The Pennsylvania State University

The Graduate School

College of Education

FACTORS THAT HELP AND HINDER SCIENTIFIC TRAINING IN COUNSELING AND CLINICAL PSYCHOLOGY STUDENTS

A Dissertation in

Counseling Psychology

by

Margaret M. Marks

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

August 2011

The dissertation of Margaret M. Marks was reviewed and approved* by the following:

Kathleen Bieschke
Professor of Counseling Psychology
Dissertation Advisor
Chair of Committee

Jack Rayman
Affiliate Professor of Counseling Psychology

Ben Locke
Affiliate Assistant Professor of Counseling Psychology

Peter Molenaar
Professor of Human Development and Family Studies

Spencer G. Niles
Professor of Counselor Education
Head of the Department of Counselor Education, Counseling Psychology, and Rehabilitation Services

*Signatures on file in the Graduate School.

ABSTRACT

The purpose of this dissertation is to better understand scientific training within clinical and counseling psychology doctoral programs. A primary goal is to extend previous research by expanding the scientific training outcome variables from research interest and productivity to include additional characteristics of scientific mindedness such as attitudes towards research and evidence based practice. A structural equation model, grounded in research training environment (RTE) theory and social cognitive career theory (SCCT), is used to predict the new construct variable of scientific mindedness. Two additional factors, the advisory working alliance and career goals, were included within the model as predictors of scientific training outcomes. Four structural equation models are designed in the current study: (1) a primary hypothesized model, (2) a specified hypothesized model, (3) a model based on Kahn's (2001) scholarly activity predictor model, and (4) a model based on the primary model where the scientific mindedness outcome does not include scholarly activity. In the primary model, it is hypothesized that scientific mindedness would be explained directly by year in program, research training environment, advisory working alliance, research self-efficacy, and career goals. It is hypothesized that research outcome expectations and interest in research would indirectly predict scientific mindedness. Data from 215 clinical and counseling psychology doctoral students is used to test the four models. Model 1 is a "poor fit" to the data. Model 2 is created from modifying Model 1. Model 2 is an adequate fit to the data and explains 44% of the variance in scientific mindedness. Model 3, which includes scholarly activity only as the outcome variable, is a good fit to the data and explains 43% of the variance of scholarly activity. Model 4 is a good fit for the data

and explains 39% of the scientific mindedness outcome variable. Models 3 and 4 have comparable fits to the data. Differences in training model and degree type were found regarding research production such that scientist-practitioner model programs and Ph.D. programs tended to have greater perceptions of the research training environment, research self-efficacy, research outcome expectations, interest in research, and scholarly activity. Differences between clinical and counseling psychology were only found in attitudes towards research and evidence based practice. Implications are discussed within the context of future research and scientific training.

TABLE OF CONTENTS

List of Tables

ACKNOWLEDGMENT

This dissertation has been an incredible journey from the very beginning through these final words. Along the way, I have been introduced to new pieces of myself and numerous inspiring individuals. I am full of so much gratitude and must acknowledge the many who accompanied me along this journey. First and foremost, I must express deep gratitude for Dr. Kathy Bieschke. She is an outstanding advisor and committee chair. It is hard to capture in words my appreciation for Kathy as her role has far exceeded that of an advisor. Her warmth, genuineness, expertise, curiosity, humor, guidance, attentiveness, patience, and dedication drove me to complete this project and program. She helped me clarify and accept my process as well as nurtured my passion for research. I am the scientist and researcher that I am because of Kathy. Additionally, her ability to walk with me in the face of pain and adversity on this journey has been invaluable. Kathy always reminded me of the light at the end of the tunnel and when I could not yet see the light, she illuminated the path. Her belief in me kept me moving forward and pushing towards excellence. Kathy has been a true mentor both professionally and personally. It is an honor to move forward as her colleague.

I must also thank my committee members: Dr. Jack Rayman, Dr. Ben Locke, and Dr. Peter Molenaar. Each of whom are leaders and innovators. I am inspired by their knowledge and dedication to their work. Their thoughtful comments throughout strengthened this project. I feel much appreciation for Jack's inclination to be my co-advisor and for continuously fueling my interest and passion in career development work. Ben is an exemplar scientist-practitioner who has significantly enriched my becoming of

a scientist-practitioner. I have been regularly inspired by Ben and feel deep gratitude for all of the ways our paths have and will continue to cross. I am also very thankful for Peter's patience, kindness, thoroughness, and ability to make complex statistics topics comprehensible. Peter's support has allowed me to move through my apprehension of statistical analyses.

I must also thank Mary McClanahan. Her humor, genuineness, and ability to hold and accept another is nearly unparalleled. I have learned how to be a therapist and how to be ME as a therapist the most from Mary. Moreover, her support has been a life line to me throughout this journey.

I wish to express deep gratitude for my mother, Patricia, father, Grier, and sister, Alex Marks, as well. Without my father, I would not have been as driven to enter this field. My mother's strength and ability to persevere through incredible challenges has constantly inspired me to march forward. My sister's perspective has pushed me to re-examine and widen my lens.

My dear friends, Jessica Green, Jil Stifel, Megan Lavoie, Caroline Steiger, Maggie and Scott Scotilla, Maria Vinca, and Elissa Faro, have been exceptional companions. Their support has been absolutely remarkable Thank you for sharing my tears, cheering me on, and reminding me to laugh and to relish the present moment.

These final miles of this journey would not have been possible without my University of Tennessee-Knoxville family: Connie Briscoe, Ashley Ross, Sandra Chambers, Melissa Bartsch, and Jennie Bingham. Each of them walked with me through some of the darkest moments of this adventure and took me to the "Nth degree". They challenged me, supported me, encouraged me, forced self-care on me, and celebrated

with me. I cannot fully express how in such a short amount of time these individuals have impacted my life personally and professionally. I feel nothing but deep appreciation for my time with these folks.

And finally, I must thank our research team: Dr. Kathy Bieschke, Shanti Pepper, Rachel Wix, Anna Dendy, Mark Patishnock, Eanah Brown, and Dorian Gray. I appreciated the team's commitment, thoughtfulness, and open-mindedness. It was a pleasure to exchange research ideas and support on various projects. I am grateful to have been a part of such a thought-provoking team.

Chapter One

INTRODUCTION

The integration of science and practice is psychology's hallmark attribute within the health care field (Belar, 2000). Emphasis on formalizing the associated training competencies of professional psychologists commenced in the early 1940s and continues today. A milestone within this process occurred during the Boulder conference in 1949 where the first formal training model, the scientist-practitioner model, was initially endorsed (Petersen, 2007). The scientist-practitioner model emphasizes an integrative approach wherein science and practice continually inform the other such that students may have a difficult time discerning between when they are being clinicians or scientists (McFall, 1991). The scientist-practitioner model continues to remain the most evident model in accredited professional psychology training programs (Benjamin & Baker, 2000). In fact, scholars (e.g., Stricker, 2000) have argued that the scientist-practitioner model is the single most important statement of training philosophy in professional psychology as nearly every training program either has adopted the scientist-practitioner model or has developed an alternative model in reaction to it. Regardless of the various interpretations and derivatives of the scientist-practitioner model, all professional psychology training models at their core include some concentration on science. The consensus on the definition of professional psychology as a science-based profession remains a solid legacy of the Boulder conference (Peterson, 2000).

The dialogue on the training of scientists in psychology and the agreement that a scientific approach is a core competency, therefore, has been an integral part of the professional psychology field since its inception (Bieschke, Fouad, Collins, & Halonen,

2006; Petersen, 2007). Scholars argue that without the credibility of science, psychological practices would be shrouded in mysticism and public skepticism (Stoltenberg et al., 2000). Interest in the "making of scientists" has stemmed from scholars bemoaning the relatively low scholarly contributions made by graduates of the scientist-practitioner model (Stoltenberg et al., 2000). The American Psychological Association Research Office Report on the characteristics of its members found that for 50% of its members, mental health services was the primary activity whereas research was the primary activity for only 10% of the members (American Psychological Association, 2005). Findings such as these generally elicit expressions of disappointment with the productivity of the field and are often cited as evidence that the scientist-practitioner model of training has failed. Scholars contend that research production is crucial for the field to thrive and survive (Betz, 1997; Gelso & Lent, 2000) and is vital to clinical practice (Bieschke, Fouad, Collins, & Halonen, 2004). Given this contention, theory and research related to the scientific training in clinical and counseling psychology programs has begun to receive attention within the empirical literature over the past few decades. The integration of two theoretical frameworks, Gelso's (1979, 1993, 1997) theory of the Research Training Environment (RTE) and Social Cognitive Career Theory (SCCT; Lent, Brown, & Hackett, 1994), have emerged as reputable sources of hypotheses about factors which influence scientific training outcomes of interest in research and research productivity within doctoral counseling and clinical psychology programs. The next section will briefly introduce the theoretical frameworks which ground this study. The following section addresses limitations in previous studies

investigating scientific training research. A detailed review of the extant literature and methodology utilized in this study follows in subsequent chapters.

Theoretical Background

Gelso's (1979, 1993, 1997) research training environment theory (RTE) hypothesizes that there are nine different interpersonal and instructional ingredients within the research training environment which account for changes in research attitudes, self-efficacy, and productivity. Empirical support for Gelso's RTE theory has been found in studies that have examined the nine ingredients collectively (Bishop & Bieschke, 1998; Kahn, 2001; Kahn & Scott, 1997; Ozegovic, Phillips, Briggs-Phillips, 2007; Phillips & Russell) and the nine ingredients separately (Gelso et al, 1996; Krebs et al., 1991; Mallinckrodt et al., 1990; Royalty et al., 1986). Early studies, prior to the creation of the Research Training Environment Scale, mostly explored one or two of the environmental ingredients (Galassi, Brooks, Stolz, & Trexler, 1986; Gelso, Raphael, Black, Rardin, & Skalkos, 1983; Royalty & Reising, 1986). While studies tend to demonstrate overall support for the RTE theory relating to attitudes towards research, research self-efficacy, and research productivity directly, not every study has confirmed the same or every ingredient within RTE. For instance, four of the nine ingredients have received support for being a part of more effective RTEs which include 1) faculty modeling, 2) positive reinforcement, 3) early involvement, and 4) science as partly social. Additionally, the significance of RTE to criterion relations varies across studies. In a review of the RTE literature, Gelso and Lent (2000) found that overall RTE accounts for 5% to 20% of the outcome variance. Finally, RTE appears to indirectly relate to outcomes such as interest in research and research productivity through research self-

efficacy, research attitudes, and research outcome expectations (Bishop & Bieschke, 1998; Kahn, 2001; Kahn & Scott, 1997).

Recent research has integrated Gelso's (1979, 1993, 1997) research training environment (RTE) theory and social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994). Applications of SCCT are based on the assumption that the interest in, choice of, and achievement in any career endeavor is due to the interaction of factors such as personal differences, environment, self-efficacy, and outcome expectations. SCCT is thought to be a complementary theory to RTE as it acknowledges the effects of environmental factors on research training. However, SCCT is different than RTE theory, as Gelso (1979, 1993, 1997) conceptualized the training environment to directly impact research attitudes and interests whereas, social cognitive career theory conceptualizes the environment to indirectly influence interests. Additionally, RTE theory focuses on the content of research training whereas social cognitive career theory focuses on interest, choice, and performance processes and is less specific about research training content.

Bishop and Bieschke (1998) were the first to explicitly conduct a path analysis applying social cognitive career theory and RTE to interest in research. Continuing in this direction, Kahn (2001) extended a causal model (i.e., Kahn & Scott, 1997) by specifically testing an integration of RTE and SCCT predicting the scholarly activity of counseling psychology doctoral students. Predictors in this model included investigative interests, the positive impact of the research training environment, the student's year in program, relationship with mentor, research self-efficacy, research outcome expectations, and research interest.

Gelso's (1979, 1993, 1997) RTE has been criticized as it seems to focus on the importance of the faculty behavior however, there is no specific ingredient in the theory that emphasizes a mentoring relationship or the advisory-advisee relationship. To address this, Kahn (2001) added mentoring relationships as part of the environment within the model. His results however, did not support mentoring relationships as important predictors of scholarly productivity. More recent findings reviewed in the statement of the problem section of this chapter demonstrate that the advisory working alliance may be a more appropriate and meaningful substitution for mentoring relationships.

Overall the recent integration of the RTE and SCCT frameworks in the empirical literature has found that year in program is related to research self-efficacy and scholarly activity; research self-efficacy is related to the prediction of research interest and productivity; outcome expectations have been shown to be a significant predictor of research interest; interest has been predictive of research related goals; and that the research training environment both directly and indirectly predicts scholarly activity (Gelso & Lent, 2000).

Statement of the problem

While previous studies using the RTE and SCCT framework examine important aspects (e.g., individual factors, environmental factors, and the interaction of factors) and outcomes (e.g., research self-efficacy, interest, outcome expectations, and productivity) of training, the empirical literature on scientific training does not altogether address some crucial elements. Most of the previous studies have been driven to answer the research question "Why do clinicians infrequently conduct research?" Much of the research has been conducted with the aim of increasing the research productivity of psychology

graduate students. Thus, as these studies have primarily focused on examining training outcomes of interest in research and research productivity, they fall short of addressing broader scientific training outcomes in professional psychology. This next section highlights concerns with the training outcomes that are currently examined in the literature. It also underscores additional missing elements in the past research including the advisory working alliance and participant samples which include both clinical and counseling psychology doctoral students.

The scientific training literature is often dubbed the research productivity literature. This brings to light two important questions. First, how are the terms such as research and science being used within the literature? Second, what are the objectives of scientific training? Gelso and Fretz (2001) argue that the terms research, science, and scholarly work are too often used interchangeably within the literature. Gelso and Fretz (2001) contend that empirical research is conducted under the broader umbrella of science and that the purpose of research is to contribute to the body of knowledge. They maintain that scientific endeavors not only include empirical research but also theory, as theories often guide the subject matter of research and research refines theories. Gelso and Fretz (2001) also argue that science is an attitude, a method, and a set of techniques. The attitude is one that values such elements as controlled observations, precise definitions, and replicability. The term scholarly work is a general one which includes intellectual activities that may go beyond what one typically thinks of as science (e.g., philosophical inquiry, analyses of counseling cases, or historical analysis) and is thought to be the disciplined and thoughtful search for knowledge and understanding.

In regards to the objectives of training, both clinical and counseling psychology have debated and struggled to define the training goals related to scientific competencies in psychology (Addis & Jacob, 2000). This difficulty to some degree has been on the construct side; what does it mean to be a psychologist trained as a scientist? Gelso and Fretz (2001) contend that the aim of scientific training is to train effective scholars who "thoughtfully and creatively seek to understand phenomena in [counseling] psychology, who seek to understand deeply, and who communicate that understanding to others" (p. 56). Scholars have asserted that there are multiple meanings and ways of "being a scientist". Gelso and Fretz (2001) illustrate three levels of being a scientist which include 1) reviewing and applying research results to practice, 2) using the scientific process and critical thinking during practice, and 3) formulating hypotheses and conducting empirical research (see Gelso & Fretz, 2001; Gelso & Lent, 2000). Bieschke et al. (2004) discuss five subcomponents necessary to become a scientifically minded psychologist which subsume Gelso and Fretz's (2001) three levels of being a scientist as well as include practicing vigilance about how sociocultural variables influence scientific practice and routinely subjecting one's work to the scrutiny of colleagues, stakeholders, and the public (see Bieschke, Fouad, Collins, & Halonen, 2004).

While these various levels of being a scientist are certainly laudable goals of training, statements such as these have caused researchers to ponder how to measure the effectiveness of and competencies associated with the scientific training within counseling and clinical psychology programs. Thus, other concerns within this literature have been on the measurement side; what counts as a valid indicator of a scientific psychologist? The majority of the existing psychological literature to date has focused on

the narrow area of research training rather than scientific training. Specifically, the literature has focused on understanding and explaining outcome variables (e.g., research attitudes, interest, self-efficacy, and productivity) that only focus on one level of being a scientist, conducting scientific inquiry. Consequently, within the training literature, the construct and measurement of "scientific" aptitudes have often been narrowly operationalized by "researcher" proficiencies. The literature lacks an illumination of other ultimate outcome variables, benchmarks, or competencies which characterize a scientifically minded psychologist (Bieschke, 2006). For instance, Barrom, Shadish, and Montgomery (1988) argue that when evaluating the science portion of training, number of publications should not be the sole measure but that assessment of consuming research and positive attitudes toward research should also be included in ultimate scientific training outcomes. Other scholars argue that the empirical literature should include measuring aspects of development of scientific inquiry including describing, explaining, controlling, and predicting behavior (Halonen et al, 2003), while others have focused more on all of the core competencies within the scientific training. Fouad et al. (2009) recently outlined several essential competency benchmarks for scientific training in graduate programs. This recent document builds upon major steps within the movement to identify, operationally define, and assess core professional competencies within the field of professional psychology. These authors are the first to identify core professional competencies across levels of development in psychology and provide behavioral anchors for each developmental level. Fouad et al. (2009) identified three components within the scientific knowledge and methods competency in professional psychology: (1) scientific mindedness, (2) scientific foundation of psychology, and (3) scientific foundation of

professional practice. They define the component of “scientific mindedness” to include critical scientific thinking, as well as valuing and applying scientific methods (e.g., formulate questions, generate hypotheses) to professional practice. The second component, scientific foundation of psychology, includes understanding psychology as a science and having knowledge of core psychology science. Finally, the third component, scientific foundation of professional practice, includes understanding the scientific foundation of professional practice, and having knowledge, understanding, and application of the concept of evidence based practice in psychology as defined by the American Psychological Association.

In sum, “being a scientist” includes scholarly, scientific, and research work. Scholars have maintained that the field of psychology will flourish if a trainee actualizes all of the levels of being a scientist as described by Gelso and Fretz (2001) and Bieschke et al. (2004). Specifically, graduates of psychology programs will be proficient at providing higher quality services by defining successful outcomes, determining efficacious interventions, and allowing research findings to inform clinical practice. Belar (2000) reminds those that narrowly operationalize “scientist” as “researcher” that the delegates of the Boulder conference established that training in psychology is defined by its integrated approach to science and practice, not by the job title or role of its graduates. Others have warned that if only one level of being a scientist is emphasized (e.g., conducting research), this may have a damaging impact on career behaviors and scholarly production of graduate students (Addis & Jacob, 2000; Bieschke et al., 2004). Fouad et al. (2009) expand on this further by stating that shifting to an expectation of these multiple levels of being a scientist and adopting a “culture of competence” within

psychology graduate school training is necessary given recent policy guidance related to licensure eligibility. Fouad et al. argue that there is a need for a competency-based definition of readiness for entry to practice (e.g. licensure eligibility) as external groups such as regional accrediting bodies and the like are considering incorporating regulations that would measure education and training outcomes in terms of specific competencies. By only assessing research production stringently, the operationalization of the scientific training goals are limited. There is a need within the scientific training literature to examine additional outcomes that measure scientific competencies rather than an ultimate outcome of scholarly productivity to truly understand the impact of scientific training. One chief purpose of the current study is to integrate these broader competencies of scientific training outcomes into the criterion variables. Additionally, as previous research has been driven by questions focused on deficiencies (e.g., lack of research production) in trainees, the underlying tone of these research questions may be perceived as disparaging or even alienating to trainees and practitioners within the field. Therefore, an additional purpose of this study is instead to be guided by more inclusive and affirmative overarching research questions "Are we training our students to be scientifically minded? What are the factors that help and hinder scientifically mindedness?"

A second limitation to the current research is a lack of integration of the advisory working alliance into the RTE and SCCT causal model of scientific training outcomes. Recent research (e.g., Gelso & Lent, 2000; Schlosser, Knox, Moskovitz, & Hill, 2003; Schlosser & Gelso, 2001; Schlosser & Kahn, 2007) has pointed to examining the advisor-advisee relationship. Specifically, research has found positive correlations between the

advisory working alliance (advisee perspective), the advisee's research self-efficacy and current attitudes toward research. Schlosser and Gelso (2005) found that advisor perceptions of a more positive advisory alliance were associated with greater advisee interest in science and practice, and greater advisee research self-efficacy. Schlosser and Kahn's (2007) examination of the dyadic perspectives on the advising relationship found that advisees and advisors demonstrate a moderate level of agreement with one another on their perceptions of their advisory working alliance and that advisors and advisee's agreed on their sense of the advisee's research competence/self-efficacy. Overall, these empirical investigations seem to suggest that the advising relationship has implications for professional development, research self-efficacy, scholarly productivity, and scientific training as a whole.

A final consideration within the literature is that while both clinical and counseling programs have training models with a core of science and have debated the outcomes of scientist training within the programs, the majority of the research training literature has been conducted using counseling psychology professionals and current counseling psychology students. There are few studies within the recent scientific training literature that have included clinical psychology students. To date, no studies have applied tenets of SCCT and RTE to scientific training using both clinical and counseling students as a participant sample. The scientific training literature could benefit from a study which includes both clinical and counseling psychology students and explores the possible differences in program types.

Goals of the Current Study

It is the hope of this author that this research project will be helpful to training directors, clinicians, scholars, and researchers. The intent of this study, when it is published, is that it will add to and therefore inform existing knowledge about factors that enhance and hinder scientific training in graduate training programs for clinical and counseling psychology. This study will contribute to the existing literature in several ways. This proposal specifically aims to extend Kahn's (2001) causal model predicting scholarly activity of psychology doctoral students. First, this study will incorporate additional criterion outcomes which will more broadly operationalize the scientific training competencies and multiple ways of being a scientist. Additionally, as the construct of the advisory working alliance has been highlighted as being important in scientific training, this study will include this construct as a predictor within the causal model. Although much of the research training literature has focused on counseling psychology training, it could be applied to all fields within professional psychology and beyond. Thus, as an additional way to broaden the literature, this study will include participants from both clinical and counseling psychology doctoral programs and will examine the differences between programs. Within this present study's model, the predictors will include year in the program, perceptions of the research training environment, advisory working alliance, research self-efficacy, research outcome expectations, research interest, and career goals. The criterion variable will be a latent variable of scientific mindedness. This latent variable of scientific mindedness will include measures of scholarly activities as well as attitudes toward evidence based practice and treatment research.

Chapter Two

REVIEW OF THE LITERATURE

The purpose of the present study is to examine how contextual variables help and hinder scientific training in counseling and clinical psychology doctoral programs. This study will extend earlier theoretically driven empirical models of research interest and scholarly productivity among counseling psychology doctoral students (Bishop &Bieschke, 1998; Kahn, 2001; Kahn & Scott, 1997). These previous models have been guided by the integration of two frameworks including Lent, Brown, and Hackett's (1994) Social Cognitive Career Theory (SCCT) and Gelso's (1993, 1997) Research Training Environment (RTE) theory. The literature demonstrates that contextual variables in these models, research self-efficacy beliefs, research outcome expectations, and the research training environment are useful for predicting research interest and scholarly productivity. This study will broaden the ultimate research training outcomes within these models beyond interest and productivity to include additional components of scientific mindedness. Additionally, these models will be extended by including the advisory working alliance as a contributing variable and including counseling and clinical students within the participants.

This chapter will first describe the theoretical frameworks of SCCT and RTE. The constructs within these theories, research self-efficacy, research outcome expectations, and research training environment, are described. Then the empirical research inspired by tenets of SCCT and RTE predicting research interest and scholarly activity will be reviewed and synthesized to lay the foundation for the rationale for the present study. This literature review will demonstrate the gaps in empirical research with

regard to participants, additional factors that may influence research training, and training outcomes. Specifically, this chapter demonstrates that the advisory working alliance should be included as a contextual variable impacting research training. Empirical literature on this construct and connections between the other variables is presented. Additionally, a broader conceptualization of scientific training is described and alternate criterion variables beyond scholarly productivity are presented to be included as scientific training outcome variables. Lastly, this chapter reviews participant samples within the empirical research This chapter concludes with the detailed hypotheses for this study.

Theoretical Background

Social Cognitive Career Theory

Lent, Brown and Hackett's (1994) social cognitive career theory (SCCT) is a framework grounded in Bandura's (1986) social cognitive theory. SCCT also incorporates Krumboltz's social learning theory of career decision making and Hackett and Betz's (1981) application of the self-efficacy construct to women's career development (Lent et al., 1994; Lent, Brown, & Hackett, 2002). SCCT describes how individuals form career and academic interests and select and perform in their career pursuits. SCCT specifically addresses the role of cognitive variables in determining career behavior. This section introduces social cognitive career theory and two intrapersonal variables, self-efficacy and outcome expectations, are discussed as they apply to research training.

Lent and colleagues (1994) formulated three models to explain and predict how career interests evolve, how career choices develop, and how the choices are pursued (for a full review see Lent & Brown, 1996; Lent et al., 1994; Lent et al., 2002). These models are based on a major tenet of Bandura's (1986) social cognitive theory which advocates

that the person-environment interaction is dynamic and can be conceptualized as a triadic-reciprocal model of causality. Specifically, Bandura maintained that (1) personal attributes, such as physical attributes, and internal cognitive and affective states; (2) external environmental factors, and (3) overt behavior, all affect one another bi-directionally. In this system "people are both products and producers of their environment" (Bandura, 1989, p. 4). Social cognitive theory maintains that key aspects of personal attributes include self-efficacy beliefs and outcome expectations. Self-efficacy beliefs are defined by Bandura as "people's judgments of their capabilities to organize and execute courses of action to attain designated types of performance" (Bandura, 1986, p. 391). Self-efficacy beliefs are seen as a set of beliefs that are specific to particular performance domains which interact in dynamic ways with other person, behavior, and contextual factors (Bandura, 1986). Self-efficacy beliefs are developed through four major sources including (1) personal performance accomplishments, (2) vicarious learning/modeling, (3) verbal or social persuasion, and (4) physiological states (e.g., anxiety or fear) (Bandura, 1977, 1989). Bandura argued that self-efficacy beliefs are central, pervasive, and are the foundation to human agency (Bandura, 2001). They can influence cognitive and emotional processes as well as influence initiation, persistence of behavior, and choice of behavioral setting (Bandura, 1977). Self-efficacy beliefs were introduced into the career literature by Hackett and Betz (1981) and have been found to be predictive of career-related choices and performances (Lent et al, 1994). Outcome expectations, on the other hand are defined by Bandura to be "personal beliefs about probable response outcomes" (1986, p. 392). Thus, outcome expectations focus on the beliefs of the consequences that the behavior will produce. Bandura (1986) maintained

that there are several types of outcome expectations including social (e.g., approval), anticipation of physical (e.g., monetary), and self-evaluative (e.g., self-satisfaction). While Bandura maintained that self-efficacy beliefs and outcome expectations interact in determining actions, he argued that self-efficacy is a stronger determinant of an individual's behavior than outcome expectations.

