significantly higher ($t(527) = 2.35, p < .05$) than the mean in the study conducted by Schlosser and Gelso and significantly lower ($t(87) = 7.12, p < .001$) than the study conducted by Schlosser and Kahn.

In the present study, no significant differences in means between men and women were found for students’ perceptions of the advisory working alliance. However, results from a one-way ANOVA showed that there were significantly different means for perceptions of the advisory working alliance across stages of doctoral program ($F(2, $
Results from post-hoc Scheffe tests revealed that students in the beginning stage of the doctoral program reported significantly stronger advisory working alliances than students in the advanced stage of the doctoral program. No other significant differences were found for advisory working alliance across stages of doctoral program.

**Research competence.** For the modified version of the Research Competence Scale (RCS; Schlosser & Kahn, 2007), a measure of students' perspectives of their research skills, students in the current sample had a mean of 35.21 (SD = 4.77; LS = 9, HS = 45). The mean from the original study that measured research competence from advisors' perspectives was 34.91 (SD = 5.43, N = 47; Schlosser & Kahn). Although the current sample investigated advisees' perceptions of their own research competence, there was not a statistically different mean than in the study conducted by Schlosser and Kahn. Furthermore, in the present study, there were no statistically different means for students' perceptions of their research competence across gender or stage of doctoral program.

**Research self-efficacy.** For the brief version of the Research Self-Efficacy Measure (SERM; Phillips & Russell, 1994), a measure of students' beliefs about their research ability, students in the current sample had a mean of 80.11 (SD = 15.08, LS = 14, HS = 105). Means from previous studies for the brief version of the SERM were 78.64 (SD = 14.17, N = 47; Schlosser & Kahn, 2007), 86.76 (SD = 14.04, N = 223; Szymanski et al., 2007), 45.85 (SD = 7.46, N = 194; Hollingsworth & Fassinger, 2002), and 74.55 (SD = 16.46, N = 149; Kahn, 2001). The research self-efficacy mean in the current sample was not significantly different than in the study conducted by Schlosser.
and Kahn. However, it was significantly lower ($t(469) = 5.66, p < .001$) than the mean in the study conducted by Syzmanski et al. and significantly higher than the means in the studies conducted by Hollingsworth and Fassinger ($t(635) = 38.73, p < .001$) and Kahn ($t(234) = 3.66, p < .001$). In addition, in contrast to previous findings in which advanced students reported higher research self-efficacy than beginning and intermediate students and males reported higher research self-efficacy scores than females (Kahn & Scott, 1997), there were no statistical differences in means for research self-efficacy across gender or stage of doctoral program.

**Research outcome expectations.** For the Research Outcome Expectations Questionnaire (ROEQ; Bishop & Bieschke, 1998), a measure of students’ expected consequences for conducting research, the current sample had a mean of 72.98 ($SD = 11.26, LS = 28; HS = 98$). ROEQ means from previous studies were 85 ($SD = 15, N = 223$; Szymanski et al., 2007) and 71 ($SD = 11.4, N = 184$; Bishop & Bieschke, 1998). The current ROEQ mean was significantly lower ($t(347) = 10.60, p < .001$) than the mean in the study conducted by Szymanski et al. and significantly higher ($t(333) = 2.00, p < .05$) than in the study conducted by Bishop and Bieschke.

In the present study, no significant differences in means between men and women were found for research outcome expectations. However, results from a one-way ANOVA showed that there were significantly different means for research outcome expectations across stages of doctoral program ($F(2, 456) = 11.57, p < .001$). Results from post-hoc Scheffe tests revealed that students in the beginning stages of the doctoral program had significantly higher research outcome expectations than students in the
intermediate and advanced stages. In contrast, there were no significant differences in research outcome expectations for students in the intermediate and advanced stages.

**Research interests.** For the Interests in Research Questionnaire (IRQ; Bishop & Bieschke, 1998), students in the current sample had a mean of 52.89 ($SD = 13.16$, $LS = 18$, $HS = 80$). Means from previous studies for the IRQ were 55.17 ($SD = 12.46$, $N = 149$; Kahn, 2001) and 53.44 ($SD = 11.84$, $N = 184$, Bishop & Bieschke, 1998). The IRQ mean in the current sample was not significantly different than the means in either of the previous samples.

In the present study, no significant differences in means between men and women were found for students' interests in research. However, results from a one-way ANOVA showed that there were significantly different means for interest in research across stages of doctoral program ($F(2, 456) = 7.21, p = .001$). Similar to findings from Kahn and Scott (1997), students in the current sample who were in the beginning stage of their doctoral program had significantly more interest in research than students in the advanced stage. No other statistically different means were found for research interest across stages of training.

**Scholarly activity.** For the Scholarly Activity Scale (SAS; Kahn & Scott, 1997), a measure that examines research activity from a broad conceptualization, students in the current sample had a mean of 5.55 ($SD = 2.06$, $LS = 0$, $HS = 9$). This mean indicates that students, on average, had been involved with almost six of the nine measured research activities. See Table 1 for descriptive information about each scholarly activity item. Surprisingly, more than half of the participants had been involved or are currently involved in eight of the nine scholarly activity items. In contrast, less than half (40%) of
the students were currently preparing to submit a poster presentation. The mean of the SAS from a previous study was 3.95 ($SD = 2.30$, $N = 149$; Kahn, 2001). The SAS mean in the current sample was significantly higher ($t (230) = 7.56$, $p < .001$) than in Kahn’s sample. Furthermore, in the present study, there was not a statistically significant difference between the amount of scholarly activity produced by men and women. In addition, when considering stage of doctoral program, there were no significantly different means on scholarly activity.

Table 1

**Frequencies, Percentages, Means, and Standard Deviations for Scholarly Activity**

<table>
<thead>
<tr>
<th>Items</th>
<th>n</th>
<th>%</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Published manuscripts</td>
<td>250</td>
<td>54.5%</td>
<td>.54</td>
<td>.50</td>
</tr>
<tr>
<td>2. Unpublished empirical manuscripts</td>
<td>255</td>
<td>55.6%</td>
<td>.56</td>
<td>.50</td>
</tr>
<tr>
<td>3. Articles submitted</td>
<td>259</td>
<td>56.4%</td>
<td>.56</td>
<td>.50</td>
</tr>
<tr>
<td>4. Manuscripts in progress</td>
<td>263</td>
<td>57.3%</td>
<td>.57</td>
<td>.50</td>
</tr>
<tr>
<td>5. Presentations given</td>
<td>398</td>
<td>86.7%</td>
<td>.86</td>
<td>.34</td>
</tr>
<tr>
<td>6. Presentations in progress</td>
<td>185</td>
<td>40.3%</td>
<td>.40</td>
<td>.49</td>
</tr>
<tr>
<td>7. Conventions attended</td>
<td>416</td>
<td>90.6%</td>
<td>.90</td>
<td>.29</td>
</tr>
<tr>
<td>8. Data collection projects in progress</td>
<td>275</td>
<td>59.9%</td>
<td>.60</td>
<td>.49</td>
</tr>
<tr>
<td>9. Data analysis projects in progress</td>
<td>248</td>
<td>54%</td>
<td>.54</td>
<td>.50</td>
</tr>
</tbody>
</table>