Lent et al.'s (1994) three models of interests, choices, and performance are considered to be interlocking and incorporate a basic casual sequence. This basic sequence includes environmental variables which become sources of self-efficacy and outcomes expectations. It is thought that individuals will form enduring interests in activities in which they view themselves to be efficacious and anticipate positive outcomes. These interests lead to goals or intentions (e.g., becoming an academician) which influence activity selection (e.g., joining a research team) and ultimately, performance attainments (e.g., submitting a manuscript to a journal). These performance attainments (e.g., successes and failures) typically assist in revising an individual's self-efficacy and outcome expectations. Outcome expectations are hypothesized to indirectly influence career pursuits through interests but also exert direct influence on goals and actions. Self-efficacy beliefs influence the process indirectly through outcome expectations and interests but also directly through career goals, actions, and performance attainment (Lent et al., 1994). While Bandura argued that self-efficacy is a stronger predictor of behavior than outcome expectations, Lent et al. (1994) maintain that an individual's self-efficacy beliefs and outcome expectations have relatively equal influence on the formation of interests, choices, and pursuits.

Social cognitive career theory is, thus, a particularly useful framework for understanding career behavior as it delineates understanding the formation of academic and career interests as well as vocational and educational pursuits. It has begun to receive support in the professional psychology literature in relation to research behaviors of graduate students in counseling and clinical psychology as well as rehabilitation counseling (Bieschke, 2006). Recent empirical studies have specifically applied Lent and colleagues' (1994) models to examine outcomes of research interest (Bishop & Bieschke, 1998) and productivity (Kahn, 2001; Kahn & Scott; 1997; Szymanski, Ozegovic, Phillips, & Briggs-Phillips, 2007). Applying components of the triadic-reciprocal model of causality to the research training, personal attributes include research self-efficacy beliefs, research outcome expectations, and demographic/person-specific variables; environmental factors include components of the research training environment, and overt behaviors could be represented by research interest, research productivity, or additional scientific training outcomes. Research self-efficacy beliefs are defined to be one's confidence or estimation of one's ability to successfully engage in scholarly or research tasks including conceptualization and analysis. Research outcome expectations represent the consequences one might expect to occur due to engaging in completing research tasks (e.g., professional advancement). The influence of environmental factors is best conceptualized by Gelso's (1979, 1993, 1997) research training environment theory. This is described in the following section together with a review of the empirical studies that have examined the direct and indirect predictors of research interest and productivity, the training outcome behaviors that have been most frequently studied.

Research Training Environment

Gelso's (1979, 1993, 1997) research training environment (RTE) is a major theoretical framework which elucidates changes in doctoral students' research attitudes (which includes interest and value placed on research in careers), research self-efficacy, and productivity. This theory is guided by two assumptions: (a) "the production of more and better science (research and theory) is a desirable goal in professional psychology and (b) the most effective setting in which to influence scientific production is the graduate training situation" (Gelso, 1993, p. 468). Gelso's theory begins with the inference that graduate students experience ambivalence regarding research or being a scientist as many students have not had much experience being a researcher. He believes that the training environment should aim at resolving the ambivalence toward research. Gelso maintains that although the training environment would rarely transform an individual's research attitudes, that it could "deepen it, dampen it, shape it, and alter it" (1997, p. 312). He hoped by resolving the ambivalence in research, that the training environment would enhance attitudes towards research and interest in research, and provide a sense of efficacy in conducting research, which would in turn influence subsequent research production.

Gelso defined the research training environment to be "all of those forces in graduate training programs (and, more broadly, the departments and universities within which the programs are situated) that reflect attitudes toward research and science" (1993, p. 470). He believed that many "training programs evidence little deliberateness and systematicness in attempting to foster positive motivation and attitudes" (Gelso, 1979, p.27) Gelso argued that research training environments should contain specific

ingredients that could enhance or impede attitudes, efficacy, and scientific productivity in graduate students. Gelso's (1979) first attempt to conceptualize the RTE posited that there were a total of 10 specific "ingredients". His theory has been revised several times (1993, 1997) to accommodate research findings that have accrued since Gelso's initial propositions. One of Gelso's notable revisions included first removing (in 1993) and then revising (in 1997) an original ingredient; "the artificial tying of research and statistics needs to be untied" became "teaching relevant statistics and emphasizing the logic of design". The original ingredient was initially removed as it failed to receive empirical support. Despite lack of empirical support, in Gelso's 1993 revision of his theory, he continued to contend that research training faculty need to enhance the quality and relevance of quantitative instruction. This statement encouraged Gelso et al. (1996) to include this proposition as a subscale in the revised Research Training Environment Scale. Once this proposition (e.g., teaching relevant statistics and the logic of design) found empirical support, Gelso (1997) again revised his theory to include this as an ingredient. A second notable revision of ingredients has included the removal of the ingredient "focusing in the latter part of graduate education on how scholarly activities may be accomplished in all practice settings". This ingredient was removed from his theory as it was only a factor that only more advanced students could experience. This ingredient was never included in any version of the Research Training Environment Scale.

Currently, there are nine ingredients which may be divided into two higher order factors, based on Kahn and Gelso's (1997) factor analysis on the current instrument for assessing perceptions of the research training environment, Research Training

Environment Scale-Revised (RTES-R). These two higher order factors, interpersonal and instructional, have now become a part of Gelso's revised RTE theory such that the nine ingredients are categorized into the interpersonal factor or the instructional factor. The interpersonal factors include (1) faculty model appropriate scientific behavior; (2) scientific activity is positively reinforced in the environment, both formally and informally; (3) students are involved in research early in their training and in a minimally threatening way; (4) the environment emphasizes science as a partly social experience. The instructional factors include (5) it is emphasized in training that all research studies are limited and flawed in one way or another; (6) varied approaches to research are taught and valued; (7) the importance of students looking inward for research ideas and questions is emphasized when students are developmentally ready for this responsibility; (8) students are shown how science and practice are wedded; (9) statistics' instruction is made relevant to applied research, and emphasis is placed on the logic of design as well as statistics (Gelso, 1993, 1997).

Gelso's theory postulates that attitudes toward research and science, efficacy as a researcher, and eventual research productivity would be positively influenced to the extent that these specific ingredients occur within the training environment. Conversely, attitudes, efficacy, and productivity, can be diminished if these ingredients are missing or are in small doses. Gelso's (1979, 1993, 1997) RTE framework has focused on answering the overarching question "To what extent and how can we as educators influence graduate students' interest in and sense of efficacy for research and science, and their eventual research activity during their careers?" (Gelso, 1997, p. 307) Thus, empirical research with the research training environment has primarily only focused on examining

training outcomes of research self-efficacy, interest in research, and research productivity.

One critique regarding Gelso's (1979, 1993, 1997) RTE theory that has been voiced recently within the literature (e.g., Gelso & Lent, 2000; Schlosser & Gelso, 2001) is that while there are several ingredients that focus on faculty behavior (e.g., modeling, reinforcing, stimulating) there is not a specific ingredient that pertains to the advisor-advisee relationship or mentoring. Early research conducted with RTE offers support that students find the interpersonal aspects of training very important. More recent research has been conducted specifically examining the advisory working alliance. This research has yielded positive correlations between the advisory working alliance and research self-efficacy and interest. Thus, while Gelso's RTE theory does not contain an advisor ingredient, research has demonstrated that this in fact is an important part of the training environment. The advisory working alliance and its empirical research will be reviewed later in this chapter.

Summary

Social cognitive career theory (Lent et al., 1994) and the research training environment (Gelso, 1979, 1993, 1997) are two theoretical frameworks that are useful in exploring factors that help and hinder psychology graduate student scientific training. SCCT maintains that the training environment works indirectly by influencing specific person variables (e.g., self-efficacy and outcome expectations) while Gelso's RTE theory contends that the research training environment directly influences research attitudes/interests and productivity. Despite some different hypotheses, these theories are thought to complement each other when integrated. Gelso's (1979, 1993, 1997) RTE

theory focuses more on the content of research training while Lent et al.'s (1994) social cognitive theory emphasizes interest, choice and performance processes, but is less specific about research training content (Gelso & Lent, 2000). Studies have formally and informally integrated these theories to primarily explain interest in research and research production in psychology graduate students. Empirical investigations of the relationships between the research training environment, social cognitive variables (e.g., research self-efficacy and research outcome expectations), and research interest and productivity are described in the next section.

Empirical Research

The extant scientific training literature may be discussed in several manners. Gelso and Lent (2000) suggest in their review of the training literature that the research may be broadly organized by three characteristics including factors (e.g., individual and environmental) that influence training, theoretical frameworks, and training outcomes. As a primary purpose of the present study is to demonstrate the fundamental need within the literature to broaden the assessment of scientific training outcomes, this section reviews the empirical research according to training outcomes. The most studied desired outcomes within the literature include research attitudes/interests, self-efficacy beliefs, competence, outcome expectations, career goals, and productivity. Gelso and Lent (2000) describe that these outcomes can be conceptualized as residing on a continuum. Some of the training outcomes can be viewed as an intermediate to a desired end, while some outcomes are end points, or the ultimate outcomes, that are sought out by a given intervention. For instance, research self-efficacy is an outcome that could be considered an intermediate by SCCT but could also be considered an ultimate outcome by RTE.

Most often however in the literature, interest in research and research productivity have received by far the most attention and focus as desired ultimate outcomes. Most recently, research productivity has been examined as the ultimate outcome. Numerous empirical studies have investigated these two training factors using the RTE and SCCT frameworks. This section first reviews studies investigating predictors of research interest. Next, studies which examine predictors of research production are presented. This review highlights the paucity of research which includes examining broader scientific training outcomes, incorporating the advisory working alliance as a predictor of training outcomes, and including participant samples composed of both clinical and counseling psychology doctoral students. Finally, the hypotheses of this present study are presented.

Research Interest

Much research has focused on enhancing interest in research as a desired outcome of training. While this is an often studied construct, it is nonetheless considered to be an intermediate training outcome. Researchers contend that understanding the development of interest in research is an important precursor to understanding more ultimate training outcomes such as productivity (Bishop & Bieschke, 1998). The following section reviews empirical research which examines predictors of interest in research.

Early empirical research. An early attempt to understand factors within graduate training affecting research interest was conducted by Gelso, Raphael, Black, Rardin, and Skalkos (1983). The researchers sought to examine current and former student attitudes towards research as well as gather preliminary data on factors that facilitated or impeded interest and skill in research. Participants included 35 (16 males, 19 females; mean age

was 29) current students and 34 (19 males, 15 females; mean age was 35) PhD graduates from the University of Maryland. Participants completed a four-part questionnaire designed for the study which assessed (1) retrospective and current ratings of percentage of time they perceived the program expected them to devote to research, percentage of time they wished to devote to research, interest in doing research and perception of value of research in careers; (2) the perceived impact of 22 research-related activities and factors (e.g., coursework, required research, non-required research, attendance at presentations, presentation of research, and research-relevant interpersonal relationships) on both skill and interest in research; (3) research productivity; and (4) an open ended question inquiring about elements of training that impacted attitudes. Two-tailed correlated t-tests yielded a significant increase in interest in doing research ($t=2.04$, $p<.05$) for the current students. The authors reported that in general, the current students and graduates reported a modest interest in performing research upon entry into the program. Both groups perceived their training programs as expecting them to do significantly ($.05> p > .0001$ in all cases) more research than they wanted to do. The authors summarized the effects of training experiences on skill and interest in research without specifying the quantitative data. The researchers found that active participation in research as well as high personal investment (e.g., dissertation) most positively influenced both research skills and interest for current students. Additionally, activities that contained an interpersonal element (e.g., research team) most positively impacted research interest for current students. For the graduates, interest in research was most related to a strong social-interpersonal dimension (e.g., advisor-advisee). While this study only included students and graduates from one program and utilized a measure that was

unproven in terms of reliability and validity information, it was a valuable beginning. It demonstrates that over time within one program, interest in research can increase and that active participation, high personal investment, and interpersonal factors (e.g., research team, role models, and advisor-advisee relationships) may be important for some students in predicting interest in research.

Royalty and Reising (1986) followed up the Gelso et al. (1983) study to examine Ph.D. graduates' perceptions of research training and the impact on research skill and interest. The researchers recruited 355 (294 males, 61 females; mean age of 49) psychology graduates within Division 17 (APA, Counseling Psychology Division). The authors noted that the participant gender ratio represented a slight underrepresentation of female psychologists as 25% of the Division 17 members were female. The researchers commented that the disparity reflected a sampling error rather than a differential response rate as approximately 18% of the random sample was female. All participants completed the Survey on Research Training (SORT), a survey constructed for this study by the authors. The survey assessed the participants research related activities and the perceptions of the adequacy of the training environment. The authors defined "research" broadly to include empirical and theoretical work, program evaluation, agency research, literature reviews, and research consultation and supervision. This definition of research is similar to Gelso and Fretz's (2001) definition of science. The SORT is a five-point Likert-type scale where participants were asked to report on five areas including: current level of skill on 23 research skills (e.g., writing skills, statistical skills); contribution of graduate training to each of the 23 skills; how 19 research-related graduate training activities (based off of Gelso et al.'s 1983 list) impact interest in research; how

adequately the graduate program prepared the individual to conduct research and affected the individual's interest in research; how many manuscripts the participants had written. The researchers found that the participants rated similar activities as those in Gelso et al.'s (1983) study as having impacted research interest in a positive way: active involvement in research (e.g., dissertation, individual research effort, presenter at professional meeting) and interpersonal involvement (e.g., role model, advisor-advisee relationship). An open-ended question which asked about influences that impacted research interest and skill found that the following had a negative impacted: lack of time and money; the view that counseling research is of poor quality or irrelevant; the belief that traditional views on research are oppressive; lack of colleagues; lack of statistical, computer, or research skills; lack of publication procedures; and "anti-research" work environment. This study found no gender differences and did not find a significant difference between participants who graduated from programs within a psychology department or an education department.

Within the same year (1986), Royalty joined with Gelso, Mallinckrodt, and Garrett to examine the research training environment and the impact on students' attitudes towards research (which includes interest in doing research and the personal value of research). This study is particularly significant as it specifically tested Gelso's proposed impactful ingredients within the RTE and created the measure, the Research Training Environment Scale (RTES). The researchers created a 45-item measure which was based on and assessed nine of the original ten (Gelso, 1979) "ingredients" of an effective RTE. The tenth ingredient, training in how research gets done in agencies, was not included in the scale as the researchers did not believe that graduate students in the

earlier years in the programs could accurately respond to this item (Royalty et al., 1986). Participants were asked to respond to items on a five-item Likert scale ranging from 1 (disagree) to 5 (agree). The nine subscales had differing numbers of items ranging from three to eight and four of the subscales had only three or four items. The researchers tested the measure on 358 graduate students in ten counseling psychology programs (190 females, 167 males). Participants also completed a measure which assessed attitudes towards research. The researchers had the participants complete the attitudes toward research measure twice responding to the items in terms of their recollection of what they felt prior to entering their program and then again responding with their current feelings. Royalty and colleagues found support for a link between training environment and impact on research attitudes. These authors found that student reports of their interest in research were often "neutral" initially but then modestly increased to become more favorable as they progressed through training. Specifically, the researchers found that in eight out of ten programs, current attitudes towards research were more positive than recalled entrance attitudes towards research ($F(9,344) = 2.55$, $p < .01$). Additionally, the researchers found that the role of different environmental ingredients varied across the different programs ($F = 4.32$, $p < .001$). The most impactful programs had the most positive environments in these ingredients: Faculty modeling of appropriate scientific behavior, reinforcement of student research, early involvement in research, teaching that all experiments are flawed, and wedding of science and clinical practice. Thus, similar to Gelso et al.'s (1983) and Royalty and Reisling's (1986) studies, we again see some similar "ingredients" of RTE importantly influencing interest in research. While this study is certainly valuable due to its contribution to the beginning development of the

RTES, the authors utilized a measure of research attitudes/interest that only included five items. Only one item assessed research interest: “I have a strong interest in doing research”.

Mallinckrodt, Gelso, and Royalty (1990) followed up on additional factors influencing research interest using Royalty et al.’s (1986) data base. These authors were the first to examine personal characteristics beyond demographics, such as gender and department type, and the RTE effects on research interest. Personal characteristics in this study were personality traits as conceptualized by Holland’s (1986) typology (e.g., Realistic, Investigative, Artistic, Social, Enterprising, and Conventional). After conducting repeated measures *t* tests, an overall increase in research interest was significant for Social students ($t=3.65$, $p<.01$), students with high ($t=2.06$, $p<.05$) and low ($t=3.31$, $p<.01$) traits with Investigative, Artistic, and Social interests, and the general sample ($t=6.01$, $p<.01$). A one-way, repeated measures multivariate analysis of variance (MANOVA) revealed that students at the two most impactful programs (identified by Royalty et al., 1986) had significantly higher Investigative scores ($n=79$, $M=3.87$, $SD=2.18$) than the students at the eight other programs ($n=279$, $M=2.68$, $SD=2.10$; $F(1,356)=19.35$, $p<.0001$). Hierarchial regression analyses demonstrated that the RTE accounted for 4%, personality types accounted for 10%, and personality-environment interactions accounted for 1-1.5% of the variance in current interest in research. While some individuals may interpret these findings as suggesting students with higher levels of Investigative interests should be more heavily recruited for doctoral programs, Mallinckrodt and colleagues argue against such a practice. First, the authors contend that these results are correlational. Also, the majority of the sample of students had strong

Artistic and Social traits which not only tend to be clinically oriented but also demonstrate greatest gains in self-reported interest in research. The authors maintain that results such as these demonstrate that it is necessary to further identify and cultivate elements that might stimulate interest in research.

These reviewed preliminary studies begin to offer support that the research training environment can impact students' reported interest in research and that some of Gelso's (1979, 1993, 1997) ingredients seem particularly influential. Across the studies, participants seem to indicate that active participation in research, especially research that includes a high personal investment (e.g., dissertation), and interpersonal involvement (e.g., research team) had the most favorable impact on interest in research. Some of the literature thus far has determined that personal aspects, such as Holland's personality traits, are also influential in predicting research interest. As mentioned early within this chapter, aspects of social cognitive, specifically self-efficacy beliefs and outcome expectations, are also considered to be aspects of an individual's personal attributes. Thus, while the environment seems to play a unique role in interest in research, others contend that personal variables, and more specifically, social cognitive variables might also play an important role in predicting interest in research. The following studies include linking variables of SCCT such as self-efficacy and outcome expectations, to research interest.

Recent empirical research. In 1995, Bieschke, Bishop, and Herbert examined research interest among rehabilitation counseling doctoral students. This study examined the degree to which research self-efficacy, research outcome expectations, and the RTE predicted interest in research. This is the first study to examine outcome expectations as a

predictor variable. The researchers recruited 92 doctoral students, where 56% were female and 80.6% were Caucasian, who completed a demographic questionnaire, Research Self-Efficacy Scale (RSES), Interest in Research Questionnaire (IRQ), the Research Outcome Expectations Questionnaire (ROEQ), and the RTES. Multiple regression analyses found that RTE, research self-efficacy, and research outcome expectations together contributed to 46% of the variance predicting interest in research (R^2=.46, p<.001). However, the authors found that research outcome expectations accounted for 43% of the variance (p<.001). While these results seem inconsistent with Bandura's (1986) theory of self-efficacy which maintains that self-efficacy is the strongest predictor of behavior, they seem a bit more consistent with Lent et al.'s (1994) SCCT models. In Lent et al.'s (1994) basic causal sequence, self-efficacy contributes directly to outcome expectations. This may suggest that self-efficacy beliefs could indirectly impact research interest through outcome expectations more so than directly influencing interest. A strength of this study is that it utilized the Interest in Research Questionnaire which has 16 items to assess this construct. This is a change from previous studies which often assessed interest through one or two survey questions. Using this longer measure may in part explain why research outcome expectations account for a larger amount of the variance than research self-efficacy. Overall, this study is important as it confirms that RTE and research self-efficacy can account for some of the variance in research interest. Perhaps, more importantly, this study also demonstrates that research outcome expectations are significant contributors to interest in research and should be included in future studies.

To specifically examine hypotheses of Lent et al.'s (1994) SCCT, Bishop and Bieschke (1998) conducted a path analysis predicting interest in research in counseling psychology doctoral students. This study was the first empirical tests of Lent et al.'s (1994) SCCT. In this study, 184 doctoral students (127 females and 57 males; mean length in program was 3.5 years; and 81% Caucasian, 6% Asian American, 4% Hispanic, 3% African American, 2% Native American, and 4% other) were asked to complete a demographic questionnaire, the Vocational Preference Inventory-Form B (VPI-B), the Research Training Environment Scale (RTES), the Research Self-efficacy Scale (RSES), Research Outcome Expectations Questionnaire (ROEQ), and the Interest in Research Questionnaire (IRQ). The authors were explicitly testing four propositions of SCCT including (1) direct contribution of self-efficacy and outcome expectations to interest in research, (2) interests are influenced by occupationally relevant activities but this relation is mediated by self-efficacy beliefs, (3) self-efficacy beliefs are derived from four sources and (4) outcome expectations are also generated through direct and vicarious experiences with educational and occupationally relevant activities. The researchers used gender, age, and Holland personality type to measure person variables and used the RTE and year in doctoral program to assess environmental variables. Bishop and Bieschke conducted a unidirectional path analysis model using three regression equations. Interest in research was regressed on all nine predicting variables including research self-efficacy, research training environment, research outcome expectations, investigative interests, artistic interests, social interests, gender, year in the program, and age. Bishop and Bieschke found that the variables predicting interest in research directly and indirectly explained 62% of the variance. Specifically, research outcome expectations (β=.64, $p<.001$),

research self-efficacy (β=.17, p<.01), age (β=.12, p<.05), Investigative interests (β=.16, p<.01) and Artistic interests (β=-.11, p<.05) all directly predicted interest in research. Research self-efficacy was found to have indirect effects on interest in research as mediated by research outcome expectations. The total effect coefficient for research self-efficacy including direct and indirect effects through research outcome expectations was .32. Investigative interests were also found to have indirect effects on interest in research as mediated by research self-efficacy and research outcome expectations. The total effect coefficient for Investigative interests including direct and indirect effects through research self-efficacy was .20 and .38 for direct and indirect effects through research outcome expectations. Research training environment (β=.28, p<.001), Investigative interests (β=.21, p<.01), and year in the program (β=.18, p<.05) predicted a total of 21% of the variance in research self-efficacy. Investigative interests (β=.35, p<.001), research training environment (β=.19, p<.01) and research self-efficacy (β=.23, p<.01) predicted a total of 28% of the variance in research outcome expectations.

In pondering the results of this study, several conclusions can be drawn. First, outcome expectations accounted for 41% of the variance in predicting interest in research. These results support Bieschke et al.'s (1995) research. Bishop and Bieschke (1998) offer that this implies that students must not only believe that they are capable of performing research tasks but that they must also believe that it will be rewarding to engage in these tasks. Second, similar to Bieschke et al. (1996), very little of the variance of research self-efficacy has been accounted for despite the use of several variables (environment, personality, age, gender, and research involvement). This demonstrates that possible additional sources of self-efficacy, for instance vicarious learning or social

persuasion, need to be investigated in regard to their relationship with self-efficacy. Bishop and Bieschke (1998) recommended that mentoring should be explored as a variable. Recent research, which will be discussed later in the chapter, actually points to examining the advisory working alliance between advisor and advisee instead of mentoring relationships as a source and predictor of self-efficacy. Finally, Bishop and Bieschke (1998) found support for Lent et al.'s (1994) SCCT model in its application for understanding research interest in counseling psychology doctoral students.

Bard, Bieschke, Herbert, and Eberz (2000) reanalyzed the data from two studies which included Bieschke, Bishop, and Herbert (1995) and Bieschke, Herbert, and Bard (1998). This study set out to compare more closely factors that influence research interests in students and faculty in rehabilitation. In Bieschke et al.'s (1995) study, 92 doctoral students (56% were female; 80.6% were Caucasian) completed a demographic questionnaire, RSES, IRQ, the Research Outcome Expectations Questionnaire (ROEQ), and the RTES. In Bieschke et al.'s (1998) study, 129 master's and doctoral rehabilitation faculty (80% were Caucasian; 74.4% were male) completed a demographic questionnaire, the RSES, ROEQ, and the IRQ. Bard et al. (2000) conducted hierarchical regression with interest in research as the dependent variable. Strong correlations were found in both the doctoral students and faculty scores on the IRQ and ROEQ ($r=.67$ and $r=.78$, respectively). Additionally, both samples demonstrated that outcome expectations accounted for over 40% of the variance in interest in research with doctoral students and faculty. Bard et al. were surprised to find that self-efficacy in the doctoral students ($\beta=.06$) accounted for a non-significant, small portion (3%) of the variance in interest whereas the faculty ($\beta=.08$) accounted for a significant 7% variance in interest. Given

these findings and Bishop and Bieschke's (1998) results, it seems apparent that self-efficacy and outcome expectations seem to play a role in predicting interest in research however, research outcome expectations seem to play a larger role than initially expected.

Summary of research interest empirical studies. In synthesizing this empirical research, it is apparent that the training environment, self-efficacy beliefs, and outcome expectations all impact research interest. It seems that specific aspects of the RTE are particularly important in predicting interest in research such as faculty modeling, reinforcement of research, and early involvement in research. Additionally, while RTE and research self-efficacy can account for a portion of the variance in research interest, research outcome expectations predict an even larger portion of the variance in research interest.

Despite these modest initial results, there are limitations within these studies that investigate predictors of interest in research. A major concern is how interest in research is measured. The early empirical research (e.g., Gelso et al, 1993; Mallinckrodt et al., 1990; Royalty et al., 1986; Royalty & Reising, 1986) used the Attitudes Towards Research Measure (ATRM; Royalty et al., 1986) which is only a five-item instrument and only includes one item that directly assesses interest. The more recent research utilizes the Interest in Research Questionnaire (IRQ; Bishop & Bieschke, 1998) which is a 16-item measure. These later studies also formally integrate both RTE and SCCT and seem to be able to account for larger amounts (e.g., 40-60%) of the variance in interest in research. Given this, it seems reasonable that future research should be conducted using the integrated framework of RTE and SCCT and utilize the IRQ for measurement.

Another concern in these studies is the participant samples. The samples range from including counseling psychology and rehabilitation doctoral students, to PhD graduates, to doctoral faculty. The differences within the variances accounting for interest in research may stem from these differing populations. As the aim of most of these studies is to understand predictors which impact the scientific training of professional psychology graduate students, it is important to examine a sample of such students. Therefore it seems reasonable to suggest that future studies include both counseling and clinical psychology doctoral graduate students as participants. Finally, the RTE seems to predict low amounts of the variance in interest in research. It may be possible that the RTE does not capture the full training environment. This environmental factor may be missing a key aspect such as the advisory working alliance. Alternatively, the RTE may be a better predictor of different training outcome other than interest in research.

Research productivity

Within the scientific training literature, research productivity is consistently deemed the ultimate training outcome. Researchers in this area contend that increasing the involvement of psychology graduate students in research and scholarly activities is a desirable goal as it is a primary way to move the psychology field forward. The following section reviews empirical research which examines research productivity utilizing the RTE and SCCT frameworks.

Empirical research of scholarly productivity. An early exploration of correlates of scholarly productivity within the counseling psychology field was conducted by Royalty and Magoon (1985). The researchers specifically hoped to better understand personality and environmental factors involved in scholarly productivity. The researchers recruited

296 full and part time counseling psychology faculty members (222 were male, 74 were female; mean age was 44) to complete the Vocational Preference Inventory (VPI) and the Scholarly Productivity Survey (SPS). The VPI is a personality inventory based on Holland's (1978) typology. The SPS was a measure created for this study and includes 147 items which assess demographic data, research attitudes, preferences for different types of environments, activity preferences, and sources of research ideas. The researchers used number of publications listed for each subject in the Social Sciences Citation Index Source Index (SSCI) as a clear-cut productivity level. Royalty and Magoon (1985) summarized their results such that high productivity individuals tended to graduate with a Ph.D. at a younger age than lower level producers, surrounded themselves with colleagues who publish, viewed research as valuable, interesting, stimulating, and satisfying, were involved in a program of research rather than conducting unrelated studies, were interested in research while in graduate school, believed that graduate school prepared them for difficulties getting published, and believed that their graduate program expected them to produce research. Low producers by contrast tended to prefer their research to grow out of the counseling experience and would rather spend time in direct service than research. After conducting a linear discriminant analysis, the researchers found that psychologists with different high point personality types prefer different research environments. Royalty and Magoon offered that Investigative personalities for instance, may enjoy producing more theoretical research, whereas Social researchers may instead prefer to conduct applied research and enjoy team research more. The researchers argued that this study demonstrates that the graduate training environment has the potential to influence the productivity of students.

They highlighted that to increase productivity, programs should focus on enhancing interest in research, exposing students to positive and negative aspects of attempting to conduct research, and placing expectations on students that they are to conduct research. While this study is useful in understanding characteristics, beliefs, and values of some individuals who produce research, it only utilized number of cited publications as a benchmark of scholarly productivity.

Soon after Royalty and Magoon's (1985) research, Galassi, Brooks, Stolz, and Trexler (1986) examined the student research productivity of counseling psychology programs. The researchers surveyed 41 training directors of counseling psychology programs to report on their student research productivity and program characteristics (e.g., requirements and emphases). Student research production was determined by number of papers presented at professional meetings and published research articles in professional journals. Survey results demonstrated that high and low research-productive programs differed in the timing and amount of research involvement required of students. Specifically, high producing programs (e.g., mean of 40.3% students presenting a paper and mean of 26.9% publishing an article) involved students in conducting or assisting in research early in their training whereas low producing programs (e.g., mean of 6.5% for presenting and mean of 4.2% for publishing) tended to not have their students involved in research until their third year or later. Additionally, most of the high producing programs required students to participate on research teams, to complete research assistantships, and placed greater emphasis on philosophy of science in research training as compared to the low producing programs. Thus, these results seem to support some of the literature predicting interest in research (e.g., Gelso, Raphael, Black, Rardin, & Skalkos, 1983) as

well as Royalty and Magoon's (1985) study. The researchers offered that this study was limited in that programs were categorized by student productivity for only one year. While it is an improvement that the researchers used two sources (e.g., article publications and conference presentations) as a way to measure research productivity, the measurement of the construct of research productivity is still very limited within this study.

Royalty and Reisling's (1986) study, previously discussed within the interest in research section, also briefly explored research productivity within Division 17 of the American Psychological Association. As a measure of productivity, the researchers used the number of each participant's manuscript publications divided by the number of years postgraduation. After conducting Pearson product-moment correlations, the researchers found the following factors were related to productivity: research design skills ($r=.33$), practical research skills ($r=.23$), quantitative and computer skills ($r=.14$) academic comfort ($r=.19$), professional level research activities ($r=.23$) and graduate level research activities ($r=.25$) (all $ps<.01$). The researchers shared that the participants who rated these skills or activities more highly tended to be more productive. Also, results indicated that gender and department type (psychology versus education) were not related to productivity. The authors noted, similar to the findings of Royalty and Magoon (1985) and Galassi et al. (1986), that involving students in research through experiences on a research team will most often include these factors that are related to enhancing research productivity. Similar to Royalty and Magoon's (1985) study, the measure of research productivity was limited to manuscript publications.

Barrom, Shadish, and Montgomery (1988) took a slightly different approach in exploring scholarly activity. These researchers examined differences between individuals who hold a Psy.D. versus those who hold a Clinical Psychology Ph.D. What is particularly noteworthy about this study is that Barrom and colleagues (1988) criticized previous research for operationalizing research productivity in the limited way of only emphasizing number of publications. These authors argued that the Scientist-Practitioner model "was not instituted for the sole purpose of producing clinical psychologists who would publish research". The model was also aimed at encouraging consumption of research; participation in all stages of research, not just publication; a critical scientific perspective; and a positive attitude toward research" (1988, p. 93). Thus, the researchers sought to examine scholarly production in a broader context including alternate measures of production beyond publication rates. Barrom et al. recruited a total of 205 professionals (157 were male, 46 were female; 117 were Ph.D.s and 84 were PsyDs). While the authors did not specifically survey the training model the participants were exposed to in graduate school, the authors offer that the PhD/PsyD distinction may be a proxy for the Boulder model (i.e., Scientist-Practitioner) versus non-Boulder model (e.g., Practitioner-Scholar). All participants completed a questionnaire designed for the study which focused on the following areas: background and demographics, scholarly production and consumption, attitudes towards scholarship, and influences on scholarly involvement. The researchers found that Ph.D.s had significantly higher levels of productivity (e.g., empirical, theoretical, professional issues, unpublished manuscript, or convention presentation) than PsyDs both overall and for each type of scholarly work except professional issues ($t(190)=1.97$, $p<.05$). Also, PhDs also tended to be more

significantly involved than PsyDs in all current research activities (e.g., writing a grant, gathering data for a project) except for writing theoretical or practical articles or grant proposals ($t(194)=1.71$, $p=.088$). Overall, the researchers found that the PhD sample produced a mean of 22.6 publications which was higher than the PsyD mean of 2.53 publications ($t(198)=5.36$, $p=.000$). The researchers found that PhDs tended to also read more research articles (4.6) than did PsyDs (2.6) ($t(183)=2.38$, $p=.018$). In examining clinicians' attitudes towards research (e.g., I believe that I should rely on research literature as a guide to clinical practice), PhDs expressed significantly more positive attitudes toward research on all but one item ($t(190)=1.96$, $p<.05$). PhDs also felt that their programs prepared them to conduct research, prepared them to critically evaluate research more so than PsyDs ($t(190)=1.97$, $p<.05$). Interestingly though, both PhDs and PsyDs seemed relatively equal on ranking the statement about their program "taught me to take a scientific attitude (to ask how, why, what is the evidence) about the problems faced in clinical work." After conducting a canonical correlation on setting predictor variables of scholarly activity, the researchers found that number of paid work hours that could be devoted to research, percentage of colleagues conducting research, and positive personal research attitudes were the most influential setting variables predicting scholarly activity.

Overall, this study demonstrates that a broader operationalization of the construct research can influence the conclusions about scholarly involvement. These researchers found that this sample tended to be involved in some form of research in the recent past, consume a good deal of research, have positive attitudes toward research, and think that research ought to be a part of clinical training. Additionally, the researchers found that

PhDs are more involved in scholarship than PsyDs in that PhDs have more publications, report more current research activities, feel more prepared to conduct research, report enjoying research more and often wish that they could do more research. The authors offer that these results may not be too surprising as the PhDs in this study were most likely trained in the Boulder (i.e., Scientist-Practitioner) models whereas the PsyDs most likely were trained by non-Boulder model (e.g., Practitioner-Scholar). This author lauds Barrom and colleagues for widening the operationalization of the term research within this study. While the present study does not utilize this specific measure to assess scholarly productivity as it is unavailable, the present study uses a measure which is based on Barrom et al.'s measure. Additionally, Barrom and colleagues' research underscores that it is important to specifically inquire about the training model of the participants to clearly examine differences between training programs.

Krebs, Smither, and Hurley (1991) examined influences on research productivity in a sample of counseling psychology professionals. These researchers recruited 260 individuals (139 males, 121 females) who had graduated from 54 counseling psychology programs since 1970. Each individual completed the Vocational Preference Inventory (VPI; Holland, 1985), RTES, and a demographic questionnaire. Participants were also asked to list the year of publication and name of journal for any research or theoretical article they had co/authored. The researchers found a significant positive correlation between Investigative personality type and research productivity ($r=.15$, $p<.01$) as well as between perceptions of the research training environment and research productivity ($r=.19$, $p<.01$). Specific ingredients of the training environment were found to correlate with research productivity including faculty modeling ($r=.14$, $p<.05$), early research

involvement (r=.18, p<.01), research as a social experience (r=.18, p<.01), all research is limited or flawed (r=.19, p<.01), and research related to practice (r=.19, p<.01). This study demonstrated that the research training environment is related not only to interest in research but also research productivity. Additionally, parallel to studies previously reviewed in this chapter, similar specific ingredients within the training environment seem to consistently relate to training outcomes. However, the authors note that the composite RTES score only explained 4% of the variance in research productivity. The authors suggest that researchers might include additional predictors. Krebs and colleagues also warn that their measure of productivity only assessed number of past publications and suggest that additional ways of assessing scholarly activity should be included such as looking separately at different types of publications and citations. The authors also recommend that the extent to which research is considered relevant to practitioners and has conceptual influence on their service delivery should also be examined as an outcome variable.

Phillips and Russell (1994) built on previous research that found early and active involvement in research and role modeling seemed to be related to research productivity. Early involvement in research and role modeling could be considered environmental sources of self-efficacy. Thus, these authors desired to examine whether research self-efficacy is important in understanding the relationship between the research training environment and research productivity. The study included 125 graduate student and intern participants enrolled in 12 APA counseling psychology programs. Participants in the program included 28 first year students, 28 second year students, 25 fourth year students, 18 interns, and 26 non-intern students beyond their fourth year. Additionally, 40

participants were male and 85 were female with 80% reporting as Caucasian. Participants completed the research training environment scale (RTES), the self-efficacy in research measure (SERM), and a demographic and productivity measure. The SERM is a measure that was developed from the Survey on Research Training (SORT) (Royalty & Reisling, 1986). Productivity in this study was operationally defined from a moderately broader perspective than just publications such that it also included research activities (e.g., dissertation in progress, submission to a referred journal, presentation of a paper). These activities were scored using a weighted point system. Analyses of variance on the RTES ($F=1.37$, $p< .25$), SERM ($F=.2.26$, $p>.11$) or productivity ($F=.44$, $p>.51$) resulted in no statistically significant differences in gender. Correlational analyses were performed on the three measures resulting in a positive statistically significant correlation ($r=.39$, $p<.001$) between SERM and RTES, accounting for 15.3% of the variance. Scores on the SERM and a measure of research productivity were also statistically significant in the positive direction with ($r =.45$ $p<.001$) and accounted for 20.6% of the variance. There was no statistically significant correlation between the RTES and measure of research productivity ($r =.13$, $p<.30$). A multiple regression analysis found that the SERM made an independent contribution in predicting productivity ($\beta=.04$, $F=23.0$, $p<.001$) whereas the RTES did not predict productivity ($\beta=-.03$, $F=1.80$, $p>.18$). In comparing the differences between beginning versus advanced graduate students, ANOVA analyses revealed significant differences between the groups on the SERM ($F=4.01$, $p<.05$) and the measure of research productivity ($F=32.07$, $p<.001$) but not on the RTES ($F=1.46$, $P>.23$). Advanced students as compared to the beginning students reported higher means on the SERM (197.3 versus 181.0) and the productivity measure (6.2 versus 2.1). When

the researchers compared the beginning students to the advanced students, it was found that the correlation between the RTES and the measure of productivity was statistically significant in the positive direction for the advanced group ($r = .29$, $p < .05$) but not for the beginning group ($r = .11$, $p > .47$).

The results of this study demonstrate a preliminary link between research self-efficacy and research productivity. This study also supports previous research that has found the RTE and year in the program contributing to levels of research self-efficacy. Additionally, there were no gender differences found on any of the variables which supports Royalty et al.'s (1986) research. The researchers noted that they only found a direct connection between the research training environment and research productivity for the advanced students. The authors suggest that the RTE may exert a cumulative influence on students which might not be reflected until later in the program.

Brown, Lent, Ryan, McPartland (1996) reanalyzed Phillips and Russell's (1994) data to explicitly test for a SCCT mediational hypothesis where self-efficacy mediates the training environment-scholarly productivity relationship. Additionally, the researchers wished to examine gender differences in depth. The researchers utilized data from 69 of the participants (22 were male and 47 were female) who were all in their fourth year, internship, or post-internship years of graduate school. Brown et al. (1996) used multiple hierarchical regression procedures in the reanalysis. The analyses revealed that the perceptions of the research training environment ($\beta = .29$, $p < .05$) were significantly related to productivity and that self-efficacy beliefs were also related to productivity ($\beta = .50$, $p < .001$). When the influence of self-efficacy on productivity was controlled for, the

relationship between the perceptions of the training environment and productivity was reduced (β=.05, p>.50). These results are consistent with a meditational hypothesis.

The researchers did not find any significant sex differences between any of the measures however, the interaction of gender and self-efficacy contributed variance to the prediction of productivity. The relationship between self-efficacy beliefs and productivity was found to be higher for males (β=.80) than in females (β=.33). For females (β=.60), the relationship between the training environment and self-efficacy beliefs was stronger than in males (β=.24) Finally, the mediational effect of self-efficacy was a bit more well-defined for the males (β=.05) than for females (β=.20). While the authors are cautious about the sample sizes in the secondary analyses of the sex differences, they hypothesize that the training environment may exert a differential effect on women's self-efficacy beliefs by enabling them to replace external attributions with more internal attributions for scholarly success.

A major contribution of this study to the literature is that the results were found to be consistent with social cognitive hypotheses (Lent et al., 1994). Additionally, due to the gender differences, the authors suggest that additional explorations of gender differences be examined. The researchers suggest that given their results, it is imperative to examine additional social cognitive variables' (e.g., outcome expectations) influence on research productivity.

Kahn and Scott (1997) drew upon previous research examining Holland's personality type, Gelso's (1993, 1997) RTE theory, and aspects of SCCT to develop a causal model predicting research productivity and science-related career goals in counseling psychology doctoral students. The predictors in Kahn and Scott's model

included investigative occupational interests, the research training environment, gender, year in the program, research self-efficacy, and interest in research. A total of 267 doctoral counseling psychology graduate students (188 female, 79 male; 79% Caucasian, 8% African American, 8% Latin American, 3% Asian, 1% Native American, 2% Other) completed the Investigative and Social subscales of the Vocational Preference Inventory Form-B, RTES-R, SERM, ATR, Scholarly Activity Scale (SAS), career goal questionnaire, and a demographic questionnaire. The researchers used structural equation modeling with latent variables to test the model. Kahn and Scott's modified model provided a good fit to the data with $X^2(64, N=267)=187.27$, Goodness of fit index=.91, and Comparative Fit Index=.91. The modified model revealed several significant direct relationships including RTE, gender, and year in program were positively related to research self-efficacy and accounted for nearly one fourth of the variance (R^2=.23). Additionally, the modified model demonstrated that Investigative personality type, RTE, and research self-efficacy were positively related to interest in research accounting for nearly one third of the variance (R^2=.33). The finding that RTE is directly related to interest in research seems to be contrary to SCCT hypotheses. Career goals were only predicted by research interest (R^2=.33). The researchers found that research productivity was predicted by research interest, career goals, and year in the program (R^2=.57). The researchers were surprised to find that research self-efficacy did not significantly predict research productivity.

Kahn and Scott's study is important in the research training literature as it was one of the first studies to examine a structural equation model predicting research productivity with counseling psychology students. This study also formed a beginning

foundation for integrating different theoretical frameworks to create one consistent model for predicting research productivity. The researcher's findings that career goals were only predicted by research interest and contributed to research productivity seem to be in line with SCCT propositions. In the basic casual sequence of SCCT, interests often lead to goals (e.g., becoming a researcher) which then contribute to activity selection (e.g., joining a research team) and then ultimately performance attainments (e.g., submission of journal article). Thus, it seems reasonable that the researchers were able to identify 57% of the variance of research productivity. While on one hand these results may seem stimulating, this causal model is only predicting one narrow competency of scientific training.

Another moderate strength of this study is the use of the SAS to measure scholarly production. The SAS is a 9-item measure and was created based on Barrom, Shadish, and Montgomery's (1988) study. Initially, Kahn and Scott (1997) developed 12 questions which would assess research productivity in a broader fashion than merely including past publications. After conducting an exploratory factor analysis using principal axis factoring was conducted on the 12 dichotomized items, three factors of research productivity were found to exist. The factors were past research productivity (e.g., "How many published manuscripts (either empirical or otherwise) have you authored or coauthored in a referred journal?"), current research involvement (e.g., "How many manuscripts are you currently in the process of preparing to submit for publication (i.e., writing the manuscript)"), and research in clinical practice (e.g., "How many intensive case studies of clients, groups, or consultations have you conducted?"). However, the researchers found that research in clinical practice was not highly

correlated with the latent construct of research productivity and thus, removed the three items which assessed this factor. The authors contend that this instrument does not merely measure research production (e.g., past publications) but truly operationalizes scholarly activity as it assesses current research and activities.

In 2001, Kahn refined and extended Kahn and Scott's (1997) study by including the student's relationship with his or her mentor and incorporated Brown et al.'s (1996) suggestion to include research outcome expectations into the model predicting scholarly activity. Kahn (2001) specifically integrated SCCT more fully into his model than Kahn and Scott's (1997) model and is the first to explicitly test SCCT as applied to scholarly productivity. The predictors in this model included investigative interests, perceptions of research training environment, relationship with mentor, year in program, research self-efficacy beliefs, research outcome expectations, and research interest. Participants included 149 counseling psychology graduate students (112 female, 37 male; 80% Caucasian, 5% Latino, 5% Native American, 4% African American, 4% Asian descent, 2% other). The students completed the Investigative subscale of the VPI-B, RTES-RS, Mentoring Functions Scale (Noe, 1988), SERM, Research Outcomes Expectations Questionnaire (ROEQ;), IRQ;, and the SAS. Kahn's (2001) trimmed model proved to have goodness of fit (X^2 (11, N=149)= 15.82, p>.10; CFI=.98). Similar to Kahn and Scott's model, research self-efficacy was directly predicted by research training environment. However, the RTE only accounted for 4% of the variance. The mentoring relationship, contrary to the hypotheses, did not attain statistical significance in predicting research self-efficacy. Variance of research outcome expectations was predicted by contributions from investigative interests (7%), research training environment (4%), and

research self-efficacy (3%) and (20%) overlapping contributions. For research interests, 59% of the variance was explained by contributions of investigative interests (3%), research training environment (2%), and research outcome expectations (34%) and (20%) overlapping contributions. A total of 17% of the variance of scholarly activity was explained by research interest (6%), research self-efficacy (5%), and student year in the program (4%).

This study is commendable as it supports an integrative model of RTE theory and SCCT by demonstrating both direct and indirect effects of the environment on interests and supports most of the SCCT relationships between research self-efficacy, research outcome expectations, research interest, and scholarly involvement. However, unlike previous studies, this study did not find research self-efficacy to predict research interest directly. Additionally, while Kahn found research self-efficacy, research interest, and year in the program to predict scholarly activity, these factors only predicted 17% of the variance. Kahn and Scott's (1997) study was able to find factors (e.g., interests, goals, and year in program) that contributed 57% of the variance of scholarly activity. Kahn had initially maintained that career goals were not necessary to include into his extended model as an outcome due to the fact that some scholars (e.g., Hill, 1997) have suggested that career goals do not perfectly predict career attainment. While this statement might be true, Kahn and Scott's (1997) model results provided evidence that career goals contributed to scholarly activity, thus making career goals a predictor instead of final outcome. SCCT views career goals as an intermediary step which contributes to career actions and intentions and then ultimately performance attainments. Thus, it seems further investigation into the role of career goals into the prediction of scholarly activity

is necessary. The theoretical and empirical literature seems to suggest that career goals should be placed back into the causal model not as an outcome but as an intermediary to career actions and ultimate attainments.

Szymanski, Ozegovic, Phillips, and Briggs-Phillips (2007) extended models of research interest (Bishop & Bieschke, 1998) and productivity (Kahn, 2001; Kahn & Scott, 1997) by integrating the recent research on internship RTEs (IRTE). These researchers recruited a total of 223 participants (16% were male, 84% were female) who had completed an APA-accredited predoctoral internship in the years 2001-2004. This sample included 30% counseling psychology and 70% clinical psychology interns. The predictors in this study's model were internship RTE, academic RTE, investigative interests, research self-efficacy, research outcome expectations, research interest, year in program, and employment setting. Each participant completed the RTES-R-S, IRTES, investigative subscale of the Vocational Preference Inventory, Form B, SERM, ROEQ, IRQ, and the SAS. The researchers found that the path analysis of their proposed model was largely supported where fit statistics indicated a good fit to the data: Chi-square=1.65, GFI=.97, IFI=.98, TLI=.95, CFI=.98, and RMSEA=.06. Investigative interests, academic RTEs, and internship RTEs predicted 17% of the variance of research self-efficacy. Whereas, investigative interests, academic RTEs, internship RTEs, and research self-efficacy accounted for 24% of the variance of outcome expectations. Sixty-three percent of the variance of research interest was predicted by investigative interests, research self-efficacy, and research outcome expectations. Research self-efficacy, research interest, year degree conferred, and employment setting accounted for 34% of the variance of scholarly productivity. These study results suggest several conclusions.

The first is that RTEs exist not only within the academic environment but also the internship environment. Additionally, as the researchers were able to group participants into training model (e.g., Scientist-practitioner vs. Practitioner-Scholar), it was found that Scientist-practitioner programs reported higher productivity than Practitioner-Scholar programs. Similar to Kahn's (2001) study, this research confirmed an integration of SCCT and RTE as a framework to examine scientific training.

Summary of scholarly productivity empirical research. Within the empirical literature, it has been demonstrated that aspects of RTE and SCCT relate to research productivity both directly and indirectly. The RTE has been found to account for moderate amounts of variance in research productivity. This has been specifically demonstrated in advanced graduate students. Similar to the interest in research empirical studies, specific ingredients of the RTE seem to correlate with research productivity including faculty modeling, early research experiences, research as a social experience, and research as it relates to practice. The relationship between the RTE and research productivity has also been found to be mediated through research self-efficacy. Research self-efficacy, interest in research, year in program, investigative interests, and career goals all have also been found to be direct predictors of research productivity. The largest amount of variance (57%) of research productivity was explained by year in program, interest in research, and career goals. Several researchers (e.g., Krebs et al.,1991) suggest that due to the fact that some of the predictors only accounted for modest amounts of the variance in research productivity, additional predictors should be included.

The operationalization and measurement of research and scholarly production varied within these studies. Typically, most researchers developed a productivity measure

for their current study. Many researchers simply measured productivity through the number of research papers, articles, or book chapters presented or published (e.g., Galassi et al., 1986; Krebs et al., 1991; Royalty & Magoon, 1985; Royalty & Reisling, 1986). Others developed a weighted scoring system assigning points to different activities (e.g., thesis in progress versus completed thesis) that contribute to overall research productivity (Phillips & Russell, 1994). The Scholarly Activity Scale (SAS), which assesses past and current research activities, was used in a few studies (e.g., Kahn, 2001; Kahn & Scott, 1997; Szymanski, Ozegovic, Phillips, & Briggs-Phillips, 2007). It is important for the field to clearly distinguish between research and scholarly production. Several authors (e.g., Barrom et al., 1988; Krebs et al., 1991) suggested that broader operationalizations of outcomes beyond number of publications should be assessed. These authors suggested that concepts such as attitudes toward treatment research and research influence on service delivery should be included.