$n = \text{number of participants who responded with at least 1 for the certain item}; \% \text{ of responses for participants who responded with at least 1 from the number of total participants (} N = 459).$
Description of Analysis, Multivariate Normality, and Goodness of Fit Measures

Three path models were tested in the current dissertation. The first path analysis was conducted to test Hypothesis 1; the second path analysis was conducted to test the alternative hypothesis and then it was compared to the first model. Findings from the first two models were used to guide the path connections in the third model, which was considered post hoc analyses in nature. To test the three path models, the PROC CALIS statement was used within SAS statistical software. PROC CALIS tests each model by applying the maximum-likelihood (ML) estimation procedural method, a method that has been the most commonly used in path analysis research (Martens, 2005).

Although multivariate normality is an assumption of the ML method (Quintana & Maxwell, 1999), one major strength of the ML method is the fact that it is somewhat robust against multivariate normality violations, particularly when the violations involve small deviations from normality (McDonald & Ho, 2002). In addition, Ullman (2006) has suggested to use the ML approach for non-normally distributed variables with sample sizes that are larger than 120. Despite the robustness of the ML approach in context of non-normally distributed variables, it is still important to test for normality and to acknowledge normality concerns (Martens). Based on the Ryan-Joiner test of normality (i.e., a normality test designed for correlational data), scholarly activity and investigative interests were both shown to be normally distributed. In contrast, results from the Ryan-Joiner tests indicated that research training environment, advisory working alliance, research competence, research self-efficacy, research outcome expectations, and research interests all slightly violated the normality assumption. Although the ML approach protects against normality deviations (McDonald & Ho; Ullman), especially small
deviations, there is still a chance of Type I error rates emerging (Powell & Shafer, 2001). Thus, given the fact most variables in the current study were not normally distributed, there was a higher chance of committing a Type I error for each tested model. Analyses from the path models provide results concerning the (a) magnitude of predicted relationships, (b) direction of predicted relationships, and (c) goodness-of-fit statistics. Consequently, after testing for multivariate normality, goodness-of-fit statistics are usually examined prior to reporting magnitude and direction of relationships among variables. Consistent with previous research, goodness-of-fit statistics that were chosen in the current study helped minimize Type I error.

*Goodness-of-fit* statistics are reported to provide information about how well each model fit the data. Based on recommendations from Hu and Bentler (1999), three goodness-of-fit indices that are commonly used to control for Type I and Type II error were used in the current dissertation. Specifically, to evaluate the fit of the three models, I used the Comparative Fit Index (CFI; compares the model to a model with no associations between variables; Bentler, 1990), the Standardized Root Mean Squared Residual (SRMR; average discrepancy between observed and expected correlations; Joreskog & Sorbom, 1993), and the Root Mean Square Error of Approximation (RMSEA; adjusts for parsimony in the model; Steiger, Shapiro, & Browne, 1985).

Findings from previous research suggest a *good* fit to the data is represented by a CFI that is greater than or equal to .95, a SRMR that is equal to or less than .08, and a RMSEA that is .06 or lower (Hu & Bentler, 1999). Each of these goodness-of-fit indices has a value that can range from 0 to 1. The three path analyses in this dissertation were based on the correlational matrix in Table 2. To evaluate significance among direct
effects, a \( p \) value for each test was obtained that was connected to each \( t \)-value. To evaluate significance among indirect effects (i.e., mediator effects), a \( p \) value (two-tailed alpha) for each test was obtained that was connected to a Sobel test statistic. For both direct and indirect effects, significant levels were based on \( p < .05 \).

Table 2

**Correlation Table for Variables in the Model 1, Model 2, and Model 3**

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Investigative Interests</td>
<td>.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Research Training</td>
<td>.22**</td>
<td>.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Advisory Working Alliance</td>
<td>.14**</td>
<td>.65**</td>
<td>.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Year in Program</td>
<td>-.04</td>
<td>-.23**</td>
<td>-.17**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Research Competence</td>
<td>.33**</td>
<td>.37**</td>
<td>.27**</td>
<td>.02</td>
<td>.86</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Research Self-Efficacy</td>
<td>.29**</td>
<td>.31**</td>
<td>.24**</td>
<td>.11*</td>
<td>.74**</td>
<td>.90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Research Outcome</td>
<td>.33**</td>
<td>.27**</td>
<td>.27**</td>
<td>-.19**</td>
<td>.32**</td>
<td>.27**</td>
<td>.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Research Interests</td>
<td>.47**</td>
<td>.29**</td>
<td>.27**</td>
<td>-.17**</td>
<td>.39**</td>
<td>.42**</td>
<td>.72**</td>
<td>.93</td>
<td></td>
</tr>
<tr>
<td>9. Scholarly Activity</td>
<td>.22**</td>
<td>.15**</td>
<td>.18**</td>
<td>-.02</td>
<td>.32**</td>
<td>.30**</td>
<td>.29**</td>
<td>.38**</td>
<td>.61</td>
</tr>
</tbody>
</table>

\( M \) = Mean of each variable; \( SD \) = standard deviation

\( p < .01 = **; p < .05 = * \)
Test of Model 1

For Model 1, CFI was .98, SRMR was .03, and RMSEA was .10. Hence, two of the three fit indices suggest that Model 1 is an overall "good fit." Although the RMSEA value was not within the limits that represent a "good fit", the 90% confidence interval included the value and suggests the model is a "fair" fit.

In support of Hypothesis 1, most of the predicted relationships were significant in Model 1. See Figure 3 for parameter estimates among exogenous variables. Due to space limitations within the model, level of significance for each parameter estimate is not indicated in Figure 3; parameter estimates of .11 and above, except for ROE to scholarly activity, are statistically significant.

Figure 3. Model 1: Parameter Estimates among Exogenous Variables
In support of *Hypothesis 1*, research competence (\( p < .01 \)), advisory working alliance (\( p < .05 \)), and research training environment (\( p < .05 \)) were significant and direct predictors of research self-efficacy. Specifically, stronger research competence, stronger advisory working alliances, and more positive perceptions of the research training environment were direct predictors of research self-efficacy. In contrast, investigative interest was not found to be a significant predictor of research self-efficacy. Overall, 48.5% of the variance in research self-efficacy was explained in Model 1. Predictors in this model explained substantially more variance in scholarly activity than Kahn's (2001) comprehensive scholarly activity predictor model. The insertion of research competence to the current model accounts for the large difference in explained variance of scholarly activity between the current model and the previous model (Kahn).

As expected, investigative interests (\( p < .01 \)), research competence (\( p < .05 \)), and research self-efficacy (\( p < .01 \)) directly and significantly predicted research outcome expectations. In particular, stronger investigative interests, stronger research competence, and higher levels of research self-efficacy were direct predictors of research outcome expectations. In addition to being a direct predictor, research competence (\( r = .13, p < .01 \)) also indirectly predicted research outcome expectations, with research self-efficacy being the mediator variable. In contrast to what was expected, students' perceptions of the research training environment and advisory working alliance were not found to significantly predict research outcome expectations. Overall, only 15% of the variance in research outcome expectation was explained. This is slightly lower than the amount of variance explained in a previous model (20%; Kahn, 2001).
In support of the first hypothesis, all variables that were expected to predict research interests were found to be significant. Research interests were directly and significantly predicted by research outcome expectations \( (p < .01) \), research self-efficacy \( (p < .01) \), investigative interests \( (p < .01) \), and research competence \( (p < .01) \). Specifically, research interest was predicted by higher levels of research outcome expectations, higher levels of research self-efficacy, stronger investigative interests, and lower levels of research competence. In this case, it appears as though there is a suppression effect between research competence and research interests. Although little can be done about a suppressor effect, it is important to acknowledge the presence of it. A suppression effect is likely to be present when there is a different sign between the bivariate correlation of two variables and the parameter estimate of the two variables (Kline, 2005). Furthermore, research self-efficacy served as a mediating variable between research interests and research competence \( (r = .24, p < .001) \), advisory working alliance \( (r = .05, p < .05) \), and research training environment \( (r = .04, p < .05) \). In addition, research outcome expectations served as a mediating variable between research interests and research competence \( (r = .08, p < .05) \), investigative interests \( (r = .13; p < .01) \) and research self-efficacy \( (r = .10, p < .01) \). Overall, these predictor variables explained 60.1% of the variance in research interests. This amount of variance is similar to a previous scholarly activity predictor model (i.e., 59%; Kahn, 2001).

Two variables that were expected to predict scholarly activity were found to be significant. In particular, higher levels of research interests \( (p < .01) \) and research competence \( (p < .01) \) were found to be direct predictors of scholarly activity. Contrary to expectations, research self-efficacy, research outcome expectations, and year in doctoral
program did not directly predict scholarly activity. In addition to directly impacting scholarly activity, research interest served as a primary mediating variable between scholarly activity and research competence \((r = -.04, p < .05)\), research outcome expectations \((r = .20, p < .001)\), research self-efficacy \((r = .12, p < .001)\), and investigative interests \((r = .07, p < .01)\). When considering direct and indirect effects, Model 1 predicted 17% of variation in scholarly activity. This model explained the same amount of variation in scholarly activity as Kahn’s (2001) model (17%).

**Test of Model 2: An Alternative Model**

Model 2 (see Figure 4 for parameter estimates) was created because researchers suggest testing more than one a priori theoretically derived model to determine if the alternative model provides a better fit to the data than the original model (Kahn, 2005, Martens, 2005). The primary change between Model 2 from Model 1 involved transitioning research competence from an exogenous variable to an endogenous variable. As part of this change, investigative interests, advisory working alliance, and year of doctoral program were expected to predict research competence. In turn, research competence was no longer hypothesized to predict research self-efficacy and research outcome expectations. Other than the changes involving research competence, predictions were consistent with Model 1. To help clarify, all parameter estimates in Model 2 that were .11 and above were significant.
To determine if Model 1 or Model 2 better fit the data, the chi-square from each model was computed and the difference between the two was tested for significance. In this case, the model with the lower chi-square is considered a better fit to the data than the other model. The chi-square statistic for Model 1 is 39.78 (df = 7) and the statistic for Model 2 is 333.15 (df = 10). Results ($\Delta \chi^2 (3) = 293.3$, $p < .001$) indicate that Model 1 is a much better fit to the data than Model 2. Similarly, all three goodness-of-fit indices indicate that Model 2 is a poor fit to the data (Hu & Bentler, 1999). Specifically, for Model 2, the CFI was .80, SRMR was .11, and RMSEA was .27. Because Model 2 had a poorer fit to the data than Model 1, a thorough description about direct and indirect
effects is not provided for Model 2. However, for comparison purposes with Model 1, the amount of explained variation for exogenous variables in Model 2 is reported.

In Model 2, predictors explained only 3% of the variance in research self-efficacy, 15% in research outcome expectations, 17% in research competence, 63% in research interests, and 14% in scholarly activity. Given the findings from the chi-square test in this section and the goodness of fit statistics for Model 2, it is not surprising that Model 2 explained less variance than Model 1 for four of the five exogenous variables.

Model 3: A Trimmed Scholarly Activity Model via Post Hoc Analysis

A trimmed model that is based on previous findings within this dissertation was generated for the purpose of parsimony. Because Model 1 was a significantly better fit to the data than Model 2, results from Model 1 were used to generate a trimmed model to help explain more variance in exogenous variables. Consistent with researchers who have previously conducted path analytic studies (e.g., Kahn, 2001; Kahn & Scott, 1997), any parameter coefficient in Model 1 that was lower than .1 was dropped from Model 3. For this dissertation, similar to research concerning previous scholarly activity models (Kahn, 2001), the chosen value of .1 was used because these relationships were not shown to meaningfully contribute to the expected exogenous variable. After dropping the parameter coefficients of .1 or lower, the trimmed model was tested (see Figure 5) by employing path analytic procedures.

Before examining the goodness-of-fit statistics and the relationships for Model 3, the model was compared to Model 1. To determine if Model 1 or Model 3 better fit the data, the difference between the two chi-square statistics was tested for significance. Again, the model with the lower chi-square is considered a better fit to the data than the
other model. The chi-square statistic for Model 1 is 39.78 (df = 7) and the statistic for Model 3 is 24.73 (df = 9). Although numerous paths were removed from Model 1 to form Model 3, results ($\Delta\chi^2 (2) = 15.05, p < .001$) indicated that Model 3 is a significantly better fit to the data. For Model 3, CFI was .99, SRMR was .05, and RMSEA was .06. Based on previous findings (Hu & Bentler, 1999), these fit indices all indicate that Model 3 is an overall "good fit." See Figure 5 for parameter estimates among variables.

Consistent with previous figures in this dissertation, significant effects are not indicated in Figure 5 because of the small amount of space in the figure; parameter estimates of .20 and above were statistically significant.