Additionally, studies included a mixture of participant samples. Specifically, about half (e.g., Royalty & Magoon, 1985; Royalty & Reisling, 1986; Barrom et al., 1988; Krebs et al., 1991) of the studies include professional psychologist samples and half (e.g., Galassi et al.,1986; Kahn, 2001; Kahn & Scott, 1997; Szymanski et al., 2007) of the studies included counseling psychology graduate student samples. As the aim of much of the literature is to understand how the graduate training influences scientific training outcomes, it seems imperative to examine a more representative sample of doctoral graduate students from both counseling and clinical psychology.

Limitations with Empirical Literature

The previously reviewed empirical research contains valuable information regarding factors that help and hinder interest in research and research production in psychology graduate students. RTE and SCCT are two theories that have in general successfully guided the examination of factors that contribute to research interest and productivity. However, as part of the inclusive scientific training literature, these studies overlook crucial elements. A significant concern is with the operationalization and measurement of scientific training outcome constructs. First, many of these studies mistakenly employ the terms research and scholarship interchangeably when in fact they are different constructs. Also, numerous studies utilize limited instruments (e.g., one or two survey items) to narrowly operationalize constructs of research interest or production. Additionally, as the training literature has chiefly focused on predicting ultimate outcomes of research interest and research production, these studies narrowly operationalize the competencies of a psychologist trained as a scientist. Research production is just one way of "being a scientist;" there are other competencies beyond research productivity that may represent "being a scientist." There is a distinct lack in the literature examining these additional "scientist" behaviors as they relate to the overall competencies of scientific training.

Second, several authors have recommended including additional factors, and in particular an interpersonal factor, to predict training outcomes. As highlighted in the discussion of Gelso's (1979, 1993, 1997) RTE theory, there is a lack of emphasis on the relationship with the advisor as a part of the environment. Gelso and Lent (2000) point out that while RTE theory focuses on faculty behavior (e.g., modeling, reinforcing,

stimulating), there is no specific "ingredient" pertaining to the advisor-advisee relationship. It is suggested that the advisory working alliance should therefore be included as a predictor of training outcomes.

Finally, the majority of empirical studies have included counseling psychology professionals or graduate students. Very few studies have included clinical psychology students or professionals only as participants. There are very few studies that have included both clinical and counseling psychology students as participants. To date, no published studies have recruited equivalent samples of counseling and clinical psychology students and examined differences between these programs. These three gaps within the empirical literature are addressed further in the following paragraphs of this section.

Scientific-Minded Psychologist Outcomes

Bieschke (2006) noted the "multiple ways one might manifest a scientific approach to one's career as a psychologist have not yet been investigated" in the scientific training literature (p. 9). Most of the scientific training empirical literature has examined research interest and research productivity as constructs that operationalize "scientist". The assumption that has guided these studies has seemed to be that a psychologist trained as a scientist must produce research in order to successfully embody the "scientist" paradigm. Addis and Jacob (2000) offer that using research production as the ultimate outcome of graduate training in psychology is similar to the story of Nasrudin. In this story, Nasrudin searched for his lost keys under a lamppost because the light shone brightly under it, not because he lost his keys there. Addis and Jacob (2000) contend that while it is initially natural to measure constructs that are less ambiguous and

behaviors that are easy to measure, we must be careful that our exploration is not just under the light of the lamppost. Addis and Jacob (2000) warn researchers that we cannot allow only the available measures, or most easily accessed behaviors, to shape the conceptualization of a construct. Bieschke (2006) along with Addis and Jacob (2000) argue that if additional ways of being a scientist are not emphasized or studied in the literature, there is danger that graduate students will start to implicitly believe that research production is the epitome of a scientist. Additionally, these authors contend that if this is so, students may start to perceive their other attempts to incorporate science into their work to be less meaningful, and ultimately limit career behavior and possibly scholarly contributions. Thus, these and other scholars argue that the goals of scientific training within professional psychology are much broader than merely producing research.

One conceptualization of the scientist training is to emphasize the competencies associated with becoming a "scientifically minded psychologist" (Bieschke et al. (2004). Bieschke et al. (2004) describes a "scientifically minded psychologists" to include both psychologists who "contribute directly to the development of science through their research efforts" (p. 715) as well as "those who do not actively conduct original research [but] demonstrate enthusiasm for the advantages that a scientific approach confers" (p. 715). As introduced in chapter one, Bieschke et al.'s (2004) conceptualization of the "scientifically minded psychologist" includes five subcomponents of competencies. These subcomponents subsume Gelso and Fretz's (2001) three levels of being a scientist and include two novel aspects: (1) access to and appropriate and habitual application of current scientific knowledge; (2) contributions to knowledge; (3) critical evaluations of

interventions and their outcomes; (4) vigilance about how sociocultural variables influence scientific practice; and (5) work routinely subjected to the scrutiny of colleagues, stakeholders, and the public (Bieschke et al, 2004).

Building on this need to identify competencies associated with scientific training in psychology graduate programs, Fouad et al. (2009) created competency benchmarks across three levels of professional development including readiness for practicum, readiness for internship, and readiness for entry to practice. This document is of particular value as it not only identifies competencies which are in line with Gelso and Fretz's (2001) and Bieschke et al.'s (2004) suggestions, but it also identifies components of these competencies as well as behavioral anchors for each of these components. Fouad et al. identified three components within the scientific knowledge and methods competency in professional psychology: scientific mindedness, scientific foundation of psychology, and scientific foundation of professional practice. They define the component of scientific mindedness to include critical scientific thinking (e.g., awareness of need for evidence to support assertions; presentations of one's own work for scrutiny by others) and values and applies scientific methods to professional practice (e.g., articulates support for issues derived from the literature; generates hypotheses regarding own contributions to therapeutic process and outcome). The second component, scientific foundation of psychology, includes understanding psychology as a science (e.g., understands basic knowledge of the breadth of scientific psychology) and having knowledge of core psychology science (e.g., intermediate and advanced levels of scientific knowledge of the bases for behaviors). Finally, the third component, scientific foundation of professional practice, includes understanding the scientific foundation of

professional practice (e.g., understands the development of evidence based practice in psychology as defined by APA), and having knowledge, understanding, and application of the concept of evidence based practice (EBP) (e.g., applies EBP to conceptualizations and interventions; compares and contrasts EBP with other theoretical perspectives). The APA's task force on evidence base practice has defined EBP to be "the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences" (2006, p.273)

Addressing the operationalization of the scientific training goals is just one challenge within the literature, addressing the concern of how to measure these broader constructs is perhaps the more complex issue. To date, there is not one instrument that assesses all aspects of these scientific training competencies or behaviors. In order to more comprehensively examine scientific-mindedness competencies of scientific training, it is necessary to utilize several instruments as part of the construct. Gelso and Fretz (2000), Bieschke et al. (2004), and Fouad et al. (2009) all identify several overlapping components of the scientific identity. While all of these competencies are necessary aspects of scientific training, this study will not examine all aspects of scientific training. For instance, in Fouad et al.'s conceptualization, the competency of scientific foundation of psychology includes behaviors such as understanding basic knowledge of the breadth of scientific psychology and having knowledge of scientific knowledge of the bases for behaviors. These competencies are mandatory requirements for students who are matriculated within American Psychological Association accredited doctoral programs. This scientific knowledge is often assessed through comprehensive examinations within training programs or professional requirements such as the

examination for professional practice in psychology (EPPP) licensure exam. Assessments of these behaviors need to be comprehensive and are typically very long. Given this, assessing this competency and its behaviors does not seem appropriate for a study such as the present study. However, measuring aspects of both scientific mindedness and scientific foundation of practice competencies are appropriate competencies to examine in a study such as this.

The scientific mindedness competency subsumes Gelso and Fretz's second (i.e., using the scientific process and critical thinking during practice) and third (i.e., formulating hypotheses and conducting empirical research) levels of being a scientist as well as Bieschke et al.'s (2004) final component (i.e., routinely subjecting one's work to the scrutiny of others). This competency might be best assessed by a scholarly activity measure. To assess scholarly productivity and contributions, it is imperative to utilize a measure that does not merely record past empirical publications but also addresses additional scholarly activities as well. As discussed in the review of research productivity empirical research section, the Scholarly Activity Scale (SAS; Kahn and Scott, 1997) is a 9-item measure which assesses different scholarly contributions and has been utilized in recent empirical studies. This study will utilize a revised version of the SAS for this study. While the SAS is certainly more comprehensive than recording past publications, this author believes that it can be revised to incorporate additional scholarly activities (For a full review, see measures section in chapter three). For instance, the first question of the SAS inquires about the number of published manuscripts in a refereed journal. These manuscripts may be empirical or otherwise. In the revised version of this instrument, the type of manuscript will be divided into separate questions (i.e., How

many published empirical manuscripts have you authored? How many non-empirical manuscripts have you published?) This revision will also occur for the second question which inquires about unpublished manuscripts. The revised SAS will also include separate questions inquiring about other written works such as books, book chapters, grants, training manuals, or book reviews. Additionally, a question will also be included which inquires about any professional leadership roles (e.g., officer of professional association; committee chair or member in professional association) held. These revisions will be made to the SAS to ensure that scholarship is broadly measured within this instrument.

It seems necessary to measure a student's use and attitudes toward EBP as Fouad et al.'s scientific foundation of practice competency includes: understanding the development of evidence based practice (EBP) in psychology as defined by APA, applies EBP in conceptualizations, treatment planning, and interventions, and compares and contrasts EBP approaches with other theoretical perspectives and interventions. Measuring this construct is inline with Barrom et al.'s (1988) and Krebs et al. (1991) suggestions for broadening the training outcome assessments. Additionally, this is inline with Bieschke et al.'s (2004) notion that a scientifically minded psychologist can "demonstrate enthusiasm for the advantages that a scientific approach confers" (p. 715)

In a review of the literature, this author found that there are very few studies and thus, limited instruments constructed to measure this aspect of scientific training. Two groups of researchers conducted surveys of graduate students' (e.g., Luebbe, Radcliffe, Callands, Green, & Thorn, 2007; Merlo, Collins, & Bernstein, 2008) perceptions of scientific training. In Luebbe et al.'s (2007) study, the researchers recruited 1,195 clinical

psychology graduate students through the Council of University Directors of Clinical Psychology. All participants completed a measure created for the study which assessed the student definition of, perceptions of, and experience with EBP. The researchers found that, in general, students are aware of EBP. Luebbe and colleagues (2007) also found that EBP has at least slightly influenced clinical work but those students who intend primarily to practice clinical work reported less agreement with the principles of EBP and were less likely to use research to guide treatment planning. In Merlo et al.'s (2008) study, the researchers found in their 611 clinical psychology student participants, that many reported that the science training as it applies to clinical work was least effective. Additionally, 14% of the sample reported receiving no science training related to clinical work. While these studies may represent an introduction into examining scientific training outcomes beyond scholarly production, both of these studies utilized surveys that were created for the studies and did not examine the psychometric properties of the surveys. Thus, these surveys were not selected to be utilized within the present study. This author, however, did find that there are two measures with sound psychometric properties that assess attitudes toward treatment research which include the evidence based practice attitude scale (EBPAS, Aarons, 2004) and the positive and negative attitudes toward treatment research scales (Nelson & Steele, 2007).

Evidence based practice attitude scale. In 2004, Aarons examined mental health providers' attitudes towards adopting EBP into their work. The author recruited 322 clinical and case management service providers from 51 programs in California. The participants in this study ranged in disciplines such that the sample included marriage and family therapy (33.9%), social work (32.3%), psychology (22.4%), psychiatry (1.4%),

and other (9.9%; e.g., criminology, drug rehabilitation, education, and public health). This sample also included both professional staff (73%) as well as interns (24.5%). All participants completed the 15-item Evidence Based Practice Attitude Scale (EBPAS). As the EBPAS was developed specifically for this study, Aarons conducted exploratory and confirmatory analysis to examine the properties of the EBPAS. Aarons found a good fit four factor solution which accounted for 63% of the variance in the data ($\chi^2(84)=144.92$, CFI=.93, TLI=.92, RMSEA=.067, SRMR=.077). Aarons labeled the factors Appeal, Requirements, Openness, and Divergence. Aarons then conducted regression analyses examining the provider and organizational characteristics in relation to each of the EBPAS scales. Overall, Aarons did not find any significant differences in attitudes towards adoption of EBPs across disciplines. Aarons (2004) found that scores on the Appeal scale were positively associated with higher educational attainment (β=.106, SE β=.042, p<.05). Interns (β=.201, SE β=.105, p<.05) and providers in wraparound services (β=.298, SE β=.130, p<.054) were found to have positive associations with Openness scores. Aarons also found that providers from day treatment programs were more likely than those from outpatient programs to score high on Requirements scale (β=.286, SE β=.150, p<.05) indicating more positive attitudes towards adopting EBPs if required to do so. Interns were more likely to score lower on the Divergence scale (β=-.216, SE β=.098, p<.05) which indicates less perceived divergence between EBP and current practice. Finally, interns (β=.182, SE β=.068, p<.05), providers in wraparound services (β=.171, SE β=.083, p<.05), and those in less bureaucratic organizations (β=.209, SE β=.088, p<.05) were found to score higher on the EBP attitudes scale total score which indicates more global positive attitudes toward adoption of EBPs.

Aarons with colleagues followed up his study in 2004 by conducting a confirmatory factor analysis of the Evidence-Based Practice Attitude Scale (EBPAS) in a geographically diverse sample of community mental health providers (Aarons, McDonald, Sheehan, & Walrath-Greene, 2007). The researchers recruited 221 individuals across disciplines in 17 states. The participant sample included doctoral degrees (12.7%), masters degrees (71%), bachelors degrees (14.5%), and no degree (1.4%). The disciplines of the sample included psychology or counseling (45.2%), social work (33.9%), marriage and family therapy (5.9%), and other (13.1%; e.g., nursing, education). The confirmatory factor analysis demonstrated that the four factor solution was again a good fit ($\chi^2(83)=183.51$; CFI=.92; TLI=.90; RMSEA=.07; SRMR=.07; $\chi^2/df=2.21$). The researchers also found that the psychometric analyses, which are listed in detail in chapter three, indicated that EBPAS subscales and total scale demonstrate fair to excellent internal consistency and reliability.

These two studies, Aarons (2004) and Aarons et al. (2007), demonstrate that the EBPAS is a psychometrically sound instrument which is helpful for examining provider attitudes towards EBPs. Additionally, Aarons offered that his results demonstrate that professional education leads to conditional openness to EBPs and that pre-professional status may facilitate the effectiveness of training in EBPs. This is consistent with the belief that graduate training is an important influence on EBP use in practice. As Aarons found attitudes toward EBPs differed by clinical setting, it is therefore important to examine differences in attitudes toward EBPs within both Clinical and Counseling Psychology graduate programs as training may vary between these programs.

Positive and negative attitudes toward research. Nelson and Steele (2007) conducted research to examine predictors of practitioner self-reported use of evidence based practices. The researchers recruited a total of 214 practitioners (115 were PhD psychologists, 25 were PsyD psychologists, 25 were Master's-level psychologists, 36 were Master's-level clinical social workers, and 13 were Master's-level clinicians from other academic programs) from 15 states. The clinical settings included private practice, hospitals, schools, university clinics and other settings. All participants completed a survey of 97 items which assessed practitioner professional characteristics, attitudes toward treatment research, and EBP use. The authors created a 4-item scale to measure positive attitudes toward treatment research and a 4-item scale to measure negative attitudes toward treatment research for this study. The researchers conducted preliminary analyses which included a series of ANOVAs, t tests, and correlational analyses. The results indicated that no differences in EBP use was found for practitioner academic degree ($t(212) = 1.25$, $p < .05$) but differences were found in clinical settings ($F(5, 208) = 4.49$, $p = .001$) with hospitals and university settings reporting higher EBP use. When the researchers conducted hierarchical regression analyses, they found that practitioner training that included emphasis on EBPs (e.g., taking a class in EBPs) predicted 7.4% unique variance in reported use of EBPs. Also, a clinical setting variable (i.e., hospital/university setting versus other settings) predicted 5.9% of the unique variance in reported use of EBPs. The results also indicated that both positive and negative attitudes toward treatment research accounted for 21.3% unique variance in self-reported EBP use. The researchers noted that both scales were found to predict a unique portion of the variance in self-reported EBP use (positive scales $\beta = .31$, $p < .001$; negative

scales β=-.25, p<.001). The researchers also examined potential mediator relationships. The results did not indicate positive attitudes as a mediator but the researchers found that negative attitudes partially mediated a relationship between EBP training and EBP use.

Overall, Nelson and Steele's (2007) findings of attitudes toward treatment research were significant predictors of EBP use are consistent with Aarons (2004) work. Additionally, while the results indicated that practitioner degree and years of clinical experience were not related to EBP use, the researchers found that practitioners who reported training in EBPs significantly predicted EBP use. These results indicate that practitioner training is related to EBP use and is consistent with the belief that graduate scientific training is important for EBP. Finally, as negative attitudes toward treatment research mediated the relationship between EBP training and EBP use, this suggests that EBP training may protect against the development of overly negative attitudes toward EBP. Thus, while EBP emphasis in scientific training might not teach students to value treatment research, it may enhance exposure and assist in developing skill use. These results, taken with Aaron's (2004, 2007) work suggest that it is imperative to examine attitudes toward treatment research within the psychology graduate student population comprehensively.

Advisor-Advisee Working Alliance

While Kahn's (2001) model is an admirable comprehensive model, recent research (e.g., Gelso & Lent, 2000; Schlosser, Knox, Moskovitz, & Hill, 2003; Schlosser & Gelso, 2001; Schlosser & Kahn, 2007) has pointed to examining the advisor-advisee relationship instead of a mentor relationship as a factor impacting scientific training. While the mentoring relationship and an advising relationship do not have to be mutually

exclusive, they are not synonymous either. Descriptions of the mentoring relationship have typically included “a positive relationship in which protégés learn professional skills” (Schlosser et al., 2003, p. 179) and are considered to be personal and reciprocal (Forehand, 2008). Forehand (2008) commented that the biological and physical sciences have long had a model of mentoring which includes a faculty member working side by side in the laboratory with a graduate student or a less experienced faculty member. He contends that the social sciences, on the other hand, have a less well developed procedure for developing a mentoring relationship. Wilson (1998) further noted that social scientists frequently fail to understand or encourage each other. As such, the definition of mentor within the social science literature has been variable and past mentoring research has found inconsistent findings in relation to the mentoring relationship impacting research productivity and research self-efficacy. Schlosser et al. (2003) point out that Kahn’s 2001 study as well as Green and Bauer’s (1995) study did not find the mentoring relationship to be significant in predicting scholarly activity. However, Cronan-Hillix et al. (1986) and Hollingsworth and Fassinger (2002) imply that the mentoring relationship can promote research self-efficacy and productivity. Forehand (2008) found in a review of the mentoring research that types of mentoring behaviors were predictive of different outcomes. Specifically, mentors that provided psychosocial help were associated with student satisfaction and mentors that provided instrumental help were associated with productivity.

Many researchers (e.g., Gelso 1979, 1993, 1997; Gelso & Lent, 2000; Schlosser & Gelos, 2001; Schlosser, Knox, Moskovitz, & Hill, 2003) contend that the graduate advising relationship is integral in shaping a graduate student’s professional

development. The term advisor refers to “the faculty member who has the greatest responsibility for helping guide the advisee through the graduate program” (Schlosser Knox, Moskovitz, & Hill, 2003, p. 179). Schlosser, Knox, Moskovitz, and Hill, (2003) argue that the construct of adviser is a more suitable term to use within the literature over mentor as the graduate psychology research has demonstrated that typically 100% of the participants indicate that they have an advisor while other studies have found that only one half of the students report having a mentor (Cronan-Hillex, Gensheimer, Cronan-Hillix, & Davidson, 1986). In graduate psychology programs, all students are assigned or select an advisor who typically works with students on dissertation and other research requirements as well as possibly providing clinical supervision or fostering professional development. Schlosser et al. (2003) argue that while the mentoring relationship is inherently positive, advising “refers to a positive or negative relationship which guidance may or may not be provided with regard to professional skill development” (Schlosser et al., 2003, p. 179). The authors argue that this distinction is made due to the fact that students often do not report problems with mentors and that students are often assigned to an advisor with whom they may or may not have selected as a professional mentor.

To explore the impact of the advising relationship, Schlosser and Gelso (2001) built upon the work of Efstation, Patton, and Kardash’s (1990) counseling supervision working alliance construct and developed and validated the self-report Advisory Working Alliance Inventory (AWAI). The AWAI assesses the working alliance between the advisor and advisee from the advisee’s perspective where the working alliance is defined to be “that portion of the relationship that reflects the connection between the advisor and the advisee that is made during work toward common goals (p. 158). In Schlosser and

Gelso's research, 281 graduate students (202 female, 79 male; 194 Caucasian, 35 Asian, 28 African American, 20 Latin American, and 2 Native American) in a doctoral counseling psychology program were asked to complete the AWAI, Research Attitudes Measure (RAM), Counselor Rating Form-Short version, and Attitudes Toward Research Scale (ATR). After an exploratory factor analysis, Schlosser and Gelso found a three factor solution which accounted for 57% of the total variance. The researchers labeled the AWAI factors as Rapport (22% variance), Apprenticeship (21% variance), and the Identification-Individuation (14% variance). In validating the measure, the researchers found positive correlations between the total AWAI and the CFS-S scores ($r=.80$, $p<.001$) and the subscales (Rapport, $r=.76$; Apprenticeship, $r=.71$; Identification-Individuation, $r=.65$; all ps $p<.001$). While the results produced consistently positive correlations, the researchers also notably found that students who had been working with their advisors between 13 and 24 months had significantly greater correlations between the AWAI and the CRF-S than students who had worked with their advisors for less than six months ($z=3.12$, $p<.05$) and between 7 and 12 months ($z=2.41$, $p<.05$). Additionally, positive correlations were found between the AWAI, the advisee's research self-efficacy ($r=.32$, $p<.001$; Rapport, $r=.36$, Apprenticeship, $r=.29$, Identification-Individuation, $r=.20$; all ps$<.001$), and advisee's current attitudes toward research ($r=.28$, $p<.001$). Once again, Schlosser and Gelso found that students who had been working with their advisor for 13 to 24 months had significantly greater correlations between the AWAI and the RAM than students who had been working with their advisor for less than six months ($z=4.13$, $p<.01$) and greater than 48 months ($z=2.03$, $p<.05$). However, the researchers did not find a similar relationship between the duration of the advisory relationship and the ATR.

Additional qualitative research conducted by Schlosser, Knox, Mosokovitz, and Hill (2003) supports the need for examining the impact of the advising relationship. In this study, 16 3rd year counseling psychology doctoral students were interviewed about their perspective on their relationship with their advisor. The researchers utilized consensual qualitative research (CQR) to analyze their data. The researchers found that similar to the research training empirical data, the qualitative data clustered into interpersonal (e.g., satisfaction, comfort disclosing, conflict management) and instructional (e.g., research, career guidance, and professional development) components. Participants reported that research was an important component of the advising relationship and that students who were satisfied with their advising relationship commented that their advisors guided them through the research process while unsatisfied students reported not receiving such guidance. Schlosser et al. (2003) also found that a positive advising relationship is one that contains good rapport, processes conflicts openly, and working together to facilitate the advisee's progress through the graduate program and development as an emerging professional. This study provides additional support that advising relationships can have positive effects where research related outcomes are concerned.

In 2005, Schlosser and Gelso constructed an advisor form of the AWAI. The researchers recruited 236 faculty members from APA-accredited counseling psychology programs. Each participant completed the AWAI-Advisor form, RAM, Session Evaluation Questionnaire, Scientist-Practitioner Inventory-20 (SPI-20), Costs and Benefits of Being an Advisor Scale (CBAS), and the Satisfaction Index. The participants completed these forms with a specific advisee relationship in mind. The researchers

found that advisor perceptions of a more positive advisory alliance were associated with advisor ratings of more satisfaction with the advising relationship ($r=.60$, $p<.001$), more benefits and fewer costs of advising ($r=.60$, $p<.001$), positive ($r=.38$, $p<.001$) and smooth advisor-advisee meetings ($r=.40$, $p<.001$), greater advisee interest in science ($r=.43$, $p<.001$) and practice ($r=.30$, $p<.001$), and greater advisee research self-efficacy ($r=.32$, $p<.001$). Knox, Schlosser, Pruitt, and Hill's (2006) qualitative examination of the advisory relationship from the perspective of the advisor found similar results and that advisors reported lower working alliances when working with difficult relationship advisees.

Schlosser and Kahn (2007) then examined the dyadic perspectives on the advising relationship. The researchers recruited 47 pairs of advisors and advisees from 32 APA-accredited counseling psychology programs. They found that advisees and advisors demonstrate a moderate level of agreement with one another on their perceptions of their advisory working alliance ($r(45)=.31$, $p<.05$). Also, advisors and advisee's agreed on the smoothness of their recent advisory interactions ($r(45)=.34$, $p<.05$) and their sense of the advisee's research competence/self-efficacy ($r(45)=.44$, $p<.01$). The authors note that the advisees and advisors did not have to agree on SPI for there to be a positive working alliance. However, the researchers suggest that factors other than interest agreement (e.g., working styles) may contribute to the quality of the alliance. While the researchers asked the advisee participants to complete the RTES-RS, the results of this measure in relation to the AWAI were not discussed in this study. It does not seem that there was a significant relationship between the RTE and the advisory working alliance.

Overall, these empirical investigations seem to suggest that the advising relationship has implications for professional development, research self-efficacy, and scholarly productivity. Specifically, the advisory working alliance seems to predict about 10% -18% of the variance within research self-efficacy, 7% of the variance within attitudes toward research, and 18% of the variance in the advisor's perception of the advisee's interest in research. As these studies are the initial studies within a new area of the literature, there are some limitations. First, these studies only utilized counseling psychology graduate students and faculty members. The advisory working alliance has not yet been explored with clinical psychology students. Additionally, two out of the three quantitative studies utilized the RAM as the research self-efficacy measure. This might not be the most appropriate measure to utilize as additional measures have been identified with strong psychometric properties. These studies also utilized the ATR and the SPI-20 as measures of interest in research. Again, these measures might not be the most suitable for use to measure advisee interest in research. The ATR in particular is only a five-item measure.

While this author certainly appreciates the foundation of these empirical studies, it seems that further research with the advisory working alliance should be conducted. Specifically, only one of the studies examined the RTE within the study and in this study it is unclear what the relationship is between the RTE and the advisory working alliance. It will be helpful to understand if the advisory working alliance can predict variance in interest in research or research self-efficacy above and beyond the RTE. None of the studies examined research outcome expectations in relation to the advisory working alliance. As research outcome expectations have been found to account for a large portion

of the variance in predicting research interest, it will be useful to know how the advisory working alliance relates to that SCCT construct. These studies did examine interests in research and practice but none of these studies examined either career goals or research productivity. Moreover, it is unclear how the advisory working alliance would relate to additional scientific training outcomes. Thus, it seems imperative to include the advisory working alliance as a predictor into a revised and extended version of Kahn's (2001) model to further understand how the advisory working alliance influences scientific training.

Participant Samples

Much of the empirical research has been conducted with individuals who have been trained in counseling psychology programs. Some early empirical research was conducted with professionals and others included students. Despite the fact that the field of clinical psychology also struggles to understand factors that influence scientific training in its graduates, very few studies have included clinical psychology graduate students. Also, very few studies have included a combination of students from both clinical and counseling psychology programs. One early study in the extant literature conducted by Gelso, Mallinckrodt, and Judge (1996) included participants from six psychology doctoral programs including four counseling psychology, one clinical psychology and one school psychology. This study was conducted to revise the research training environment scale. While it is laudable that the researchers revised the research training environment scale on a participant sample broader than just counseling psychology students, the researchers did not analyze differences between the programs as the program samples were too small. A more recent study conducted by Szymanski,

Ozegovic, Phillips, and Briggs-Phillips in 2007 included 223 psychology interns from clinical and counseling psychology doctoral programs to examine scholarly productivity within the internship research training environment. These researchers included students who were completing PhD and PsyD requirements. While the researchers examined differences between training philosophies of the academic programs (e.g. scientist-practitioner, practitioner scholar), the researchers did not compare clinical and counseling psychology programs.

Recent poster research conducted by Kahn and Schlosser (2009) examined the research training environments and vocational outcomes within 42 doctoral psychology programs. The researchers included 233 doctoral students from 9 counseling, 24 clinical, and 9 school psychology programs. The participants completed the RTES-R, IRQ, and the brief version of the SERM. After conducting one way ANOVA analysis, the researchers found that 16% of the variance in RTE ratings was attributable to program differences (χ^2 (41) =83.22, p<.001). Personal communication with one of the authors (Kahn, 2009) regarding additional analysis not reported in the poster demonstrated that clinical and school programs differed in their RTE perceptions with clinical programs being rated more positively than school programs. Counseling psychology programs were found to be between the two. The author shared that they did not examine potential differences in research self-efficacy or interest in research. This research is one of the only ones that has included adequate sample sizes from differing programs and has begun to explore differences between programs. This study demonstrates that it is necessary to further examine differences in the scientific training outcomes between types of doctoral programs. The present study will be the first to include equivalent samples from

counseling and clinical psychology doctoral programs in a model predicting scientific training outcomes.

Research Hypotheses

The purpose of this study is to examine how contextual variables help and hinder scientific training in counseling and clinical psychology doctoral programs. This study will extend earlier theoretically driven empirical models of research interest (Bishop &Bieschke, 1998) and scholarly productivity among counseling psychology doctoral students (Kahn, 2001; Kahn & Scott, 1997). The proposed model within this study is inspired by Lent et al.'s (1994) social cognitive career theory and Gelso's (1979, 1993, 1997) theory of research training environment.

Recent literature has demonstrated that the advisory working alliance directly impacts research training outcomes such as research self-efficacy beliefs and research interest. These results, as well as previous research that has demonstrated that interpersonal aspects of research contribute to research training outcomes, suggest that the advisory working alliance be included as a predictor of scientific training outcomes. Additionally, a shift towards understanding training competencies within the field of psychology is occurring. Past research training literature has only examined research interest and/or research productivity as training outcomes. However, these outcomes only represent a narrow assessment of the scientific training competencies. Several scholars (e.g., Gelso & Fretz, 2001; Bieschke et al., 2004; Fouad et al., in press) have identified other competencies or aspects which are equally important attainments of scientific training. These competencies delineate certain actions and values that embody the scientist within the field of psychology. Currently, there are no studies that have

examined several factors (e.g., scholarly productivity, evidence based practice for psychologists, and values towards research) as one latent construct representing the actions of a Scientist. Therefore, it seems essential to include alternate scientist actions beyond scholarly productivity into an extended causal model.

The proposed extended model therefore will include the advisory working alliance as a predictor variable, and will instead examine aspects of being a scientist (which includes scholarly activity) as an ultimate scientific training outcome. Much of the current research has been conducted using samples of only counseling or clinical students or psychologists. It is rare to find samples that include both counseling and clinical psychology graduate students. As both of these programs are grounded in science, it is important to both populations to understand how factors influence scientific training. Therefore, this study will also extend previous literature by including both counseling and clinical psychology students.

The proposed model is presented in Figure 1. The purpose of this study is to assess the fit of this model predicting scientific-mindedness training outcomes. Predictors in this model include perceptions of research training environment, advisory-working alliance, year in program, program type, research self-efficacy, research outcome expectations, interest in research, and career goals. All relationships specified in this model are hypothesized to be positive and the theoretically based indirect effects specified are hypothesized to be significant. This model includes the following hypotheses:

Hypothesis 1: According to RTE theory and SCCT, the research training environment will directly contribute to research self-efficacy beliefs. This is also consistent with

research (Bishop & Biescke, 1998; Kahn, 2001; Kahn& Miller, 2000; Kahn& Scott, 1997; Phillips & Russell, 1994)

Hypothesis 2: As proposed by SCCT, the research training environment will directly contribute to research outcome expectations. This is also consistent with research (Bishop & Biescke, 1998; Kahn, 2001)

Hypothesis 3: As hypothesized by RTE, the research training environment will directly contribute to research interest. This is also consistent with research (Kahn, 2001; Kahn & Scott, 1997)

i. As proposed by SCCT, the research training environment will also indirectly influence research interest due to its direct relationship to research self-efficacy beliefs and outcome expectations.

Hypothesis 4: As proposed by RTE, the research training environment will directly contribute to scientific-mindedness actions. This is a partially new hypothesis. Research has found that RTE has contributed to the variance of research production (Brown et al., 1996; Krebs et al., 1991)

Hypothesis 5: The advisory working alliance will directly contribute to research self-efficacy beliefs. This is consistent with research (Schlosser & Gelso, 2001; Schlosser & Kahn, 2007). Additionally, this is hypothesized due to the SCCT proposition that states that the environment directly impacts self-efficacy beliefs.

i. Students who have worked with their advisor for 6 months or less will have lower research self-efficacy beliefs than those who have worked with their advisor for 13+ months. This is based on Schlosser and Gelso's 2001 research.

Hypothesis 6: The advisory working alliance will directly contribute to research outcome expectations. This is a new hypothesis to be tested. This proposition is based on tenets of SCCT which propose that aspects of the environment directly influence outcome expectations.

Hypothesis 7: The advisory working alliance will directly contribute to interest in research. This is consisted with empirical research (Schlosser & Gelso, 2001). This hypothesis is based on RTE theory which proposes that interpersonal factors are an integral part of the environment and may directly impact interest in research.

i. Students who have worked with their advisor for 6 or less months will have the lowest correlation between the advisory working alliance and interest in research.
ii. Students who have worked with their advisor for 37-48 months will have the highest correlation.

Hypothesis 8: The advisory working alliance will directly contribute to career goals. This is a new hypothesis to be tested.

Hypothesis 9: The advisory working alliance will directly contribute to scientific-mindedness outcomes. This is a new hypothesis to be tested.

Hypothesis 10: The student's year in program will directly contribute to research self-efficacy. This is consistent with past research (e.g., Bishop & Bieschke, 1998; Kahn & Scott, 1997; Phillips & Russell, 1994).

Hypothesis 11: The student's year in program will directly contribute to scientific mindedness outcomes. This is a partially new hypothesis and is based off of past research (Kahn, 2001; Kahn & Scott, 1997).

Hypothesis 12: Research self-efficacy beliefs and research outcome expectations will directly contribute to interest in research. This hypothesis is consistent with proposition 1 of Lent et al.'s (1994) social cognitive career theory as well previous research (e.g., Bishop & Bieschke, 1998; Bieschke et al., 1995, Kahn & Scott, 1997).

Hypothesis 13: Research self-efficacy beliefs will directly contribute to research outcome expectations. This hypothesis is consistent with proposition 12 of SCCT and previous research (e.g., Bishop & Bieschke, 1998; Kahn, 2001).

i. Research self-efficacy will also have indirectly contribute to research interest through its relationship with outcome expectations. This is proposed by SCCT and is supported by research (Bishop & Bieschke, 1998).

Hypothesis 14: Research self-efficacy beliefs and research outcome expectations will directly contribute to career goals. This hypothesis is consistent with proposition 3 and 4 of Lent et al.'s (1994) SCCT.

i. Research self-efficacy will also indirectly contribute to career goals through its relationship with outcome expectations. This is proposed by SCCT propositions 3 and 4.

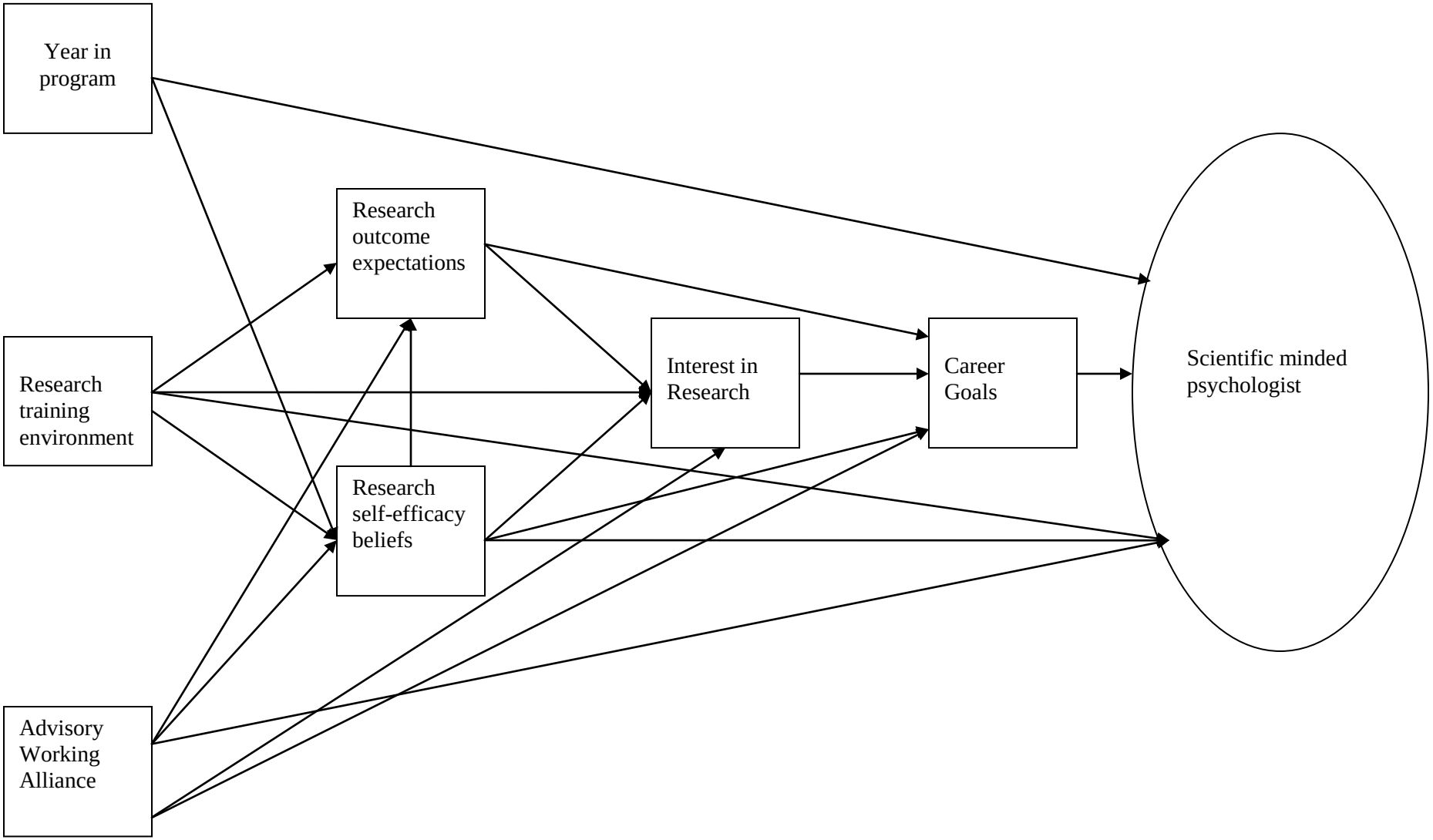
Hypothesis 15: As proposed by SCCT, research self-efficacy beliefs will directly contribute to scientific mindedness outcomes. This is supported in part by the empirical literature (Kahn, 2001; Kahn & Scott, 1997; Phillips & Russell, 1994).

Hypothesis 16: As proposed by SCCT, research interest will directly contribute to career goals. This is also supported in the empirical literature (Kahn and Scott, 1997).

i. According to SCCT, research interest will indirectly contribute to scientific-mindedness outcomes through the influence of career goals.

Hypothesis 17: As proposed by SCCT, career goals will directly contribute to scientific mindedness outcomes. This is also supported in the empirical literature (Kahn & Scott, 1997).

Figure 1-Proposed Model



Chapter Three

METHODS

Chapter Two presented a synthesis of the theoretical and empirical literature on the research training environment, research interest, research self-efficacy, research outcome expectations, research productivity, the advisory working alliance, alternate scientific training outcomes, and social cognitive career theory applications to these constructs. This chapter presents the method for exploring the hypotheses of the proposed study. Descriptive information about the participants, recruitment methods, procedure for data collection, measures that were included in the survey, and data analysis procedures are presented.

Participants

A total of 279 clinical and counseling psychology doctoral students responded to the survey in the present study. Incomplete survey responses (i.e., did not reach the end of the survey), duplicate participants, non-current student status, and outlier status resulted in the elimination of 64 participants; 215 participants were used for data analyses. This represents an initial response rate of 35.6% and after the removal of 64 cases, a final response rate of 27.5% response rate. Table 1 includes demographic characteristics for the final sample of 215 participants. Participants' age ranged from 22 years old to 57 years old; the mean age for the sample was 28.17. Participants' year in program ranged from first year to beyond the sixth year; the mean year for the sample was 3.17. One hundred sixty-seven participants identified themselves as female (77.7%), 48 participants as male (22.3%), and 0 as transgender. The ethnic racial diversity of the sample includes 9 African-American/Black (4.2%), 11 Asian/Asian American (5.1%),

170 Caucasian/White (79.1%), 11 Hispanic/Latino/Latina (5.1%), 1 American Indian/Alaska Native (.5%), 8 Biracial (3.7%), and 5 Other (2.3%) participants. Additionally, the sample includes 50 Psy.D. participants (23.3%) and 165 Ph.D. participants (76.7%). One hundred thirty-nine of the participants indicated that they were in a clinical psychology program (64.7%) and 73 (34%) of the participants indicated that they were in a counseling psychology program. These data are similar to the national demographics of doctoral level psychologists in training (i.e., 70% women and 30% women in 2000; 71% white and 29% minority in 2010; and 75% clinical psychology Ph.D. degrees and 25% counseling psychology Ph.D. degrees in 2006) compiled by the APA research office and retrieved from their website (http://www.apa.org/workforce/publications/grad-00/table-9.pdf; http://www.apa.org/workforce/publications/11-grad-study/table-09.pdf; http://www.apa.org/workforce/snapshots/2006/figure-12.aspx) on May 15th, 2011.

Participants reported being trained in various models of scientific training including Scientist-Practitioner (142, 65.6%), Practitioner-Scholar (40, 19%), Clinical Scientist (22, 10.4%), Scholar-Practitioner (2,.9%), Local Clinical Scientist (5, 2.3%), and Scientist-Practitioner-Advocate (4,1.8%). Most participants reported receiving an equal emphasis on science and practice in their training (41.9%), others received more of an emphasis on scientific training than clinical skills (29.8%) or more of an emphasis on clinical training than scientific training (27.4%). Finally, participants reported being assigned to their advisor as well as selecting their advisor. Fifty participants reported being assigned their advisor (22.8%), 148 participants reported selecting their advisor

(68.8%), and 17 (7.9%) participants reported other means of being matching with their advisor such as rank order or working with their advisor prior to entering the program.

Procedures

Recruitment. The recruitment procedures for this study were developed according to the guidelines outlined by Kahn (2001) and suggestions made by Weathers, Furlong, and Solorzano (1993). Unlike Kahn's (2001) study however, this study was conducted over the internet.

Several steps were taken prior to contacting students from clinical and counseling psychology programs . First, a list of all APA-accredited clinical and counseling psychology doctoral programs in the U.S. was generated. These lists are accessible via the American Psychological Association's website, www.apa.org. Counseling and clinical psychology programs were categorized into doctor of philosophy (Ph.D.) and doctor of psychology (Psy.D.) programs. It was found that approximately 173 Clinical Ph.D., 62 Clinical Psy.D., 66 Counseling Ph.D., and 3 Counseling Psy.D. programs exist.

Programs were then further categorized by size, research intensity, and geography, so that this study's sample could represent the professional psychology field at large. Programs were categorized by inclusion or exclusion within the Association of American Universities (AAU). In general, AAU universities tend to be larger universities and designated as research intensive universities. Non-AAU programs tend to be small to medium sized universities and tend to be less research intensive universities. There are approximately 62 universities that are within the AAU. Programs were also categorized into geography regions within the United States including northeast, southeast, midwest, and west.

Programs were then selected to represent the field on numerous levels including geography, size, subfield type (e.g., clinical or counseling), degree type (e.g., Ph.D. or Psy.D), research rigor (e.g., AAU or non-AAU). To best represent the professional psychology field, this study's recruitment sample only includes Clinical Ph.D., Clinical Psy.D., and Counseling Ph.D. programs. As Psy.D. programs represent approximately 20% of the field and Ph.D. programs represent 80% of the field, it was determined to recruit a similar sample for this study. Additionally, as Clinical programs represent approximately 77% of the field and Counseling programs represent approximately 23% of the field, this study's recruited sample included a larger (60%) amount of clinical programs. Additionally, as there are more non-AAU programs in existence, it was determined to select more non-AAU programs for this sample.

A total of 17 programs were invited to participate in this study including: 3 Clinical Psy.D. programs (non-AAU programs); 7 total Clinical Ph.D. programs where 3 programs are within the AAU and 4 non-AAU universities; and 7 total Counseling Ph.D. programs where 3 programs are within the AAU and 4 non-AAU universities. These programs represent differing geographic areas such that four programs from the northeast, five programs from the southeast, four programs from the Midwest, and four programs from the west were invited to participate. Finally, an additional 17 programs with the same categorization (i.e., 3 Clinical Psy.D., 7 Clinical Ph.D., and 7 Counseling Ph.D.) were selected for a second round of recruitment in the case of the majority of the first round invited programs choose not to participate in the study.

The office for research protections at Penn State University determined that the training directors from each of the selected psychology programs could not provide a list

of current students in their programs to the principal investigator due to privacy concerns but could forward a recruitment notice to their students on the principal investigator's behalf. Training directors from the initial 17 programs were contacted via electronic email (See Appendix A). Training directors were provided a brief summary of the study and were asked if their program would require institution review board approval (IRB) at their university in order for their students to participate in this study. Finally, training directors were asked to invite their current graduate students to participate in the study by forwarding a recruitment invitation (see Appendix A) to their current graduate student listserv. Current students were defined as first year students through internship year. Students therefore received a recruitment invitation to this study on their program's listserv.

All 17 training directors were first contacted via email regarding recruitment of their program's graduate students. One southeastern program required IRB approval from their university prior to forwarding the recruitment invitation to their students. IRB approval was received from this southeastern university prior to current graduate students receiving the recruitment invitation via the program's listserv. Training directors from four programs, one northeastern Counseling psychology Ph.D. non-AAU program, one western Clinical psychology Ph.D. AAU program, one southeastern Clinical Ph.D. non-AAU program, and one Midwestern Psy.D. non-AAU program, did not initially respond to the recruitment invitation letter. The principal investigator followed up with each of these training director's with one phone call and one email regarding participation in this study. Three of these four training directors continued to not respond to attempts to recruit students from their graduate program. These three programs were not contacted

further and were not included in the final eligible number of participants. Data was thus received from 14 (8 clinical, 6 counseling) out of the invited 17 programs. A total of 782 students from 14 programs were eligible to participate in the study.

Inclusion criteria. Participants are current doctoral students (i.e., first year through the pre-doctoral internship level) in APA-accredited clinical or counseling psychology doctoral programs. All participants have a graduate advisor which refers to the faculty member who has the greatest responsibility for helping guide through the graduate program.

Data Collection. The data was collected and stored using an Internet web-based survey on psychdata.com (www.psychdata.com). Once Penn State's Office of Research Protections determined this study to be exempt and granted approval for data collection, participant consent form, instructions, and instruments for the survey were uploaded onto this website. Then, initial recruitment invitations including the survey web address link were sent to the 17 selected training directors to forward to their listserv of current students.

Weathers, Furlong, and Solorzano (1993) identified specific procedures which correlated to higher response rates in survey research. These procedures include follow-up contacts with non-respondents within two to four weeks, and including an incentive to complete the survey. Using these guidelines, the principal investigator requested that training directors send out a total of three recruitment invitations to their current student listervs. Training directors were asked to forward to their current student listserv an initial invitation (Appendix B) to students which included a short introduction to the survey, notified participants that their responses would not be in any way accessible to their

training directors or members of their training program, and included a web address link to the informed consent and survey on Psychdata.com. Training directors were contacted two to three weeks after the initial recruitment and were asked to forward a follow-up invitation (Appendix D) to their listserv. Training directors were then contacted two to three weeks later to forward a final recruitment invitation (Appendix F) to their current graduate students. Using Weathers et al. (1993) guidelines, all of the recruitment invitations included notification of an incentive to complete the survey. Participants were notified that one $20.00 gift card to Amazon.com and one $5.00 gift card to Starbucks would be awarded to two participants from their graduate program that completed the survey. Participants were notified that a raffle drawing would be held after data collection ceased to award the gift cards (see Appendix S).

Once participants received the recruitment invitation from their listserv and utilized the hyperlink to Psychdata.net in the recruitment notice, participants were asked to read an informed consent form (see Appendix G). The informed consent explained the purpose of the study and ensured confidentiality. Participants were also informed that their participation was completely voluntary and that they would not be penalized in any way if they decided not to participate. Participants were also reminded that they could choose not to answer specific questions or withdraw from the survey at any time. Finally, the informed consent requested that only participants 18 years and older and who were currently a psychology doctoral graduate student with a graduate advisor continue to complete the survey. Participants provided implied consent through the secure PsychData website by clicking on a “continue” button in the informed consent and by completing the survey instruments online.

After reading and accepting the informed consent, participants were randomly assigned to one of three surveys (e.g., A, B, or C) which included 142 questionnaire items. Each survey contained identical survey instruments and questions. The three surveys only differed in the ordering of the instruments. Participants were asked to complete the following 10 instruments: (a) a brief demographic questionnaire, (b) the Research Training Environment Scale Revised Short (Kahn & Miller, 2000), (c) the Advisory Working Alliance Inventory (Schlosser & Gelso, 2001), (d) the Self-Efficacy in Research Measure, short version (Kahn & Scott, 1997;Phillips and Russell, 1994), (e) Research Outcome Expectations Questionnaire short form (Bieschke, 2000), (f) the Interest in Research Questionnaire (Bishop & Bieschke, 1994), (g) Career Goals (Kahn & Scott, 1997), (h) Scholarly Activity Scale Revised (Marks, 2009), (i) Evidenced Based Practice Attitude Scale (Aarons, 2004), and (j) Positive and Negative Attitude Toward Treatment Research (Nelson & Steele, 2007). At the end of each survey, each participant was asked whether they wished to participate in the raffle drawing for the Amazon.com and Starbucks gift cards for their program. If participants opted out of the raffle, their survey responses were submitted electronically. If participants wished to participate in the raffle drawing, their responses were submitted electronically and they were taken to a separate survey to complete the raffle drawing questionnaire. This separate survey ensured that participant survey responses were not linked to their names, contact information, or any other identifiable demographic information.