![Parameter Estimates for the Trimmed Model](image)

*Figure 5. Parameter Estimates for the Trimmed Model*

In Model 3, research competence ($p < .001$) was the only significant and direct predictor of research self-efficacy. Specifically, stronger research competence scores were direct predictors of research self-efficacy. When removing five paths, in contrast to Model 1, students' perceptions of the advisory working alliance and research training
environment both became non-significant predictors of research self-efficacy. Overall, it appears as though research competence is a very strong predictor of research self-efficacy, as the model explained almost 55% of the variance in research self-efficacy. Thus, Model 3 explained slightly more variance in research self-efficacy than Model 1 of the current study and substantially more variance than a previous scholarly activity predictor model (11%; Kahn, 2001).

Similar to Model 1, research outcome expectations were significantly and directly explained by investigative interests (\(p < .001\)) and research competence (\(p < .01\)). In particular, stronger investigative interests and stronger research competence were predictors of research outcome expectations. In contrast to Model 1, research self-efficacy did not significantly predict research outcome expectations. Also in contrast to Model 1, research competence (\(r = .04, p < .05\)) did not indirectly predict research outcome expectations in Model 3, mostly because research self-efficacy was a weak predictor of research outcome expectations. Overall, 16% of the variance in research outcome expectation was explained. This is slightly higher than the amount explained in Model 1 (i.e., 15%) and slightly lower than the amount of variance explained in a previous model (20%; Kahn, 2001).

Research interest was directly and significantly predicted by research outcome expectations (\(p < .001\)), research self-efficacy (\(p < .01\)), and investigative interests (\(p < .001\)). Specifically, research interest was predicted by higher levels of research outcome expectations, higher levels of research self-efficacy, and stronger investigative interests. Furthermore, research self-efficacy served as a mediating variable between research interests and research competence (\(r = .17, p < .05\)). In addition, research outcome
expectations served as a mediating variable between research interests and research competence \((r = .12, p < .01)\) and investigative interests \((r = .16; p < .001)\). Overall, direct and indirect predictor variables explained 62% of the variance in research interests. This amount of explained variance is slightly higher than the amount explained in both Model 1 (60%) and a previous scholarly activity predictor model (i.e., 59%; Kahn, 2001).

Consistent with Model 1, two variables significantly and directly predicted scholarly activity. In particular, higher levels of research interests \((p < .01)\) and research competence \((p < .01)\) were found to be direct predictors of scholarly activity. In addition to directly impacting scholarly activity, research interest served as a primary mediating variable between scholarly activity and research outcome expectations \((r = .18, p < .001)\), research self-efficacy \((r = .07, p < .001)\), and investigative interests \((r = .06, p < .001)\). These direct and indirect predictors explained 18% of variation in scholarly activity. This third model explained slightly more variation in scholarly activity than both Model 1 (i.e., 17%) of this dissertation and Kahn’s (2001) model (i.e., 17%).
CHAPTER V
DISCUSSION

Introduction

The scholarly activity predictor model in this dissertation appears to be the most comprehensive model to date and builds upon existing research training and outcome literature (Kahn, 2001; Kahn & Scott, 1997), social cognitive career theory (SCCT; Lent et al., 1994), and research training environment theory (RTE; Gelso, 1979, 1993, 1997). Given that the most comprehensive scholarly activity predictor model (Kahn) only explained 17% of the variation in scholarly activity, the purpose of the current study was to extend previous models of scholarly activity (e.g., Kahn; Kahn & Scott) to potentially explain more variance in scholarly activity. Explaining more variance may provide a better understanding of variables that contribute to scholarly activity and may provide a strong framework to guide future research and research training practices. Chapter 5 is composed of five main sections. First, the main findings of the current scholarly activity predictor model are discussed. Second, findings are reviewed concerning the variables that extend previous models, research competence and advisory working alliance. Third, SCCT and RTE theory are described in context of current findings. Fourth, future research is suggested and limitations to the current study are addressed. Fifth, implications are discussed within the context of research training and for counseling psychology programs.

Main Findings of Current Scholarly Activity Predictor Model

The originally tested model in this dissertation built on the most recent scholarly activity predictor model (Kahn, 2001) by including two relatively new research training
variables, research competence and advisory working alliance. Two *goodness-of-fit* indices from this original model revealed that the model was a “good fit” to the data and the third goodness-of-fit index reflected a “fair” fit (Hu & Bentler, 1999). Results from this model indicated that 17% of the variance in scholarly activity was directly or indirectly explained by investigative interests, research competence, research self-efficacy, research outcome expectations, and interests in research. Furthermore, analyses revealed that advisory working alliance and research training environment also added to the model above and beyond the other predictor variables. However, students’ year of doctoral program did not uniquely contribute to the model.

Because research competence was a new variable and it was unclear where it fit in the model, an alternative model (Model 2) was designed and it was transitioned from an exogenous variable to an endogenous variable. *Goodness-of-fit* indices revealed that Model 2 was a “poor fit” to the data. Similarly, Model 2 only predicted 14% of the variance in scholarly activity and was shown to be inferior to Model 1. Consistent with previous path analytic studies (Kahn, 2001, Kahn & Scott, 1997; Martens, 2005), paths that did not substantially contribute to the strongest hypothesized model were dropped to create a more parsimonious model. Because Model 1 was shown to be a better predictor of scholarly activity, it was used to guide the creation of the trimmed model (i.e., Model 3). Results for the trimmed model are reviewed.

Based on the strength of path estimates from Model 1, three paths were predicted to explain the variance in research self-efficacy. As expected, research self-efficacy was directly predicted by research competence. However, students’ perceptions of the research training environment and advisory working alliance failed to attain statistical
significance. Given that research competence was the only significant predictor of research self-efficacy, it was found to be a powerful predictor and the model explained 55% of the variance in research self-efficacy. This trimmed model accounted for slightly more variance in research self-efficacy than Model 1 (i.e., 48%) of the current study and substantially more than in previous studies, with explained variances ranging from 11% to 23% (Kahn, 2001; Kahn & Scott, 1997).

Three predictor variables were expected to explain the variance in research outcome expectations. As expected, investigative interests interacted with research competence to explain research outcome expectations. In contrast, research self-efficacy did not account for a significant amount of variance in research outcome expectations. Overall, the trimmed model accounted for 16% of the variance in research outcome expectations, an amount that is slightly higher than Model 1 (i.e., 15%) and lower than Kahn's (2001) most recent model (20%).

Research interest was directly explained by investigative interests, research self-efficacy, and research outcome expectations and indirectly explained by research competence (via research-self-efficacy). In contrast, research competence did not directly contribute to research interests. This trimmed model explained 62% of the variance in research interest, which is higher than previous models (i.e., 33% to 60%; Kahn, 2001; Kahn & Scott, 1997) and the amount of variance predicted in Model 1 of this dissertation (i.e., 60%).