Security of responses and protection of participants. This study used www.psychdata.net online survey system to collect and store data. This system is a professionally developed server and many studies have used it. All of the participants'

responses were encrypted using 128 bit SSL technology (Secure Socket Layer), which is equivalent to the industry standard for securely transmitting credit card information over the internet. Once research data was stored on the psychdata sever, it was held in an isolated database that was only accessed by the principal investigator. Participant responses were not linked to names, contact information, or any identifiable demographic information.

Measures

Participant demographic questionnaire (see Appendix H). An online web based questionnaire to be completed by the participant was used to gather information on the following: age, gender, relationship status, ethnicity, current student status, year in the program, program subfield (e.g., clinical or counseling), degree seeking (e.g., Psy.D. or Ph.D.), graduate school progression, training model, theoretical orientation, program accreditation status, how advisors were assigned to students, and program emphasis on research versus clinical work in the program.

Research Training Environment Scale-Revised (see Appendix I). The RTES-R-S (Kahn & Miller, 2000) was designed to measure graduate student global perceptions of the research training environment. The RTES-R-S is a shorter 18-item version of the longer 54-item RTES-R (Gelso, Mallinckrodt, & Judge, 1996). The RTES-R-S only provides one total score representing the global perceptions of the research training environment as compared to the RTES-R which provides a total score as well as nine subscale scores representing the nine training environment ingredients. Kahn and Miller (2000) suggest that when a researcher is measuring the research training environment as a variable in a structural equation model, it is useful to only use the total score representing

the student's global perception of the training environment. The RTES-R-S was developed to be more time efficient while still providing a reliable and valid measure of the training environment.

The RTES-R-S consists of self-report items that represent the nine factors in the research training environment as illustrated by Gelso (1993, 1997) including: (1) faculty modeling of appropriate scientific behavior; (2) positive reinforcement of scholarly activities; (3) early, minimally threatening research involvement; (4) teaching relevant statistics and the logic of design; (5) teaching students to look inward for research ideas; (6) science as a partly social experience; (7) emphasizing that all studies are flawed and limited; (8) focus on varied investigative styles; (9) wedding of science and clinical practice. Each factor is measured by two items where one is a positively worded item and one is a negatively worded item. Students rate the items on a 5-point Likert scale ranging from 1 (disagree) to 5 (agree). Items include statements such as "I have felt encouraged during my training to find and follow my own scholarly interests"; "The faculty members of my graduate program show excitement about research and scholarly activities" and "Our faculty seems interested in understanding and teaching how research can be related to counseling practice." The total scores on the RTES-R-S range from 18 to 90 where higher scores reflect perceptions of a more positive research training environment.

Kahn and Miller's (2000) development and validation research initially utilized the data from Kahn and Scott's (1997) 270 doctoral counseling psychology participants to validate the measure. The researchers found that the Spearman-Brown formula predicted an internal consistency estimate of .86 for the short form. Additionally, a reliability analysis of the short form produced a coefficient alpha of .87 with 270 doctoral

counseling psychology students. Additional coefficient alphas have been found to be .85, .87, and .90 (Kahn, 2001; Phillips, Szymanski, Ozegovic, & Briggs-Phillips, 2004; Szymanski et al., 2007). A correlation between the RTES-R and the RTES-R-S was found to be .96 suggesting substantial overlap between the measures. In Kahn and Miller's (2000) cross-validation study of the RTES-R-S, the researchers utilized 80 counseling psychology doctoral students. The researchers found a coefficient alpha of .88 and that the RTES-R-S scores correlated positively and significantly with research self-efficacy as measured by the RAM ($r=.49$, $p<.01$), interest in scientist activities ($r=.47$, $p<.01$), and investigative personality type ($r=.34$, $p<.01$). The researchers then conducted a second cross-validation study where they administered the RTES-R-S as a stand-alone instrument (as compared to administering both the RTES-R and RTES-R-S), the Self-Efficacy in Research Measure (SERM; Phillips & Russell, 1994), the Interest in Research Questionnaire (IRQ; Bishop & Bieschke, 1994), and the Investigative and Social Subscales from the VPI-B (Holland, 1985b) to 155 counseling psychology doctoral students (117 female, 37 male). Similar to the results of the first two studies, Kahn and Miller found adequate internal consistency of .86. Additionally, as expected, the RTES-R-S scores correlated significantly and positively to research self-efficacy ($r(152)=.27$, $p<.01$) and interest in research activities ($r(152)=.32$, $p<.001$). In the current study, the Cronbach's alpha is .80.

Advisory Working Alliance Inventory (see Appendix J). The AWAI-S (Schlosser and Gelso, 2001) is a self-report measure intended to measure the advisor-advisee working alliance from the student's perspective. The working alliance concept is based on the psychotherapy alliance (Bordin, 1979; Horvath & Greenberg, 1989) and

counseling supervision ((Efsation, Patton, & Kardash, 1990). The 5-point Likert 30-item scale measures three factors including Rapport, Identification-Individuation, and Apprenticeship. The 11-item Rapport subscale measures the part of the advising relationship that reflects the advisor's support and encouragement of the advisee (Schlosser & Gelso, 2001). This factor also includes the emotional bond between the advisor and advisee that occurs out of the work together. Higher scores on this subscale signify an alliance where there is a strong interpersonal connection, and where the advisee feels respected, encouraged, and supported by his or her advisor (Schlosser & Gelso). The 5-item Identification-Individuation subscale is intended to measure part of the emotional bond between the advisor and the advisee reflecting the advisee's admiration of the advisor (Schlosser & Gelso, 2001). Low scores on this subscale indicate that the advisee does not want to be like his or her advisee. The 14-item Apprenticeship subscale measures the part of the relationship where the advisors promote the advisee's understanding of the tasks, goals, and process of graduate school (Schlosser & Gelso, 2001). Higher scores on this subscale denote a relationship where the advisee learns from his or her advisor, the advisee feels like the advisor facilitates his or her development, and there is a mentor-protégé quality to the working alliance. Lower scores may indicate an instructional disconnection (Schlosser & Gelso).

Internal consistency for the AWAI total and subscale scores has been demonstrated in Schlosser and Gelso's research with 281 counseling psychology doctoral students. Specifically, the Cronbach's Alphas were .95, .90, and .93 for the AWAI total scores, .93, .84, .89 for the Rapport subscales, .91, .85, .90 for the Apprenticeship subscales, , and 77, .57, .63 for the Identification-Individuation subscale. More recent

internal consistency for the total scores was found to be .84 with a population of 47 (41 female, 6 male) counseling psychology doctoral students (Schlosser & Kahn, 2007). Two-week test-retest reliability coefficients were .92 for the total scores, .89 for Rapport, .92 Apprenticeship, and .75 for the Identification-Individuation. In the current study, the Cronbach's Alpha is .95. Evidence of convergent validity was demonstrated through positive correlations between the AWAI and the Counselor Rating form. Schlosser and Gelso contend that positive advisory working alliances are indicative of an advising relationship where the advisee perceives his or her advisor as expert, attractive, and trustworthy. On the Counselor Rating Form on a 7-point scale, the means for the perceptions of the advisors on the subscales were Expertness (5.85), Attractiveness (5.47), and Trustworthiness (5.65). Additional evidence for validity has been demonstrated by significant correlations with research self-efficacy (total score $r=.32$, $p<.001$; subscales Rapport $r=.36$, Apprenticeship $r=.29$, Identification-Individuation, $r=.20$ all $ps<.001$) and research attitudes ($r=.28$, $p<.001$).

Self-Efficacy in Research Measure Brief Version (see Appendix K). While three measures of research self-efficacy currently exist, the brief version of the Self-Efficacy in Research Measure (SERM) has been utilized in recent studies utilizing the integration of the RTE and SCCT frameworks (Kahn, 2001; Kahn and Scott, 1997; Szymanski, Ozegovic, Phillips, & Briggs-Phillips, 2007). The brief 12-item version of the SERM was created by Kahn and Scott in 1997 from the original 33-item self-report measure. The measure assesses four areas of research self-efficacy: research design skills (e.g., formulating hypotheses), practical research skills (e.g., keeping records during a research project), quantitative and computer skills (e.g., understanding computer printouts), and

writing skills (e.g., writing the introduction and literature review for a dissertation). Each domain is assessed by three questions. Participants are asked to indicate their confidence either in successfully performing each task or in their belief that they possess the skill for each item. Confidence is measured on a scale from 0 to 9 where 0 indicates no confidence and 9 indicated complete confidence for that task. Total scores can range from 0 to 108 (each factor can include up to 27), with higher scores reflecting greater research self-efficacy.

Phillips and Russell (1994) created the original measure based on a sample of 219 counseling psychology students. The authors developed the SERM based off of the Survey of Research Training (SORT; Royalty & Reising, 1986). In that study, the researchers found good internal consistency with a Cronbach's alpha of .96. The subscales also had good internal consistency: research design skills alpha=.90, practical research skills alpha=.83, quantitative and computer skills alpha=.93, and writing skills=.94. Phillips and Russell found that the SERM correlated with the research training environment (r=.39) and research productivity (r=.45). In Kahn and Scott's (1997) revision of the original instrument, the authors sampled 287 counseling psychology doctoral students. Kahn and Scott's brief version proved to have generally acceptable internal consistency: total scale alpha=.90, research design skills alpha=.78, practical research skills alpha=.57, quantitative and computer skills alpha=.87, and writing skills alpha=.80. Kahn and Scott also reported positive correlations with research training environments and research productivity (R^2=.28). More recent research has found similar results reporting total strong internal consistency Cronbach alpha=.90 (Kahn, 2001; Szymanski et al., 2007). The Cronbach alpha in this current study was found to be .91.

Research Outcome Expectations Questionnaire-Short Form (see Appendix L).

The ROEQ-R (Bieschke, 2000; Bieschke & Bishop, 1994) is an 8-item short version of the original 20-item scale used to measure students' self-reported expected consequences of conducting research. Participants are asked to respond on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Items include statements such as "Involvement in research will enhance my job/career opportunities" and "Research involvement will lead to a sense of satisfaction." The coefficient alpha for the longer version of the ROEQ has been reported to range from .88 (Kahn, 2001), .89 (Bieschke & Bishop, 1994; Bishop & Bieschke, 1998) to .90 (Bieschke, Bishop, & Herbert, 1995)

In Bieschke's (2000) study, an exploratory and confirmatory factor analysis was conducted on the 20-item ROEQ. A one factor model was identified which seems to assess positive outcome expectations one might believe if one engages in research activities. Bieschke (2000) suggested that high scores on this scale seem to reflect the belief that participation in research activities can result in contributions to the field, professional development, and increased respect for others. The confirmatory factor analysis confirmed the one factor structure of the ROEQ and indicated that 8-items represent an excellent fit to the data. The item-total correlation coefficients and the coefficient alphas for the 8-item scale were found to be comparable to the longer versions. Specifically, coefficient alpha for the one factor model was reported as .90 and item-total correlation coefficients ranged from .50 to .80 (Bieschke, 2000). Szymanski et al. (2007) reported an alpha coefficient as .93.Validity was also supported by examining the ability to predict research interest over and above research self-efficacy beliefs (Bieschke, 2000). In the current study, the Cronbach's alpha is .92.

Interest in Research Questionnaire (see Appendix M). While there are currently three measures that exist to examine interest in research, the IRQ has been utilized in studies utilizing the SCCT framework (e.g., Bishop & Bieschke, 1998; Kahn, 2001). As this study will be testing RTE and a portion of the SCCT model, the IRQ measure will be used in this study. The IRQ (Bishop Bieschke, 1994) is used to measure students' interest in research activities. The measure is a 14-item self-report scale which requires participants to indicate degree of interest on a 5-point Likert scale ranging from 1 (very disinterested) to 5 (very interested). Research activities are defined to include both qualitative and quantitative approaches. Sample research activity items include "discussing research ideas with my colleagues," "conducting a literature review," and "being a member of a research team." Total scores can range from [16 to 80] where higher scores reflect greater research interest. Reported internal consistency has been adequate as evidenced by coefficient alphas of .89 (Bishop & Bieschke, 1994), .90 (Bieschke et al., 1995), .91 (Bishop & Bieschke, 1998; Kahn, 2001) and .94 (Szymanski et al., 2007). The Cronbach alpha in the current study is .94. Additionally, validity has been supported by correlating the IRQ scores with measures assessing research training environment ($r=.40$, $p<.05$; Kahn & Scott, 1997), research outcome expectations ($\beta=.64$, $p<.001$; Bishop & Bieschke, 1998) research self-efficacy ($\beta=.17$, $p<.01$; Bishop & Bieschke, 1998). The total score on the IRQ has also correlated significantly with the Investigative scale of the Vocational Preference Inventory (Holland, 1985; $r=.29$, $p<.05$) (Bieschke, Bishop & Herbert, 1995; Bishop & Bieschke, 1998). The IRQ total score has not correlated with any other Holland type (e.g. Artistic, Social, Enterprising, Realitic, or

Conventional). These are important findings as the Investigative type tend to be analytical, methodical, precise, and curious.

Career Goals Measure (see Appendix N). The Career Goals Measure (Kahn & Scott, 1997) is an 11-item measure which asks students to rank order their top three preferences for working in one of 11 environments. These environments include (A) academic (large university), (b) academic (small college), (c) counseling center, (d) Veterans Administration hospital, (e) research facility, (f) government agency, (g) industry, (h) community mental health center, (i) private practice, (j) full-time consultations, and (k) other setting. Using Kahn and Scott's (1997) method of analysis, the top three choice career goals will receive a score of 1 for any of the three choices in which they select a research setting (e.g., academic or research facility) and a score of 0 for those in which they selected a practice setting (e.g., counseling center, private practice). A weight of 3 will be multiplied to the score (i.e. 1 or 0) obtained from their first choice and a weight of 2 was multiplied to the score from the second choice. Therefore, students' total score will range from 0 to 6, with a sum of 0 indicating primary interest in clinically-oriented career, and 6 indicating primary interest in a research-oriented career.

Scholarly Activity Scale Revised (see Appendix O). The SAS-R is a revised version of the Scholarly activity Scale (Kahn & Scott, 1997) created for this study. The original SAS is a 9-item measure which assesses the students' level of scholarly activity including both past accomplishments and current production of research. Sample items include "How many published (either empirical or otherwise) have you authored or coauthored in a refereed journal? (include manuscripts in press)", "How many

presentations have you made at local, regional, or national conventions?", and "Are you currently involved in gathering data?". Following Kahn and Scott's (1997) lead, responses to items are dichotomized where a score of 1 indicates that a student has some involvement in the research activity and a score of 0 indicates that the student has no experience in that activity. The nine items are then scored providing a total score ranging from 0 to 9 with higher scores reflecting greater research activity. Internal consistency Kuder-Richardson-20 coefficients in studies with doctoral psychology students were reported as .68 (Kahn & Scott, 1997) and .70 (Kahn, 2001). In Szymanski et al.'s (2007) research with pre-doctoral internship students, the reported Kuder-Richardson-20 internal consistency as .79. Additionally, Kahn and Scott reported that the SAS positively correlated with interest in research and the science-relatedness of students' career goals.

For this study, this measure was revised such that it includes a total of 16 items. In this version, questions distinguish between types of written work (e.g., empirical manuscripts, non-empirical manuscripts, books/book chapters, and grants). An additional question was included to assess other scholarly activities such as professional leadership roles held (i.e., officer of professional association, committee chair or member in professional association). These revisions were made to include scholarly work of graduate students that might not have been as clearly assessed in the original version. Similar to the original version, participant responses were then scored according to their involvement in the activity. A score of "0" for an item denoted no activity and a score of "1" denoted being engaged in the activity. Total scores on this measure ranged from 0 to 16. The internal consistency of the SAS-R in the current study has an alpha of .795.

Evidence Based Practice Attitude Scale (see Appendix P). The EBPAS (Aarons, 2004) is a measure which assesses provider attitudes toward the adoption of evidenced based practices. This instrument was included in the present study to specifically address the third component of Fouad et al (2009) scientific knowledge and methods competency in professional psychology: having knowledge, understanding and application of the concept of evidenced based practice.

The EBPAS is a 15-item self-report measure which asks providers to rate on a 5-point Likert scale from not at all (0) to a very great extent (4) their attitudes towards using new types of therapy, interventions, or treatments. Items include statements such as "I am willing to use new and different types of therapy/interventions developed by researchers," "Research based treatments/interventions are not clinically useful," and "I would try a new therapy/intervention even if it were very different from what I am used to doing." The measure includes four different subscales including Requirements, Appeal, Openness, and Divergence. The Requirements subscale measures the extent to which a provider would adopt EBP if it were required by an agency, supervisor, or state. The Appeal subscale measures the extent that a provider would adopt EBP if it were intuitively appealing, could be used correctly, or was being used by colleagues who were happy with it. The Openness subscale includes the extent to which a provider is generally open to trying new interventions. The Divergence subscale assesses the extent to which the provider perceived EBP as not clinically useful and less important than clinical experience. In this study, the total scores were used.

Internal consistency for the EBPAS total and subscale scores has been demonstrated in Aaron's (2004) research with 322 professionals from counseling and

related fields such as social work and marriage counseling (Aarons, 2004). Specifically, the Cronbach's alphas were .77 for the EBPAS total score, .80 for Appeal subscale, .90 for Requirements subscale, .59 for Divergence subscale, and .78 for the Openness subscale. In Aarons's more recent work with colleagues McDonald, Sheehan, and Walrath-Greene (2007), strong internal consistency was also found with a sample of 221 professional providers. Specifically the researchers found the Cronbach's alpha's to be .79 for the total score, .74 for the Appeals subscale, .93 for the Requirements subscale, .66 for the Divergence subscale, and .81 for the Openness subscale. Additional research establishing the concurrent or predictive validity of the EBPAS has not yet been conducted. In the current study, the Cronbach's alpha for the total score is .80.

Positive and Negative Attitudes toward Treatment Research (see Appendix Q). The PATR and the NATR (Nelson & Steele, 2007) are two measures which assess attitudes toward treatment research. These brief instruments are included in the present study to specifically address the third component of Fouad et al.'s (2009) scientific knowledge and methods competency in professional psychology: having knowledge, understanding and application of the concept of evidenced based practice.

Both the PATR and NATR are 4-item self-report measures which ask providers to rate on a 5-point Likert scale from completely disagree (1) to completely agree (5) their attitudes towards treatment research. Items on the PATR include the statements "Most relevant treatment research published in the last 10 years is directly relevant to me in my clinical work," "Clinical research should be the foundation of clinical practice," "Researchers understand the needs of practitioners," and "Clinical research addresses questions that are important to me." The NATR includes the following item statements

"Clinical judgment is more important than clinical research in determining appropriate treatment," "Efforts to empirically evaluate treatment effects are overly simplistic and therefore of little value to me," "Reading and applying research findings is too time-consuming," and "I would like to apply treatment research in my practice, but most research does not address questions that are important to me."

Internal consistency for the PATR and NATR scales has been demonstrated in Nelson and Steele's (2007) research with 214 mental health practitioners. For the PATR, the Cronbach's alpha was .76. The NATR Cronbach alpha was .74. In the current study, the Cronbach's alpha for the PATR is .69. The Cronbach alpha for the NATR is .73. The PATR and NATR scales were found to be moderately negatively correlated to each other ($r=-.458$, $p<.001$). Validity of the PATR and NATR has not yet been demonstrated within the empirical research.

Table 1

Participant Demographic Information (N = 215)

Characteristics	N	%
Gender		
Female	167	77.7
Male	48	22.3
Transgender	0	0
Ethnic/racial identity		
African American/Black	9	4.2
Asian/Asian American	11	5.1
Caucasian/White	170	79.1
Hispanic/Latino/Latina	11	5
American Indian/Alaska Native	1	.5
Native Hawaiian/Pacific Islander	0	0
Biracial	8	3.7
Other	5	2.3
Relationship Status		
Single	78	36.3
Married/committed	77	35.8
Partnered (*living together but not married/committed)*	44	20.5
Separated	0	0
Divorced	4	1.9
Widowed	0	0
Other	11	5.1
Missing	1	.5

Table 1 (continued)

Participant Demographic Information (N = 215)

Characteristics	N	%
Age		
22-25	60	27.9
26-30	110	51.2
31-35	33	14.9
36-40	4	1.8
41-45	4	1.8
46+	3	1.5
Year in Program		
First year	44	20.5
Second year	45	20.9
Third year	38	17.7
Fourth year	38	17.7
Fifth year	25	11.6
Sixth year	18	8.4
Beyond sixth year	7	3.3
Progression of graduate training		
Earning a terminal master's in related field and accepted into a doctoral program	3	1.4
Earning doctoral degree without master's	25	11.6
Earning doctoral degree and previously earned a related terminal master's degree	55	25.6
Earning a doctoral degree with earning a Psychology Master's as part of doctoral degree	130	60.9
Other	2	.9

Table 1 (continued)

Participant Demographic Information (N = 215)

Characteristics	N	%
Doctoral program degree		
Psy.D.	50	23.3
Ph.D.	165	76.7
Doctoral program subfield		
Clinical psychology	139	64.7
Counseling psychology	73	34
Other	3	1
Training Model		
Scientist-Practitioner	145	65.6
Practitioner-Scholar	40	19
Clinical Scientist	22	10.4
Scholar-Practitioner	2	.9
Local Clinical Scientist	5	2.3
Scientist-practitioner advocate	4	1.8
Science and Clinical practice emphasis		
More emphasis on science	64	29.8
More emphasis on clinical	59	27.4
Equal emphasis on science and clinical	90	41.9
Missing	2	.9

Table 1 (continued)

Participant Demographic Information (N = 215)

Characteristics	N	%
Theoretical Orientation		
Behavioral	27	12.6
Cognitive	40	18.6
Family System	7	3.3
Humanistic/Existential	15	7.0
Interpersonal	25	11.2
Psychodynamic	27	12.6
Integrative	57	26.5
Other	17	7.9
Missing	1	.5

Chapter Four

RESULTS

This chapter presents the results of the preliminary and the primary analyses conducted to address the hypotheses presented at the end of chapter two. The results are divided into three parts. First, the preliminary analyses conducted on all of the data will be presented. This section will also report the descriptive data for all of the variables in the study. Second, the results of structural equation measurement model analyses will be presented. Finally, the results of the structural model addressing the research hypotheses are presented.

Preliminary analyses

Raw data was downloaded into Excel spreadsheets from www.psychdata.net once data collection had ended. A total of three Excel spreadsheets were initially created as there were three variations (e.g., A, B, and C) of the 142 question survey. These variations only differed in the ordering of the instruments. After reordering each spreadsheet so that each had the same order of instruments and questions, the three spreadsheets were combined into one large Excel spreadsheet. This initial data set included information for 279 participants. Four duplicate participants were identified in the data set and were removed. The responses to the demographic question inquiring whether the participant was a current student and whether the student had an advisor were examined. Based on the inclusion criteria that participants in this study must be current students and have an advisor, five cases were deleted due to the participants reporting not being a currently enrolled student. The data in the Excel spreadsheet was then transferred into an SPSS Statistics 19 datasheet.

Next, this researcher focused on each of the survey instruments. Specifically, items that needed to be reverse coded such as items from the Advisory Working Alliance Inventory (AWAI), Research Training Environment Scale-Revised Short form (RTES-RS), and the Evidence Based Practice Attitude Scale (EBPAS) were reverse coded. The Career Goals measure responses were then examined and converted into weighted sum scores. The weighted sum scores were calculated based on the participant top three occupation setting choices where a score of one was given for any of the research setting choices (e.g., academic settings, research facility) and a score of zero for any of the practice settings (e.g., counseling center private practice, community mental health center, Veteran Affairs hospital) or the combined settings (consultation, industry, government agency, other). A weight of three was multiplied to the participants' first choice responses and a weight of two was multiplied to the second choice responses. The scores on the Scholarly Activity Scale Revised (SAS-R) were also converted. For each scholarly activity item that a participant endorsed, a score of one was assigned no matter how little or much involvement and a score of zero indicated that the participant had no experience in that activity.

After tending to the scores of each of the instruments, univariate descriptive and frequency statistics were examined for accuracy, plausibility, out of range values, and missing values. As there are no specific methods for determining the number of missing items that constitute appropriate case deletion, the researcher determined that a participant would be deleted from the analyses if a participant did not complete all of the instruments in the survey. Instruments were considered to be complete if no more than 12.5% of responses were missing by a participant. This percentage allows for

unintentional missing or skipping of at least one response in an instrument but does not allow for incompletion of an instrument. This percentage allowed a participant to miss up to three responses in the AWAI, two in the RTES-RS, one in the ROEQ, one in the SERM, two in the IRQ, two in the SAS-R, one in the EBPAS. No responses could be missing from the Career goals measure and the PATR and NATR as there are very few items (e.g., 3, 4, and 4 respectively) in these measures. After examining all of the missing data by instrument and by participant, 52 participants were identified as not having completed all of the instruments in the survey. The majority of these participants, 42 of the 52, had at least four or more instruments within the survey that were deemed incomplete. These participants most likely started the survey but did not complete the survey. In light of this, these 52 cases were deleted from the analyses. This resulted in a pre-analysis sample size of 218 participants.

Replacement of missing data. After the data were examined for currently enrolled students, accuracy of data, and inadequate missing data, replacement of the missing data for the remaining cases was completed. In a sample of 218 participants, it was found that there were a total of 66 missing responses within the AWAI, RTES-RS, ROEQ, SERM, IRQ, PATAR, NATR, EBPAS, and the SAS-R. This represents .2% missing data within the 126 survey questions representing the variables to be used for analysis. An additional total of eight responses were missing in the demographic questionnaire. However, none of the 218 participants missed reporting their year in the graduate program. After conducting a missing values analysis (MVA) within SPSS, the little MCAR's test was found to be not significant (chi square: χ^2 =7595.473, df=7676, p=.741). Tabachnick and Fidell (2007) suggest that a statistically non-significant result indicates that the

probability that the pattern of missing diverges from randomness is greater than .05, so that MCAR, or missing completely at random, may be inferred. Tabachnick and Fidell (2007) also state that if only or less than 5% data are missing almost any procedure for handling missing values yields similar results. Tabachnick and Fidell (2007) suggest using Expectation Maximization (EM) in SPSS MVA as a method to replace missing data when there is not a large amount of missing data as it is simple and a reasonable approach to imputation. EM is specifically used for randomly missing data. EM creates a missing data correlation matrix based on a normal distribution for the partially missing data and basing inferences about missing values on the likelihood under than distribution. The process finds the conditional expectation of the missing data given the observed values and current estimate of parameters. The expectations are then substituted for the missing data. A maximum likelihood estimation is performed with the filled in missing data.

After the missing values were filled in, sum scores were created for the instrument variables (e.g., AWAI, RTES-RS, ROEQ, SERM, IRQ, Career goals, SAS-R, EBPAS, PATR, and NATR). Descriptive statistics including means (see Table 2), standard deviation (see Table 2), minimum and maximum values, standardized scores, skewness, and kurtosis were calculated for each of the instrument sum scores for 218 participants. Tabachnick and Fidell (2007) maintain that potential univariate outliers are cases with very large standardized scores in excess of 3.29 ($p<.001$). Three cases out of the 218 were identified as having standardized scores above 3.29 on one or more instruments including the AWAI, RTES, and EBPAS. Evaluation of the outliers was deferred until additional

tests of normality were conducted. Skewness and kurtosis values were examined to further test the normality of the data collected (see Table 3).

Kline (1998) states that when examining the absolute values of skewness and kurtosis indexes, there are few clear guidelines about how much non-normality is problematic. After a review of several "Monte Carlo" studies (e.g., Chou & Bentler, 1995; Curran, West, Finch, 1996), Kline offers that data with absolute value of univariate skewness indexes greater than three should be described as "extremely" skewed. Garson (2011; http://faculty.chass.ncsu.edu/garson/PA765/statnote.htm) claims that skew should be within the absolute value range of two when the data are normally distributed. Kline (1998) commented that there is even less consensus about absolute values of kurtosis but that univariate kurtosis index values from 8.0 to over 20.0 have been described as indicating "extreme" kurtosis. Tabchnick and Fidell (2007) state that underestimates of variance associated with positive kurtosis disappear with samples of 100 or more and with negative kurtosis, the underestimation of variance disappears with samples of 200 or more. Thus, Kline (1998) offers that a conservative approach would seem that an absolute value greater than 10.0 for kurtosis may suggest a problem and values above 20.00 indicate a serious concern. After examining the variables, four variables demonstrated extreme negative skewness, three variables demonstrated moderate skewness, and four variables demonstrated a normal distribution. Absolute values scores on the AWAI (skewness= -5.630), RTES (skewness=-5.480), ROEQ (-3.510), and SERM (-4.270) thus, represent extreme negative skewness. The variables IRQ (skewness= -2.68), Careergoals (skewness= 2.210), and Year in program (skewness= 2.59) represent moderate skewness. Absolute value index skewness scores on SAS-R (skewness=-.080),

EBPAS (skewness= -1.15), PATR (skewness=.240), and NATR (skewness=-.810) represent normal distributions. All variables had kurtosis index scores below 5.50 representing moderately normal kurtosis. Departures from normality were also evident from the heteroscedasticity discovered during the inspection of the bivariate plots.

Tabachnick and Fidell (2007) suggest transforming variables to reduce the influence of outliers and improve the normality of distributions. The researcher determined that the degree of skewness and the heteroscedasticity of AWAI, RTES, ROEQ, SERM, and IRQ warranted transformation of the data to improve the normality of the distributions. The career goals variable was not transformed due to the data representing ranked choices of occupations.

As AWAI, RTES, SERM, ROEQ, and IRQ had negative skewness, these variables were first reflected prior to their transformation. The remaining variables (e.g., Career goals, SAS, EBPAS, PATR, and NATR) were also reflected to ease interpretation during the analysis stage. A square root transformation as compared to a logarithmic transformation was found to produce more normal distribution in the transformed variables. Specifically, the negative skewness values were reduced for all of the transformed variables. The kurtosis values also reduced and represent normal distributions. The skewness and kurtosis absolute value indexes for the transformed variables are: skewness SQRTAWAI= 0.46, kurtosis=.00; skewness SQRTRTES= -.06, kurtosis=.22; skewness SQRTROEQ=.25, kurtosis=3.710; skewness SQRTSERM=-2.04, kurtosis=1.23; skewness SQRTIRQ=-1.71; kurtosis=1.36.

The 218 cases, with the transformation applied to SQRTAWAI, SQRTRTES, SQRTROEQ, SQRTSERM, SQRTIRQ, were screened for multicollinearity and

multivariate outliers through SPSS Regresssion. No multicollinearity was evident after examining the collinearity diagnostics. Three cases were identified through Mahalnobis distance as multivariate outliers with $p<.001$. Tabachnick and Fidell (2007) state that the criterion for Mahalanobis distance is evaluated as χ^2 with degrees of freedom equal to the number of variables. In this study, there are 11 variables. Therefore, any case with a Mahalnobis distance greater than $\chi^2(11) = 31.264$ is a multivariate outlier. The three multivariate outliers identified were also the three cases found to have standardized scores above three prior to the transformation. These three cases were deleted resulting in a final sample of 215 participants for analyses.

After transforming five variables and deleting three outlier cases, the descriptive statistics were reexamined for normality. The distribution of the data (see Table 3) was more consistent with a normal distribution such that the skewness for each variable was either normal or only slightly moderately skewed and homoscedasticity and linearity have increased. Specifically, eight variables (e.g., SQRTAWAI, SQRTOEQ. SQRTRTES, SQRTIRQ, SAS-R, PATR, NATR, and EBPAS) had skewness absolute index values below 2.0 and thus represent normal distributions. Three variables (e.g., Year in program, SQRTSERM, and Careergoals) had skewness index values ranging from 2.25 to 2.55 indicating somewhat moderate skewness. Tabachnick & Fidell (2007) suggest examining the shape of the distribution for large samples ($n>200$) to also evaluate skewness and kurtosis. The shape of SQRTSERM had a moderately normal shaped distribution. The researcher determined that the shape of SQRTSERM was acceptable to move forward with the primary analyses.

Next, all of the analyses were conducted first with non-transformed data and then again with the transformed values. Nearly all of the significance levels and the directions of the relationships (i.e., signs on the standardized regression weights) did not change meaningfully from those obtained with the non-transformed data. However, as the significance of several standardized regression weights were impacted by the transformations, it was determined the researcher should use the transformed data as it represents more normal distributions and is thus more appropriate to use for structural equation modeling analysis.

Finally, the resulting sample (n=215) was examined to ensure it met the recommended observations for structural equation modeling analyses. Bentler and Chou (1987) recommend 5-10 observations per estimated parameter in structural equation models. Comrey's (1973) recommendation is that an "adequate to good" sample size is between 200-300 participants. The proposed model in Figure 1 contains 39 parameters thus necessitating at least 195 participants. While the sample size is somewhat low, the 215 observations in this study are adequate to perform the analyses.

Confirmatory factor analysis

The first step in structural equation modeling is to use confirmatory factor analysis to test the fit of the measurement model. A measurement model is a model which depicts relations between indicators or measured variables to factors or latent variables (Kline, 1998). The researcher used Amos, Version 18.0 (Small Waters Corp.) and the maximum likelihood estimation method. Following Martens' (2005) suggestions of indices for evaluating model fit, the researcher used: standardized root mean squared residual (SRMR), the robust Comparative Fit index (CFI), the root mean square error of

approximation (RMSEA), the incremental fit index (IFI), and the Tucker Lewis Index (TLI). Although the χ^2 statistic and the χ^2/df ratio are influenced by sample size, they are reported in this study to remain consistent with other published papers that use SEM.

Hu and Bentler (1999) have found in Monte Carlo studies that SRMR values of .08 or lower, RMSEA values of .06 or lower, and CFI values of .95 or higher represent a good fit. SRMR is the average difference between the predicted and observed variances and covariances in the model, based on standardized residuals. The RMSEA assesses closeness of fit with values of .08, .05, and .00 indicating reasonable, good, and exact fit. The RMSEA is often reported with its confidence interval. For a well-fitting model, the lower 90% confidence limit includes or is very close to 0, while the upper limit is less than .08. The CFI, a goodness of fit test, compares the existing model fit with a null model which assumes the indicator and the latent variables in the model are uncorrelated. Values of the CFI range from 0 to 1, with values equal to or greater than .90 indicating a good fit (Hu & Bentler, 1999). The IFI should be equal to or greater than .90 to accept the model. For the TLI, another goodness of fit index, .95 is widely used as the cutoff for a good model fit (e.g., Schumacker & Lomax, 2004) while values below .90 indicate a need to respecify the model. The χ^2 /dfstatistic, chi-square fit index divided by degrees of freedom, is an attempt to make model chi-square less dependent on sample size. Carmines and McIver (1981, 80) maintain that relative chi-square should be in the 2:1 or 3:1 range for an acceptable model. Kline (1998) contend that a ratio of 3 or less is acceptable while Marsh and Hoceuar (1985) allow values as high as 5 to be considered a model adequate fit.

The results of this analysis indicated that the measurement model was a good fit for the data as all of the fit indices were within the suggested ranges: IFI=.99; TLI=.96; CFI=.99; RMSEA=.075 (90% confidence interval for the RMSEA lower bound=.00 and upper bound=.172); SRMR=.03; χ^2 =4.380, df=2, p=.112; and CMIN/DF=2.190. All of the parameter estimates, and thus the factor loadings, were significant. The significant standardized factor loadings for the model were PATR (r= .773, p<.01, 95% CI lower bound=.632, upper bound=.866), NATR (r=.-.772, p<.01, 95% CI lower bound=.-.869, upper bound=-.664), EBPAS (r=.630, p<.01, 95% CI lower bound=.495, upper bound=.731), and SAS-R (r=.238, p<.01, 95% CI lower bound=.073, upper bound=.370). The R^2 values summarize the variance explained for each of the variables in the model. The variance explained was highest for PATR (60%) and NATR (60%). Forty percent of the variance of EBPAS was explained while only 6% of the variance of SAS-R was explained. While the measurement model overall is a moderately good fit, it appears that SAS-R does not fit the scientific mindedness variable as well as NATR, PATR, and EBPAS. However, as SAS-R did have significant results, it was left within the measurement model for the analysis of the hypothesized model.

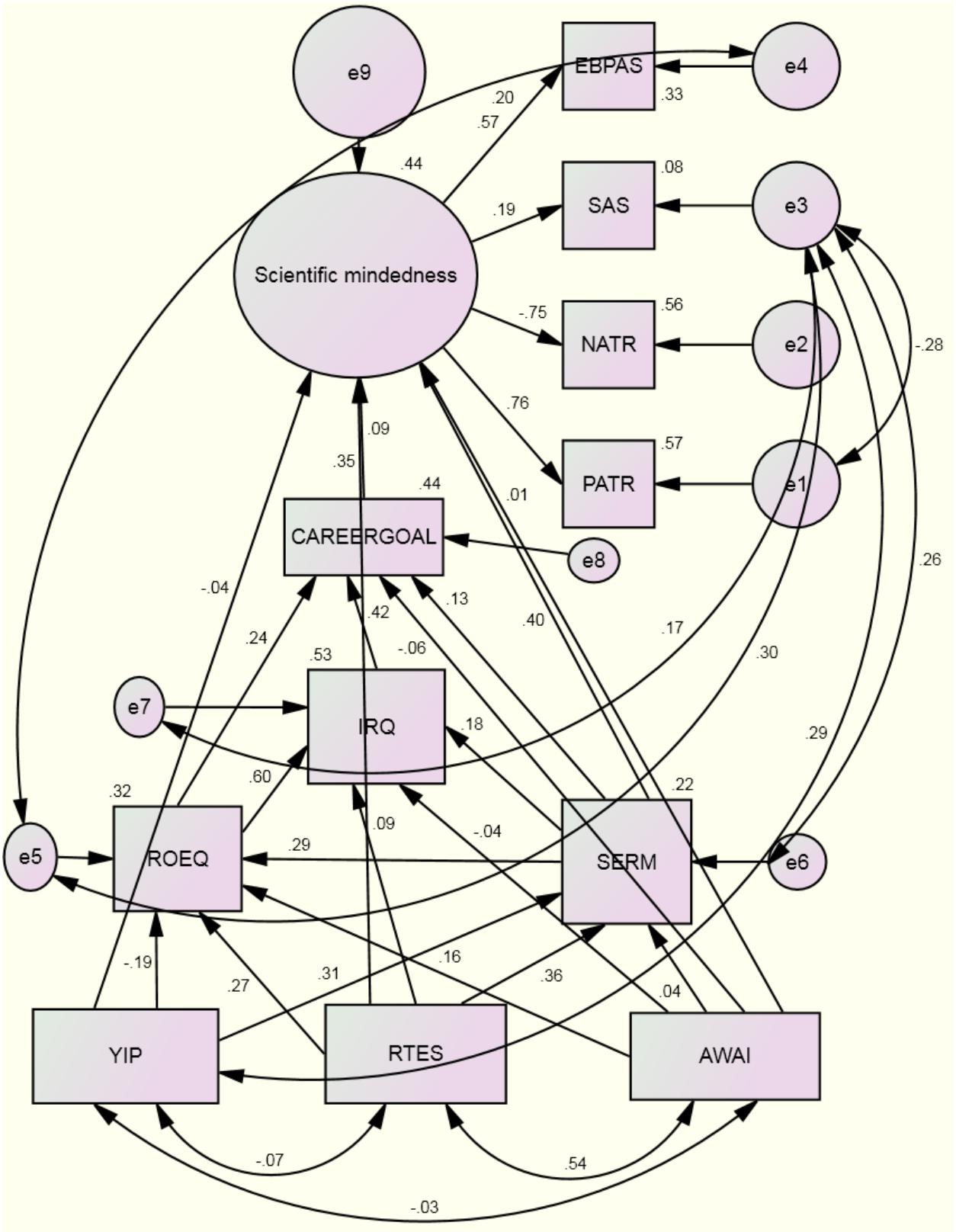
Structural model analysis

Robust SEM analysis involves proposing a target model based on relevant theory and prior research and then compares that model with one or more previously indicated competing models by other theoretical positions, contradictions in the literature, or parsimony (Hoyle & Panter, 1995). Based on the recommendations from Shrout and Bolger (2002) and Mallinckrodt, Abraham, Wei, and Russell (2006), the use of bias

corrected bootstrap methods were used in the models. This researcher used 1,000 bootstrap samples drawn from the 215 participant sample with a 95% confidence interval. The researcher first tested the hypothesized model (Model 1) in Figure 1 with all residual variances assumed to be uncorrelated and all exogenous variables assumed to be correlated. This model was then compared to an alternate model similar (Model 3) to Kahn's (2001) hypothesized model where SAS-R, not scientific mindedness, is the outcome variable. Finally, these models were compared to a second alternate model (Model 4) which is the study's hypothesized model without the variable SAS-R as part of the scientific minded latent variable. The SEM analysis was based on the correlation matrix shown in Table 4. The hypothesized model did not provide an overall good fit to the data, $\chi^2 = 153.89$, df=29, p<.000; CMIN/DF ratio=5.31; RMSEA=.14, (90% CI lower bound=.12, upper bound=.16); SRMR=.10; IFI=.87; TLI=.74; CFI=.86.

Inspection of model diagnostics revealed that a portion of the source of the ill fit was the assumption of uncorrelated residuals. An examination of the residual covariance matrix reveal large residual covariances (e.g., >2.58) for the SAS-R variable and AWAI, RTES, SERM, OEQ, IRQ, and Career goals. Additionally, residual covariances between EBPAS and SERM, OEQ, and IRQ were deemed to be large. The modification indices suggested covarying several of the residuals including SAS-R residuals with the residuals of SERM, OEQ, Career goals, and Scientifically-minded psychologist. The regression weight modification index suggested adding paths from RTES, YIP, SERM, ROEQ, IRQ, Career goals, and PATR to SAS-R directly to enhance the model fit. The indices also suggested adding paths from ROEQ and IRQ to scientific-mindedness as well as career goals and to SAS-R to PATR within the scientific-mindedness latent variable. Finally, the

indices suggested adding a path from year in program to research outcome expectations. Kline (1998) suggests that a blind model specification search guided entirely by modification indexes is unlikely to lead to the correct model. However, residual terms may be allowed to covary if there is a plausible explanation for the covariance. After reflecting on the items within each variable and each variable within the model, the residuals from the SAS-R were allowed to covary with year in program (YIP), interest in research (IRQ) residual, research self-efficacy beliefs (SERM) residual, research outcome expectations (ROEQ) residual, and positive attitudes towards research (PATR) residual. Additionally, the residuals from the research outcome expectations questionnaire were allowed to covary with the EBPAS. These covarying paths were implemented into the model as they make theoretical sense. Finally, a path between year in program and research outcome expectations was created as this path is in line with social cognitive career theory's stipulation that individual differences influence research outcome expectations. The overall fit for the specified hypothesized model (Model 2) provided a moderate fit to the data, $\chi^2 = 73.72$, df=22, p<.000; CMIN/DF ratio=3.35; RMSEA=.11, (90% CI lower bound=.08, upper bound=.13); SRMR=.065; IFI=.95; TLI=.86; CFI=.94. Several direct and indirect relationships were significant in this model and supported the hypotheses of this study (see Figure 2). Research self-efficacy beliefs (SERM) was



Model 2: Specified hypothesized model

significantly predicted by year in program (YIP;95% CI lower bound= .191, upper bound=.414) and the perceptions of the research training environment (RTES;95% CI lower bound=.197, upper bound=.504). These relationships were positive suggesting that more years within a program and more positive perceptions of the research training environment predict higher research self-efficacy. These predictors combined to explain 22% of the variance in research self-efficacy. These findings support hypothesis 1 and hypothesis 10 proposed in the literature review. Contrary to expectation and hypothesis 5, the advisory working alliance (AWAI) was not a significant predictor of research self-efficacy.

Research outcome expectations (ROEQ) were significantly predicted by the research training environment (RTES;95% CI lower bound=.110, upper bound=.423), advisory working alliance (AWAI;95% CI lower bound=.026, upper bound=.300) and research self-efficacy (SERM;95% CI lower bound=.160, upper bound= .419) with more positive perceptions of the training environment, strong advisory working alliances, and greater research self-efficacy predicting more positive expectations about the consequences of doing research. These results support hypothesis 2, 6 and 13. Year in program (YIP, 95% CI lower bound=-.30, upper bound=-.06) was found to have an inverse relationship with research outcome expectations such that with each additional year in the program predicted more negative expectations about the consequences of conducting research. Year in program (YIP;r=.09, p<.01, 95% CL lower bound=.04, upper bound=.15) and research training environment (RTES;r=.11, p<.001, 95% CL lower bound=.06, upper bound=.18) were found to have a significant indirect relationship

with research outcome expectations through research self-efficacy. These predictors accounted for 32% of the variance in research outcome expectations.

As proposed in hypothesis 12, both research self efficacy beliefs (SERM;95% CI lower bound=.09, upper bound=.27) and research outcome expectations (ROEQ;95% CI lower bound=.5, upper bound=.7) directly predicted interest in research (IRQ). Both relationships were positive which suggests that higher self-efficacy beliefs and more positive expectations about conducting research predicted greater interest in research. However, contrasting to hypotheses 3 and 7, the research training environment (RTES) and the advisory working alliance (AWAI) did not significantly directly influence interest in research. Indirect relationships were found between interest in research and the advisory working alliance (AWAI;r=.11, p<.05; 95% CI lower bound=.01, upper bound=.20), the perceptions of the research training environment (RTES; r=.29, p<.01; 95% CI lower bound=.17, upper bound=.41), and research self-efficacy (SERM; r=.18, p<.01; (95% CI lower bound= .10, upper bound=.27) through research outcome expectations. The variance in interest in research explained by these predictors was 53%.

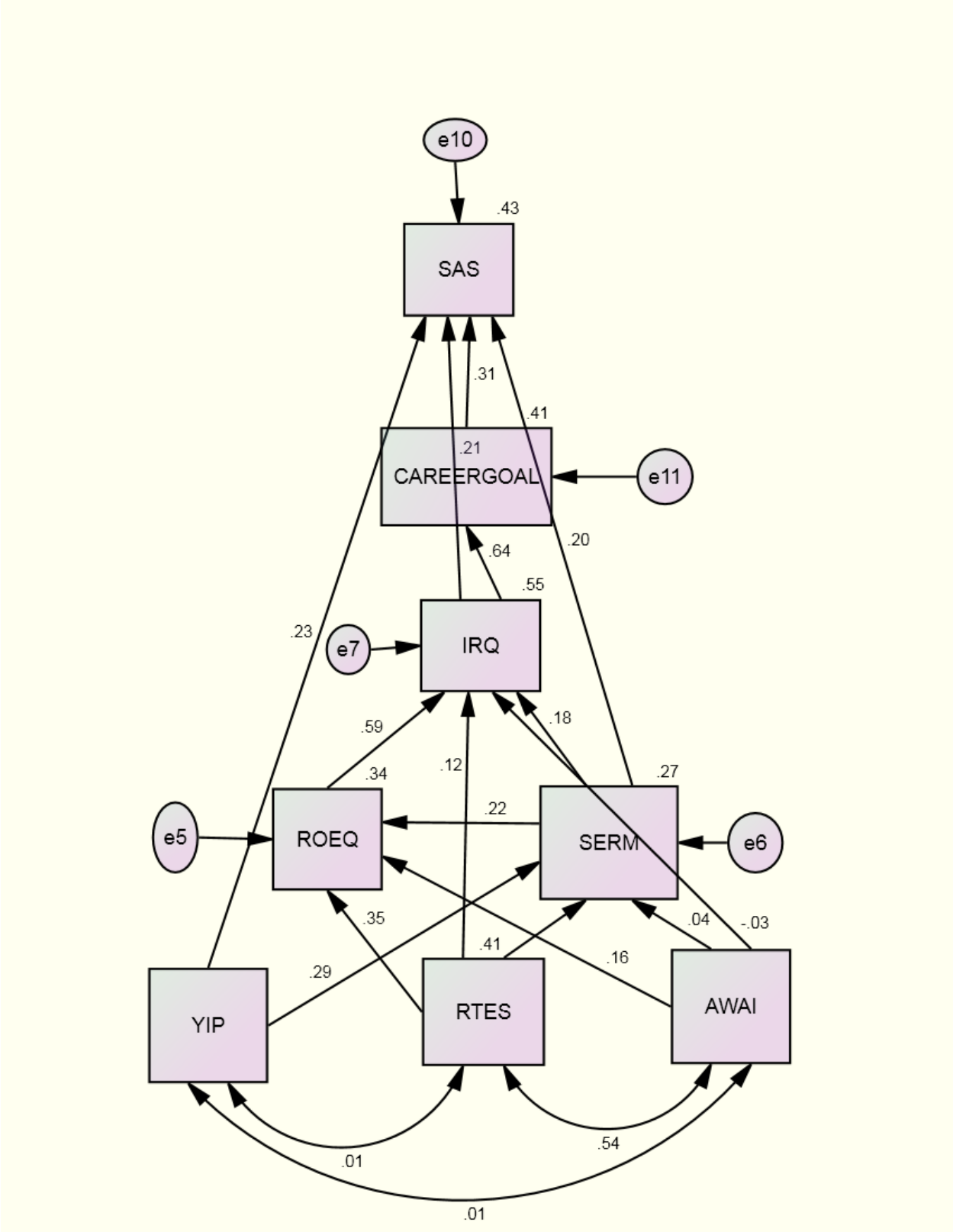
Career goals were directly predicted by research self efficacy beliefs (SERM; 95% CI lower bound=.03, upper bound=.24), research outcome expectations (ROEQ; 95% CI lower bound=.08, upper bound=.4), and interest in research (IRQ; 95% CI lower bound=.26, upper bound=.57). All were positive relationships which suggest that higher research self-efficacy, more positive expectations of conducting research, and greater interest in research predict careers in more research intensive environments. These findings support hypotheses 14 and 16 in the literature review. Contrary to hypothesis 8, the advisory working alliance did not directly or indirectly contribute to career goals. The

perceptions of the research training environment (RTES; r=.30, p<.01; 95% CI lower bound=.18, upper bound=.41), research self efficacy (SERM; r=.22, p<.001, 95% CI lower bound= .15, upper bound=.30) and research outcome expectations (ROEQ; r=.25; p<.002, 95% CI lower bound= .16, upper bound=.35) all indirectly contributed to career goals. These predictors combined to explain 44% of the variance in career goals.

Finally, the scientific-mindedness latent outcome was only directly predicted by the perceptions of the research training environment (RTES, 95% CI lower bound= .17, upper bound=.55), and research self-efficacy beliefs (SERM, 95% CI lower bound= .20, upper bound=.56). Both of these relationships were positive such that more positive perceptions of the research training environment and higher research self-efficacy predicted greater scientific mindedness outcomes. These results support hypotheses 4 and 15. Contrary to hypotheses 9, 11 and 17, year in program (YIP), advisory working alliance (AWAI), and career goals did not directly predict the scientific-mindedness outcome variable. The research training environment (r=.17, p<.01, 95% CI lower bound=.08, upper bound=.30) and year in program (r=.12, p<.01, 95% CI lower bound=.06, upper bound=.20) were found to have positive indirect relationships with the scientific mindedness latent variable. The predictors in the model accounted for 44% of the variance in scientific mindedness outcome variable.