Based on Model 1, two variables directly and significantly predicted scholarly activity. As predicted, scholarly activity was explained by research interests and research competence. Contrary to expectations, it was not directly predicted by research self-
efficacy and research outcome expectations. However, research outcome expectations and research self-efficacy both indirectly explained scholarly activity along with investigative interests and research competence. Overall, this trimmed model explained 18% of the variation in scholarly activity, which is slightly more than the amount explained in Model 1 of the current study and in Kahn's (2001) model. To better understand relationships within the model, the newly added variables and corresponding paths are described in the next section.

**The Modified and Extension Variables**

The current scholarly activity predictor model extended the scholarly activity literature by (a) inserting research competence into the model and (b) modifying mentoring relationships with advising relationships. Counseling psychologists have long theorized that both of these variables are important contributors to research training and outcome (Gelso, 1979; Heppner, Wampold, & Kivlighan, 2008; Schlosser & Gelso, 2001). Furthermore, SCCT (Lent et al., 1994) suggests students' research competence may enhance research self-efficacy and research outcome expectations, ultimately leading to more involvement with research. Given that there have been instruments created over the past decade to measure research competence and advisory working alliance, it seemed crucial to insert them into the model to potentially better explain scholarly activity.

**Research Competence**

As has been theorized for more than a decade (Heppner, Kivlighan, & Wampold, 1999; Heppner, Wampold, & Kivlighan, 2008), findings from the current study indicate that research competence is an important and powerful contributor to other research
training and outcome variables. Consistent with SCCT, in the originally theorized model (i.e., Model 1) of this dissertation, students' research competence was shown to directly and positively enhance research self-efficacy as well as increase research outcome expectations and scholarly activity. In other words, students who possess research skills have beliefs that they are able to conduct scholarly activity, expect positive consequences from getting involved with research, and ultimately produce scholarly activity. In addition to direct relationships, research competence indirectly explained (a) research outcome expectations, (b) research interests, and (c) scholarly activity, with primary mediating variables being research self-efficacy, research outcome expectations, and research interest, respectively. Because it was conceptually unclear whether research competence was better situated as an exogenous or endogenous variable, Model 2 was created to empirically examine the best place to situate research competence.

In Model 2, research competence was transitioned from an exogenous variable to an endogenous variable. When situating research competence as an endogenous variable, the model lost the direct and indirect relationships that connected research competence to both research self-efficacy and research outcome expectations. Without these direct and indirect relationships, it makes sense that Model 2 was a "poor fit" to the data and the model explained substantially less variation in research self-efficacy, research outcome expectations, and scholarly activity than Model 1. Given ideas from SCCT and empirical findings from Model 1 and Model 2 of this dissertation, it seems reasonable to conclude that research competence is best situated as an exogenous variable. Given this conclusion, for the trimmed model, research competence was placed as an exogenous variable and weak paths were removed from the model. When removing five paths that
had parameter estimates that were less than .1, research competence became the only significant predictor of research self-efficacy and continued to explain a significant amount of variance in research outcome expectations and scholarly activity. In addition to these direct paths, research competence continued to indirectly explain research outcome expectations, research interest, and scholarly activity. Needless to say, findings strongly suggest that research competence is an important variable to consider in the research training process.

**Advisory Working Alliance**

In Model 1 of this dissertation, students' perceptions of the advisory working alliance directly contributed to research self-efficacy whereas perceptions did not contribute to research outcome expectations. In other words, a more positive relationship with advisors concerning the area of research enhances students' beliefs about their ability to conduct research whereas it does not change their beliefs about research leading to positive consequences. Given that students' perceptions of the working alliance did not contribute to research outcome expectations, the path was dropped in the trimmed model (i.e., Model 3) and the only path for advisory working alliance was connected to research self-efficacy. Surprisingly, in the trimmed model, the advisory working alliance did not attain statistical significance in connection to research self-efficacy. This finding was rather surprising and somewhat challenging to understand.

To help understand this surprising and challenging finding, both Model 1 and the trimmed model were examined. When examining the trimmed model, it appears as though removing the path between investigative interests and research self-efficacy changed the relationship between advisory working alliance and research self-efficacy.
from a significant to an insignificant relationship. This effect was similar to findings from a previous model (Kahn, 2001). Specifically, when the weak path between investigative interests and research self-efficacy was removed, the path between mentoring relationship and research self-efficacy also did not attain statistical significance. Thus, it seems that substituting mentoring relationships with advising relationships in the current study did not provide a better understanding of research training or scholarly activity. Although it is difficult to understand the reason that this path became insignificant, it seems students’ perceptions of the advisory working alliance do not explain beliefs about their ability to conduct research without also considering their level of investigative interests. Given findings from this dissertation, it seems that students’ perceptions of the advisory working alliance may not play as an important role in the research training process as other research-related variables (e.g., research competence). This may be, in part, because students may have a difficult time teasing out their perceptions of the advisory working alliance from the general research training environment and because of the large effect of research competence on research outcome expectations.

**Findings from Current Models in Context of Theory**

**Social Cognitive Career Theory**

Kahn (2001) originally tested SCCT in the context of the scholarly activity model and found that the theory was strongly supported. Since the time that Kahn tested SCCT, a measure for research competence was created (Schlosser & Kahn, 2007); thus, research competence was added to models in the current study to further test SCCT. SCCT asserts that research skills enhance beliefs about research ability and increases positive
expectations about producing research; beliefs about research ability increase positive expectations about producing research and interest in research; positive expectations about producing research increase interest in research, and interest in research ultimately leads to involvement with scholarly activity (Lent et al., 1994). Consistent with the most recent scholarly activity predictor model (Kahn), findings from the hypothesized model (Model 1) and the trimmed model (Model 3) in the current study both strongly support SCCT. Specifically, in the trimmed model, research competence predicted research self-efficacy (54% of unique variance) and research outcome expectations (4% of unique variance); research self-efficacy (5% of unique variance) and research outcome expectations (37% of unique variance) both predicted research interest; and research interest predicted scholarly activity (8% of unique variance).

In accordance with SCCT, nearly all of the direct paths that were expected to be statistically significant were found to be significant; however, the path between research self-efficacy and research outcome expectations did not attain statistical significance. This was somewhat surprising, given the fact that the research self-efficacy did significantly contribute to research outcome expectations in Kahn’s (2001) model and in previous studies (e.g., Bishop & Bieschke, 1998). The lack of statistical significance between these two variables may be partially explained in context of findings concerning research competence. That is, research self-efficacy and research competence were shown to be strongly related to one another and research competence was shown to significantly predict research outcome expectations; thus, findings may indicate that positive expectations concerning research is better explained by research skills than beliefs about ability of conducting research.
Research Training Environment

In his RTE theory, Gelso (1979, 1993, 1997) has long theorized that certain factors within the graduate training program, department, and institution may influence students' research self-efficacy, research interests, and scholarly activity. Furthermore, Gelso has theorized that these factors within the research training environment interact with individual factors to better explain research self-efficacy, research interests, and scholarly activity. Whereas two previous scholarly activity models provided strong support for RTE theory, findings from the current study provided mixed support. That is, some findings from this dissertation supported RTE theory whereas others did not.

As hypothesized in Model 1, students' perceptions of the research training environment directly influenced research self-efficacy; research self-efficacy directly predicted research interest and mediated the relationship between research training environment and research interest; in turn, research interests directly predicted scholarly activity and mediated the relationship between research self-efficacy and scholarly activity. When considering that these direct and indirect relationships interacted with investigative interests to explain research interest and scholarly activity, findings support RTE theory. However, when dropping weak path estimates in Model 1 to create the trimmed model, parameter estimates unexpectedly changed and results appeared to be more complex to understand.

The main changes in parameter estimates involved the predictor variables of research self-efficacy. When dropping the unimportant paths between investigative interests and research self-efficacy, the path between (a) RTE and research self-efficacy
along with (b) advisory working alliance and research self-efficacy did not attain statistical significance. When considering the growing body of research that has repeatedly shown that both RTE (Bishop & Bieschke, 1998; Gelso et al., 1996; Hollingsworth & Fassinger, 2002; Kahn, 2001; Kahn & Scott, 1997; Phillips & Russell, 1994; Szymanski et al., 2007) and advisory working alliance (Schlosser & Gelso, 2001; Schlosser & Kahn, 2007) are related to research self-efficacy, it was rather surprising that these two path estimates were not significant. Surprisingly, it appears that these two paths are important when they interact with students’ level of investigative interests whereas they are not important when investigative interests are not considered. When considering that RTE did not directly contribute to research self-efficacy or indirectly contribute to research interests or scholarly activity, findings from Model 3 do not seem to support RTE theory. However, it seems to be more complicated than findings presented in Model 3. That is, when considering levels of students’ research self-efficacy, research interests, and scholarly activity change within the framework of graduate training, certain factors of the RTE model are likely to be influencing these variables.

Although this study is cross-sectional in nature and causation cannot be determined, it appears as though certain research training environment factors may be influencing some research variables in the opposite manner of the intended direction. In particular, students in the beginning stage of the doctoral program reported more positive perceptions of the advisory working alliance and research training environment than students in the advanced stage. Furthermore, students in the beginning stage reported stronger research interests and more positive outcome expectations than students in the
advanced stage. These results are similar to previous inferences that suggested students’ interest in research is ambivalent in the beginning of their doctoral program (Gelso, 1997). Based on findings from this dissertation, beginning students may be resolving their ambivalence by decreasing their interest in research along with other perceptions of other research-related variables (e.g., research outcome expectations) during the graduate training process. Despite these declining trends concerning research variables, students in the current sample, on average, were either previously or currently involved with a significantly higher amount of scholarly activity than students in Kahn’s (2001) sample. Thus, despite the declining trends in research related variables (e.g., research interests) across stage of doctoral program, scholarly activity still increased compared to Kahn and Scott’s (1997) sample. When considering scholarly activity levels in light of these findings, it seems clear that much more research is needed to better understand the amount of research involvement among psychology doctoral students.

Although findings from this dissertation do not provide an explanation for the declining trend in these research variables, it seems reasonable to conclude that they may be declining because of individual as well as environmental factors. When considering the graduate training program provides a framework for change in research self-efficacy, research interest, and scholarly activity, there is some evidence in the trimmed model that supports RTE theory; unfortunately, it appears as though certain training environment factors may be influencing students’ research outcome expectations and research interests in a contrasting direction than what is intended. By conducting more research on research training, scholars may better be able to understand the declining trends in some
research variables. In the next section, future research, limitations of the current study, and implications are discussed.

Future Research, Limitations, and Implications

Future Research

Although the current dissertation extends the research training literature within counseling psychology, much more research needs to be conducted to understand research training and outcome more fully. Despite the fact that the model in the current study inserted two new research training variables, only 18% of the variance in scholarly activity was explained. Thus, there is still a large percentage that may be explained by variables that have not been included in the model. Examples of variables that have either been suggested or studied include students’ level of research support from peers (Love, Bahner, Jones, & Nilsson, 2007), amount of research productivity produced by advisor (Kahn, 2001), students’ experiences with research teams (Love et al.), students’ achievement motives (Deemer, Martens, & Podchaski, 2007), and students’ learning styles (West, Kahn, & Nauta, 2007). Inserting some or all of these variables into the scholarly activity predictor model may account for more variance in scholarly activity.

To date, only cross-sectional studies have been conducted in the area of research training in counseling psychology. Although cross-sectional studies are useful to provide a snapshot of the research training process, longitudinal studies would provide much more information about the process. For example, researchers may want to consider examining students when they are beginning students, intermediate students, and advanced students. Because the current study cannot determine causation, it is difficult to understand the declining trends in research variables from the beginning years to the
advanced years of training. Through longitudinal analyses, we may have a better understanding of the declining trends in students' perceptions of the research training environment and advisory working alliance as well as the declining scores in research outcome expectations and research interests.

In addition to using longitudinal analyses to better understand the findings concerning declining trends of research variables, qualitative analyses would also provide important information concerning the research training process. Through qualitative analyses involving student interviews, students may provide information that highlights important unmeasured variables that either promote or detract from the research process. Similarly, interviewing faculty members about students' scholarly activity may provide useful information.

**Limitations**

Although findings from the current study seem relevant and important to the field of counseling psychology, they must be considered within the context of three noteworthy limitations. First, self-report measures were used in the current study. Although students' names were not connected to the data and the data was confidential, self-report measures inherently create social desirability concerns. Furthermore, the scholarly activity measure asked students to report information about their current and past involvement with research. Although questions asking about current and past research involvement are geared toward objective responses, there is no way to assess the accuracy of responses due to the concerns with self-report measures.

The second limitation concerns external validity. That is, given that the response rate in the current study was only 38%, there is no way to determine if the results are
representative of the general body of counseling psychology doctoral students. Furthermore, all students were enrolled in an APA-accredited program and most students who participated were Caucasian females. Thus, results should be judiciously generalized to counseling psychology doctoral students, especially for students who are not Caucasian females or in non-APA accredited programs.

The third limitation involves normally distributed variables. Specifically, given that most research variables in the current study were not normally distributed, there was a higher probability of committing a Type I error (Martens, 2005). Although the maximum-likelihood estimation procedural method partially protects against Type I error, there is a chance that some path estimates were found to be significant strictly by chance (Powell & Shafer, 2001).

Implications

Results from the current study further extend the research training and outcome literature within the field of counseling psychology and add to previous scholarly activity predictor models. This study is important because it may help guide future research in the quest for a better understanding of scholarly activity among counseling psychology doctoral students. Given the powerful contributions of research competence on other research training variables, it seems to be a beneficial variable for future research on the scholarly activity predictor model. Furthermore, although it was not as strong of a predictor of research training as research competence, students' perceptions of the advisory working alliance contributed to research-related variables and scholars may want to also consider inserting it into future models. Perhaps students’ perceptions of the
advisory working alliance will be important when it interacts with a variable that is yet to be included in the model.

In addition to guiding future research, findings from the current study have implications for graduate training programs. When considering that research competence, research self-efficacy, research interests, and research outcome expectations all contributed to scholarly activity and seem to be amenable to change, faculty members may want to explicitly target these variables. Over the past few decades, researchers have suggested and studied some interventions that may promote scholarly activity. For example, researchers have suggested to increase support from peers concerning research activity (Love et al., 2007) and tailor education concerning research to students’ learning styles (West et al., 2007).

Implementing major curriculum changes within training programs is one intervention that may increase research self-efficacy and research competence (Wampold, 1986). To increase research design and analysis competencies, Wampold suggests that counseling psychology students should take 1-year of coursework concerning univariate analyses and 1-year of coursework concerning multivariate statistics. Along with taking 2 years of statistical courses, Wampold suggests that it would benefit students to transition into the role of a researcher by progressing through the following stages: (1) observe others engage in the ongoing research process, (2) complete a year long practicum course that involves conducting simulated research, (3) gain supervised research experience, and (4) conduct research independently of others. Although these curriculum changes would be challenging to implement, they would show a serious commitment to students’ research training during graduate school.
To enhance research self-efficacy and research interests, faculty may want to use a variety of teaching styles to reach students with certain learning styles (West et al., 2007). For example, to reach students who are visual learners, advisors and instructors may want to supplement research findings and procedures with graphs and tables. In addition, setting up research teams that provide positive experiences around research have been shown to enhance research self-efficacy (Love et al., 2007). To increase research outcome expectations, over 20 years ago, Wampold (1986) suggested to reward students who excel in research areas by giving them research awards. Anecdotally, it seems that this suggestion has been implemented in many counseling psychology training programs. Although these specific interventions have either been suggested or empirically found to be beneficial to the research training process, faculty members could implement them in a method that works best for the specific training program or for the specific student.

**Conclusion**

Findings from the current study provide strong support for social cognitive career theory within the area of scholarly activity and mixed support for research training environment theory. The originally hypothesized model (i.e., Model 1) in this dissertation was shown to be a “good fit” to the data and explained 17% of the variance in scholarly activity. The alternative model (i.e., Model 2) was shown to be a “poor fit” to the data, suggesting that research competence is better situated in the model as an exogenous variable rather than an endogenous variable. In the trimmed model, investigative interests, research competence, research self-efficacy, research outcome expectations, and research interests all contributed to scholarly activity. Overall, the trimmed model was
shown to be a “good fit” to the data and explained 18% of the variance in scholarly activity. Given that 82% of the variance in scholarly activity remains to be explained, much more research needs to be conducted on research training and outcome. Findings from the current study have important implications for future investigations on research training and outcome as well as for research training practices.
Appendix A

Letter to American Psychological Association

APA Research Office
750 First St NE
Washington, DC 20002-4242

ATTN: Dr. Jessica Kohout

RE: Label request, Review of survey materials

January 29, 2009

Dear Dr. Jessica Kohout,

For my dissertation, I am studying research-related variables that contribute to scholarly activity among counseling psychology doctoral students. I am sending this letter to request a set of mailing labels for 1,000 counseling psychology doctoral students of Division 17 Student Affiliate Group (Counseling Psychology)—doctoral students only who are enrolled in a Counseling Psychology Doctoral Program please. If possible, we prefer pressure sensitive (gummed) labels. Please key code labels in alphabetical order by the member’s last name starting at #001. Please print labels in alphabetical/numerical order.

We are requesting this information so that we may conduct a survey of counseling psychology doctoral students. In accordance with APA policy, a description of the research, evidence of Human Institutional Review Board approval, and copies of the survey instruments and cover letter/consent form are enclosed for review by the APA research office. In addition, I have included my reminder letters that are probably needed to get a higher response rate if potential participants do not return initial packets of questionnaires.

We understand that there is a standard reviewer fee and computer service charge in addition to the cost of the labels. We should be eligible for the discount that applies to student principal investigators. Our mailing and billing address are one in the same.

If there are any questions concerning this request, please contact Daniel Huber via phone: (319) 230-1119, email: daniel.m.huber@wmich.edu, or fax: 616-742-5058.

Sincerely,

Daniel Huber, M.A., Doctoral Student
WMU Graduate Center
200 Ionia St. SW
Grand Rapids, MI 49503

Eric M. Sauer, Ph.D., Associate Professor, Training Director
WMU Graduate Center
200 Ionia St. SW
Grand Rapids, MI 49503
Appendix B

Background Questionnaire

Directions: Please respond to the following questions. Indicate your information in the space provided or place a circle around the number that corresponds to your response.

1). What is your gender?

1 = woman
2 = man
3 = other (please specify: ____________)

2). What is your age? __________

3). With which racial/ethnic/cultural group do you identify most closely?

1 = African American
2 = Asian/Pacific Islander
3 = Caucasian
4 = Hispanic/Latino(a)
5 = American Indian/Alaska Native
6 = Other (please specify: __________________)

4). What is your sexual orientation?

1 = heterosexual
2 = lesbian or gay
3 = bisexual
4 = prefer not to categorize myself

5). What is your present relationship status?

1 = single
2 = married
3 = partnered (living together but not married)
4 = separated
5 = divorced
6 = widowed

6). What is the subfield of your doctoral program in psychology? (If not in a doctoral program, please specify.)

1 = Counseling psychology
2 = Clinical psychology
3 = Other (please specify __________________)

(please see reverse side)
7). What is the accreditation status of your training program?

1 = APA-accredited
2 = APA-accredited, on probation
3 = Other accreditation than APA and not APA accredited (please specify ________)
4 = Not accredited

8). Are you currently a student member of Division 17 (Counseling Psychology)?

_____ No    _____ Yes

9). What degree are you seeking?

1 = Terminal master's
2 = Earning Master's degree and already accepted in doctoral program
3 = Earning doctoral degree without earning master's degree
4 = Earning doctoral degree and already earned master's degree

10). What year of your doctoral education are you completing at this time?

_____ First Year
_____ Second Year
_____ Third Year
_____ Fourth Year
_____ Fifth Year
_____ Higher than Fifth year

11). Do you have a faculty advisor? (The term advisor is referring to the faculty member that has the greatest responsibility for helping guide you through your graduate program)?

_____ Yes    _____ No
Appendix C

Human Subjects Institutional Review Board Approval Letter

Date: January 29, 2009

To: Eric Sauer, Principal Investigator
    Daniel Huber, Student Investigator for dissertation

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number: 09-01-32

This letter will serve as confirmation that your research project entitled “The Scholarly Activity Predictor Model among Counseling Psychology Doctoral Students: A Modification and Extension” has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: January 29, 2010
Appendix D

Informed Consent

January 31, 2009

Dear Counseling Psychology Doctoral Student:

You are invited to participate in a research project that has been designed to explore factors that contribute to research activity among counseling psychology doctoral students. This dissertation is being conducted by Daniel M. Huber, a counseling psychology doctoral student, under the direction of Dr. Eric M. Sauer in the Department of Counselor Education and Counseling Psychology at Western Michigan University. We are interested in learning more about the contributions of a variety of variables on research activity. For the purpose of this study, a broad conceptualization of research activity is used that includes past and current research activity, literature reviews, poster presentations, and publications. Even if you have no research experience, you are still eligible for the current study. This study serves as my doctoral dissertation.

In order to participate in this study, you must be a graduate student enrolled in an APA-accredited counseling psychology doctoral program. You must also have a graduate advisor. For the purposes of this study, “graduate advisor” refers to the faculty member who has the greatest responsibility for helping guide you through your graduate program. If the criteria above do not apply to you, please disregard this letter.

If you decide to participate, you will be asked to complete a survey packet containing a variety of research-related questionnaires. We anticipate that the questionnaires will take you between 20-30 minutes to complete. Some questions will ask for demographic information about you; other questions will ask about your interests and experiences with research as well as other training areas. You may choose to not answer any question and simply leave it blank.

Given the importance of research activity in counseling psychology, studies of this kind are important. However, we do not anticipate any immediate or direct benefits to you. The time it takes to respond to the survey is the only perceived inconvenience or risk to you.

Your participation in this study is voluntary. You may refuse to participate or withdraw your consent to this research and discontinue your participation in it at any time without prejudice, penalty, or risk of any loss of service you would otherwise have. Participation or non-participation is in no way related to your standing in your graduate program.

Please know that none of the questionnaires will ask the name of your graduate program or graduate advisor. Data will be recorded so that you will not be able to be identified. Furthermore, your name and mailing address will not appear on any of the questionnaires. This information will be converted to a code number. A master list of names, mailing addresses, and code numbers will be stored (temporarily) separate from the survey packets in a secure location. When all survey packets are returned and before we
look at the surveys in order to enter data, this list will be destroyed. This is so that no one, not even the researchers, can connect data with the person who provided it. Original raw data (i.e., anonymous questionnaires) will be stored in a secure location for a minimum of 3 years. Electronic data concerning this study will be maintained on the principal investigator’s password-protected personal computer for a minimum of 7 years. Information gathered via this study may be reported in future publications. However, you will not be identified as a participant and the name of your graduate institution will not be mentioned.

This consent document has been approved for use for 1 year by the Human Subjects Institutional Review Board (HSIRB) at Western Michigan University as indicted by the stamped date and signature of the Board Chair in the upper right hand corner. You should not participate in this project if the stamped date is more than 1 year old.

Again, participation will involve the completion of research-related questionnaires. If you choose to not participate in this study, you may simply discard the contents of this survey packet. If you decide to participate, please (1) complete the questionnaires, (2) enclose your completed questionnaires in the self-addressed, postage-paid return envelope provided, and (3) return the envelope to the researchers via mail. Data will not be connected to your name so please do not put your name anywhere on the questionnaires. Please keep this form for your reference. Returning the survey packet indicates your consent for use of the answers you supply.

If you have any questions or concerns related to this study, please contact Daniel Huber (daniel.m.huber@wmich.edu) or Dr. Eric Sauer (616-771-4171). You may also contact the Chair of the Human Subjects Institutional Review Board (269-387-8293) or the Vice President for Research (269-387-8298) at Western Michigan University if questions or problems arise during the course of this study.

Sincerely,

Daniel M. Huber, M. A., Doctoral student
WMU Graduate Center
200 Ionia St. SW
Grand Rapids, MI 49503

Eric M. Sauer, Ph.D., Associate Professor, Training Director
WMU Graduate Center
200 Ionia St. SW
Grand Rapids, MI 49503
March 16, 2009

Dear Counseling Psychology Doctoral Student:

A few weeks ago, we sent a survey packet to you in the mail that invites you to participate in a dissertation study concerning research activity in counseling psychology. If you have already completed and returned your survey, please disregard this reminder. If you have decided to participate, but have not yet had an opportunity to complete and return the survey packet, we would like to remind you to do so as soon as it is convenient for you. We anticipate that responding to the survey would take approximately 20-30 minutes of your time. We would like to reiterate that your responses to survey questions cannot be connected to you.

If you have any questions or concerns related to this study, please contact Daniel Huber (daniel.m.huber@wmich.edu) or Dr. Eric Sauer (616-771-4171). If you would like another packet of materials, please email Daniel Huber.

Sincerely,

Daniel M. Huber, M. A., Doctoral student
WMU Graduate Center
200 Ionia St. SW
Grand Rapids, MI 49503

Eric M. Sauer, Ph.D., Associate Professor, Training Director
WMU Graduate Center
200 Ionia St. SW
Grand Rapids, MI 49503
Appendix F

Second Reminder Letter

April 13, 2009

Dear Counseling Psychology Doctoral Student:

A few weeks ago, we sent a survey packet to you in the mail that invites you to participate in a dissertation study concerning research activity in counseling psychology. If you have already completed and returned your survey, please disregard this reminder. If you have decided to participate, but have not yet had an opportunity to complete and return the survey packet, we would like to remind you to do so as soon as it is convenient for you. We anticipate that responding to the survey would take approximately 20-30 minutes of your time. We would like to reiterate that your responses to survey questions cannot be connected to you.

If you have any questions or concerns related to this study, please contact Daniel Huber (daniel.m.huber@wmich.edu) or Dr. Eric Sauer (616-771-4171). If you would like another packet of materials, please email Daniel Huber.

Sincerely,

Daniel M. Huber, M. A., Doctoral student
WMU Graduate Center
200 Ionia St. SW
Grand Rapids, MI 49503

Eric M. Sauer, Ph.D., Associate Professor, Training Director
WMU Graduate Center
200 Ionia St. SW
Grand Rapids, MI 49503


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