As discussed earlier, the researcher also tested two other alternate models to compare to the study's hypothesized model. The first alternate model (Model 3) closely resembles Kahn's (2001) hypothesized model predicting scholarly activity (see Figure 3). This model differs from Kahn's (2001) model in that it examines the advisory working alliance instead of the relationship with a mentor, it does not include investigative

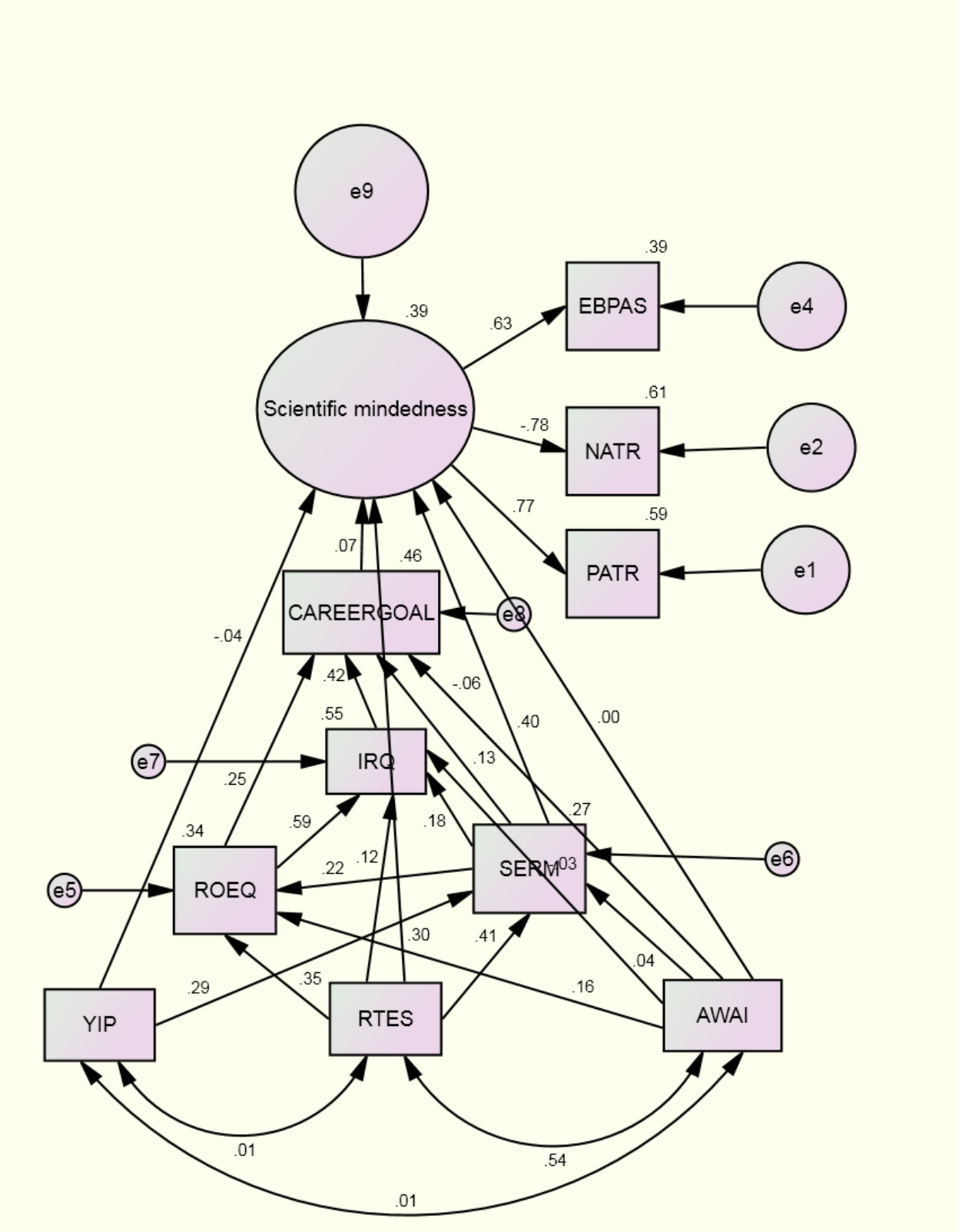
interests as a predictor, and career goals have been included as a predictor of scholarly activity. The overall fit for Model 3 provided a moderate fit to the data , $\chi^2 = 33.567$, df=10, p<.000; CMIN/DF ratio=3.357; RMSEA=.11, (90% CI lower bound=.07, upper bound=.15); SRMR=.06; IFI=.96; TLI=.90; CFI=.96. This fit to the data is very similar to results Kahn (2001) found with his hypothesized model. Several direct and indirect relationships were significant in this model (parameter estimates are displayed in Figure xx and Table 6). Similar to Model 2, the advisory working alliance did not have any significant direct paths in the model. All of the direct paths that were significant in the specified hypothesized model were also significant in this model. In Model 3, 27% of the variance, as compared to 22% in Model 2, in research self-efficacy was explained by year in program (9%) and perceptions of research training environment (16%). Research outcome expectations were directly predicted by research training environment (12%), advisory working alliance (2.5%) and research self-efficacy (5%) with 34% of the variance, as compared to 32% in Model 2, in this criterion explained. Interest in research was directly predicted by research outcome expectations (35%) and research self-efficacy (3%) with 56% of the variance explained as compared to 53% variance explained in Model 2. The variance in career goals can be explained by the direct relationship with interest in



Model 3: Based on Kahn's (2001) model

research (41%). Finally, in Model 3, where scholarly activity is the ultimate outcome, 43% of the variance is explained. Scholarly activity is directly predicted by year in program (r=.23, p<.01, 95% CI lower bound=.12, upper bound=.34), interest in research (r=.21, p<.01,CI lower bound=.05, upper bound=.36), research self-efficacy beliefs (r=.20, p<.01, CI lower bound=.07, upper bound=.32), and career goals (r=.31, p<.01, CI lower bound=.16, upper bound=.44). Scholarly activity is also indirectly predicted by research training environment (r=.26, p<.01, CI lower bound=.18, upper bound=.34), year in program (r=.094, p<.001, CI lower bound=.05, upper bound=.14), research self-efficacy (r=.13, p<.001, CI lower bound=.08, upper bound=.19), research outcome expectations (r=.24, p<.01, CI lower bound=.17, upper bound=.32), and interest in research (r=.20, p<.01, CI lower bound=.11, upper bound=.31). In Model 3, all indirect effects that were significant in the prior model continued to be statistically significant with the addition of years in program had indirect significant paths to interest in research (r=.09, p<.001, 95% CI lower bound=.05, upper bound=.14) and career goals (r=.06, p<.001, 95% CI lower bound=.04, upper bound=.09).

A second alternate model was then tested for fit. This second alternative model (Model 4) includes all of the predicted paths as the hypothesized model except that the latent variable of scientific mindedness outcomes did not include the variable of scholarly activity (see Figure 4). Model 4 provided a moderately good fit to the data, $\chi^2 = 48.57$, df=20, p<.000; CMIN/DF ratio=2.43; RMSEA=.08, (90% CI lower bound=.05, upper bound=.11); SRMR=.06; IFI=.97; TLI=.92; CFI=.96. All the direct relationships that were significant in the Model 2 and Model 3 were also significant in this model (parameter estimates are displayed in



Model 4: No Scholarly Activity Scale in Scientific Mindedness outcome variable

Figure 4 and Table 7). Research self-efficacy beliefs and interest in research direct relationships were exactly the same in Model 4 as they were in Model 2. In Model 4, 34% instead of 32% of variance in research outcome expectations was explained. Career goals were again positively and directly related to research self-efficacy beliefs (1.8%), research outcome expectations (6%), and interest in research (18%) with 46% of the variance of career goals accounted for. The scientific mindedness latent variable was again directly predicted by the perceptions of the research training environment (9%) and research self-efficacy beliefs (16%) with a total of 39% of scientific mindedness latent variable variance explained. Model 4 explained 5% less variance in scientific minded latent outcome than the modified hypothesized model. However, in examining the variables included in the scientific mindedness (SM) variable, in this alternative model, SM directly and positively predicts evidence based practice attitudes (EBPAS, 39%) and positive attitudes toward research (PATR, 59%) and inversely and directly predicts negative attitudes toward research (NATR, 61%). In Model 4, SM explains more variance in these variables as compared to the modified hypothesized model where it explained 57% of the variance in PATR, 56% of NATR, 34% of EBPAS, and 8% of SAS-R.

In order to compare the fit of Model 2 with the fit of the alternative models, it is necessary to examine the various model fit indices (see Table 8). Comparing the χ^2 for each model, we find that Model 2 has a χ^2=73.72 with a CMIN/DF ratio of 3.35, Model 3 has a χ^2=33.57 with a CMIN/DF ratio of 3.357, and Model 4 has a χ^2 =48.57 with a CMIN/DF ratio of 2.43. For this fit index, lower χ^2 and lower CMIN/DF ratios are desired. Model 3 has the lowest χ^2 while Model 4 has the lowest CMIN/DF ratio. In

comparing the RMSEA, Models 2 and 3 both have a value of .11 while Model 4 has a value of .08. As RMSEA values of .08 or lower represent an adequate fit, Model 4 has a better fit as compared to Models 2 and 3. Models 3 and 4 have the same and good fit for the SRMR index with .06. For the CFI index, as mentioned previously, closer to 1 indicates a good fit. All models have CFI indices above .90, with Models 3 and 4 having the better fit with CFI=.96. While none of the models meet the typical .95 cut-off for good fit of the TLI, Model 4 is the closest with.92. And finally for the IFI, all three models represent a good fit with values above .90, with Model 4 having the highest value of .97. Thus, overall, Models 3 and 4 fit better than Model 2. Models 3 and 4 have very comparable fit indices values with Model 4 having a slightly better fit overall.

Training philosophy and degree group differences

Independent *t* tests were conducted to examine group differences between doctoral degree type, Ph.D. and Psy.D, between psychology subfield, Clinical psychology and Counseling psychology, and training philosophy differences, Scientist-Practitioner and Practitioner-Scholar. Independent *t* tests were conducted using a Bonferroni corrected alpha of .0002 (alpha/n). Independent *t* tests revealed no significant differences between Ph.D. and Psy.D. degrees and the advisory working alliance (t=-1.187, df=213, p=.237), the evidence based practice attitude scale (t=1.425, df=213, p=.156), positive attitudes toward research (t=-.372, df=213, p=.711), negative attitudes toward research (t=3.31, df=213, p=.001). Whereas as shown in Table 9, differences in degree type did emerge where Ph.D. programs reported significantly higher levels of perceptions of research training environment (t=-4.711, df=213, p=.00), research outcome expectations (t=-5.793, df=213, p=.00), research self-efficacy (t=-3.93, df=213, p=.00), interest in

research (t=-4.79, df=213, p=.00), career goals (t=-8.105, df=213, p=.00), and scholarly productivity (t=-11.973, df=213, p=.00) than those from Psy.D. programs. No differences between program subfields clinical psychology and counseling psychology were found in the advisory working alliance (t=.279, df=210, p=.781), perceptions of the research training environment (t=-.459, df=210, p=.647), research outcome expectations (t=-1.31, df=210, p=.191), higher research self-efficacy (t=-3.50, df=210, p=.001), interest in research (t=-2.31, df=210, p=.02), career goals (t=-.194, df=210, p=.054), and scholarly activity (t=.589, df=210, p=.556). However, significant differences were found (see Table 10) where clinical psychology reported significantly higher evidence based practice attitudes (t=-5.22, df=210, p=.00) and positive attitudes towards research (t=-5.39, df=210, p=.00) than counseling psychology participants. Counseling psychology participants reported significantly higher scores on negative attitudes towards research (t=4.77, df=210, p=.00) as compared to clinical psychology participants. In examining the differences between scientist-practitioner model and the practitioner-scholar model, no significant differences were found in the advisory working alliance (t=.910, df=213, p=.36), evidence based practice attitudes (t=1.42, df=213, p=.16), positive attitudes towards research (t=1.04, df=213, p=.30) and negative attitudes towards research (t=-3.47, df=213, p=.001). Evidence was found that different training models may have produced differing outcomes with participants from scientist-practitioner programs reporting significantly higher means (see Table 11) in the perceptions of research training environment (t=4.10, df=213, p=.00), research outcome expectations (t=5.26, df=213, p=.00), research self-efficacy (t=4.40, df=213, p=.00), interest in research (t=4.27,

df=213, p=.00), career goals (t=7.74, df=213, p=.00), and scholarly activity (t=10.77, df=213, p=.00).

Table 2

Means and Standard Deviations for Variable Total Scores

Variable	M	SD
1. RTES	70.30	9.43
2. AWAI	117.78	18.78
3. YIP	3.17	1.71
4. SERM	90.66	15.98
5. ROEQ	33.92	5.26
6. IRQ	57.58	12.73
7. Career goals	2.30	2.18
8. SAS	6.59	3.47
9. PATR	14.01	2.41
10. NATR	9.86	2.90
11. EBPAS	57.25	7.15

Note: M=Mean; SD=Standard deviation; RTES=Research Training Environment Scale; AWAI=Advisory Working Alliance Inventory; YIP= Year In Program; SERM=Self-Efficacy in Research Measure; ROEQ=Research Outcome Expectations Questionnaire; IRQ=Interest in Research Questionnaire; SAS=Scholarly Activity Scale Revised; PATR=Positive Attitudes Towards Research; NATR=Negative Attitudes Towards Research; EBPAS= Evidence Based Practice Attitudes Scale

Table 3

Skewness and Kurtosis for Variable Total Scores

Variable	Skewness	Kurtosis
Untransformed		
1. AWAI	-.696	.231
2. RTES	-.394	-.389
3. ROEQ	-.563	-.530
4. SERM	-.510	.150
5. IRQ	-.450	-.212
6. Career goals	.373	-1.319
7. SAS	-.003	-.682
8. PATR	.052	.047
9. NATR	.153	-.198
10. EBPAS	-.022	-.331
Square root Transformed		
1. AWAISQRT	-.052	-.283
2. RTESSQRT	-.239	-.382
3. ROEQSQRT	.025	-1.214
4. SERMSQRT	-.398	.260
5. IRQSQRT	-.274	-.416

Note: Skewness Std. Error=.166; Kurtosis Std. Error=.330. RTES=Research Training Environment Scale; AWAI=Advisory Working Alliance Inventory; YIP= Year In Program; SERM=Self-Efficacy in Research Measure; ROEQ=Research Outcome Expectations Questionnaire; IRQ=Interest in Research Questionnaire; SAS=Scholarly Activity Scale Revised; PATR=Positive Attitudes Towards Research; NATR=Negative Attitudes Towards Research; EBPAS= Evidence Based Practice Attitudes Scale

Table 4

Correlations Among Scientific Training Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
1. D9yrs	---										
2. AWAI	-.01	---									
3. RTES	-.03	.55**	---								
4. OEQ	-.10	.37	.50**	---							
5. SERM	.30**	.24	.37**	.36**	---						
6. IRQ	-.09	.27	.44**	.71**	.42**	---					
7. Career	-.04	.21	.40**	.58**	.40**	.63**	---				
8. SAS	.26**	.17*	.34**	.43**	.47**	.47**	.52**	---			
9. EBPAS	-.001	.17*	.31**	.36**	.31**	.38**	.26**	.12	---		
10. PATR	.06	.24**	.33**	.39**	.41**	.34**	.22**	.13*	.50**	---	
11. NATR	-.08	-.19**	-.39**	-.36**	-.42**	-.41**	-.32**	-.25**	-.48**	-.59**	---

Note: YIP= Year In Program; AWAI=Advisory Working Alliance Inventory; RTES=Research Training Environment Scale; ROEQ=Research Outcome Expectations Questionnaire; SERM=Self-Efficacy in Research Measure; IRQ=Interest in Research Questionnaire; SAS=Scholarly Activity Scale Revised; PATR=Positive Attitudes Towards Research; NATR=Negative Attitudes Towards Research; EBPAS= Evidence Based Practice Attitudes Scale

*p<.05. **p<.01.

Table 5

Unstandardized, Standardized, and Significance Levels for Hypothesized Specified Model (Model 2)

In Figure X (Standard Errors in Parentheses; N = 215)

Parameter Estimate	Unstandardized	Standardized	P
SERM ← YIP*	.272 (.05)	.306	.003
SERM ← RTES*	.478 (.10)	.361	.003
SERM ← AWAI	.033 (.06)	.036	.717
ROEQ ← YIP*	-.113 (.04)	-.189	.004
ROEQ ← RTES*	.240 (.06)	.270	.004
ROEQ ← AWAI*	.096 (.04)	.158	.024
ROEQ ← SERM*	.196 (.04)	.293	.002
IRQ ← RTES	.105 (.08)	.087	.245
IRQ ← AWAI	-.031 (.05)	-.037	.607
IRQ ← SERM*	.168 (.05)	.183	.002
IRQ ← ROEQ*	.826 (.08)	.603	.003
CAREER ← AWAI	-.078 (.07)	-.061	.247
CAREER ← ROEQ*	.510 (.16)	.243	.003
CAREER ← IRQ*	.640 (.11)	.417	.002
CAREER ← SERM*	.186 (.08)	.132	.006
SMP ← YIP	-.047 (.07)	-.045	.532
SMP ← RTES*	.545 (.13)	.348	.001
SMP ← AWAI	.011 (.08)	.011	.881
SMP ← SERM*	.47 (.10)	.398	.003
SMP ← CAREER	.076 (.06)	.091	.375
PATR ← SMP*	1.00	.755	.005
NATR ← SMP*	-1.191 (.13)	-.747	.002
SAS ← SMP	.356 (.20)	.185	.189
EBPAS ← SMP*	2.232 (.30)	.573	.003

Table 5 (continued)

Unstandardized, Standardized, and Significance Levels for Hypothesized Specified Model (Model 2)

In Figure X (Standard Errors in Parentheses; N = 215)

Parameter Estimate	Unstandardized	Standardized	P
Cov/Corr RTES & AWAI*	1.034	.536	.002
Cov/Corr YIP & RTES	-.130	-.066	.380
Cov/Corr YIP & AWAI	-.094	-.033	.652
Cov/Corr error EBPAS & error ROEQ*	.946	.197	.005
Cov/Corr error SAS & error ROEQ*	.842	.303	.002
Cov/Corr error SAS & error SERM*	1.168	.264	.020
Cov/Corr error SAS & error IRQ*	.551	.173	.007
Cov/Corr error PATR & error SAS*	-1.438	-.278	.002
Cov/Corr error SAS & error YIP*	1.633	.288	.002
Variance YIP*	2.943		.001
Variance RTES*	1.318		.001
Variance AWAI*	2.82		.001
Variance of residual SERM*	1.79		.000
Variance of residual ROEQ*	.707		.000
Variance of residual IRQ*	.928		.000
Variance of residual Career*	2.582		.000
Variance of residual SMP*	1.824		.001
Variance of PATR*	2.433		.001
Variance of RTES*	3.628		.001
Variance of SAS*	10.953		.001
Variance of EBPAS*	32.675		.001

Note: *=denotes parameter estimate significance.YIP= Year In Program; AWAI=Advisory Working Alliance Inventory; RTES=Research Training Environment Scale; ROEQ=Research Outcome Expectations Questionnaire; SERM=Self-Efficacy in Research Measure; IRQ=Interest in Research Questionnaire; SAS=Scholarly Activity Scale Revised; PATR=Positive Attitudes Towards Research; NATR=Negative Attitudes Towards Research; EBPAS= Evidence Based Practice Attitudes Scale

Table 6

Unstandardized, Standardized, and Significance Levels for Model 3

In Figure X (Standard Errors in Parentheses; N = 215)

Parameter Estimate	Unstandardized	Standardized	P
SERM ← YIP*	.27 (.05)	.29	.003
SERM ← RTES*	.55 (.09)	.41	.002
SERM ← AWAI	.04 (.06)	.04	.697
ROEQ ← RTES*	.32 (.06)	.35	.002
ROEQ ← AWAI*	.10 (.04)	.16	.023
ROEQ ← SERM*	.15 (.04)	.22	.002
IRQ ← RTES	.15 (.08)	.12	.103
IRQ ← AWAI	-.03 (.05)	-.034	.670
IRQ ← SERM*	.17 (.05)	.18	.002
IRQ ← ROEQ*	.82 (.08)	.60	.003
CAREER ← IRQ*	.97(.08)	.64	.003
SAS ← YIP*	.46 (.12)	.23	.002
SAS ← IRQ*	.50 (.17)	.21	.008
SAS ← SERM*	.44 (.14)	.20	.007
SAS ← CAREER*	.49 (.11)	.31	.003

Note: YIP= Year In Program; AWAI=Advisory Working Alliance Inventory; RTES=Research Training Environment Scale; ROEQ=Research Outcome Expectations Questionnaire; SERM=Self-Efficacy in Research Measure; IRQ=Interest in Research Questionnaire; SAS=Scholarly Activity Scale Revised

Table 6 continued

Unstandardized, Standardized, and Significance Levels for Model 3

In Figure X (Standard Errors in Parentheses; N = 215)

Parameter Estimate	Unstandardized	Standardized	P
Covariance/Correlation RTES and AWAI*	1.034	.536	.001
Covariance/Correlation YIP and RTES	.011	.006	.884
Covariance/Correlation YIP and AWAI	.024	.008	.856
Variance YIP*	2.915		.001
Variance RTES*	1.318		.001
Variance AWAI*	2.82		.001
Variance of residual SERM*	1.79		.000
Variance of residual ROEQ*	.73		.000
Variance of residual IRQ*	.93		.000
Variance of residual Career*	2.79		.001
Variance of residual SAS*	7.0		.000

Note: *=denotes parameter estimate significance.YIP= Year In Program; AWAI=Advisory Working Alliance Inventory; RTES=Research Training Environment Scale; ROEQ=Research Outcome Expectations Questionnaire; SERM=Self-Efficacy in Research Measure; IRQ=Interest in Research Questionnaire; SAS=Scholarly Activity Scale Revised

Table 7

Unstandardized, Standardized, and Significance Levels for Model 4

In Figure X (Standard Errors in Parentheses; N = 215)

Parameter Estimate	Unstandardized	Standardized	P
Model 4			
SERM ← YIP*	.27 (.05)	.29	.003
SERM ← RTES*	.55 (.09)	.41	.002
SERM ← AWAI	.04 (.06)	.04	.697
ROEQ ← RTES*	.32 (.06)	.35	.002
ROEQ ← AWAI*	.10 (.04)	.16	.023
ROEQ ← SERM*	.15 (.04)	.22	.002
IRQ ← RTES	.15 (.08)	.12	.103
IRQ ← AWAI	-.03 (.05)	-.03	.670
IRQ ← SERM*	.17 (.05)	.18	.002
IRQ ← ROEQ*	.82 (.08)	.60	.003
CAREER ← AWAI	-.08 (.07)	-.06	.247
CAREER ← ROEQ*	.51 (.16)	.25	.003
CAREER ← IRQ*	.64 (.11)	.42	.002
CAREER ← SERM*	.19 (.08)	.13	.006
SMP ← YIP	-.05 (.08)	-.04	.533
SMP ← RTES*	.48 (.14)	.30	.001
SMP ← AWAI	.01 (.09)	.00	.986
SMP ← SERM*	.47 (.10)	.40	.002
SMP ← CAREER	.06 (.06)	.07	.476
PATR ← SMP*	1.00	.77	.007
NATR ← SMP*	-1.22 (.13)	-.78	.002
EBPAS ← SMP*	2.42 (.29)	.63	.003

Table 7 (continued)

Unstandardized, Standardized, and Significance Levels for Model 4

In Figure X (Standard Errors in Parentheses; N = 215)

Parameter Estimate	Unstandardized	Standardized	P
Covariance/Correlation RTES and AWAI*	1.03	.54	.001
Covariance/Correlation YIP and RTES	.01	.01	.884
Covariance/Correlation YIP and AWAI	.02	.01	.856
Variance YIP*	2.92		.001
Variance RTES*	1.32		.001
Variance AWAI*	2.82		.001
Variance of residual SERM*	1.79		.000
Variance of residual ROEQ*	.73		.000
Variance of residual IRQ*	.93		.000
Variance of residual Career*	2.58		.000
Variance of residual SMP*	2.08		.001
Variance of PATR*	2.39		.000
Variance of NATR*	3.28		.002
Variance of EBPAS*	31.0		.001

Note: *=denotes parameter estimate significance.YIP= Year In Program; AWAI=Advisory Working Alliance Inventory; RTES=Research Training Environment Scale; ROEQ=Research Outcome Expectations Questionnaire; SERM=Self-Efficacy in Research Measure; IRQ=Interest in Research Questionnaire; PATR=Positive Attitudes Towards Research; NATR=Negative Attitudes Towards Research; EBPAS= Evidence Based Practice Attitudes Scale

Table 8

Fit Indices for model comparison

Model	X^2	RMSEA	SRMR	IFI	TLI	CFI
Measurement Model	4.38	.075	.03	.99	.96	.99
Model 1	153.89	.14	.10	.87	.74	.86
Model 2	73.72	.11	.07	.95	.86	.94
Model 3	33.57	.11	.06	.96	.90	.96
Model 4	48.57	.08	.06	.97	.92	.96

Note: RMSEA= Root mean error of approximation; SRMR= Root mean squared residual; IFI=Incremental fit index; TLI= Tucker Lewis Index; CFI=Comparative fit index. Good fit is indicated when RMSEA<.08; SRMR<.08; IFI>.90; TLI >.95; CFI>.90.

Table 9

T-test results for Ph.D. and Psy.D. variable means

Variable	Mean	SD	t	Significance
AWAI			-1.19	.237
Ph.D.	118.61	19.18		
Psy.D.	115.02	17.28		
RTES			-4.71	.000
Ph.D.	71.89	9.30		
Psy.D.	65.05	7.91		
ROEQ			-5.79	.000
Ph.D.	34.98	4.96		
Psy.D.	30.40	4.68		
SERM			-3.93	.000
Ph.D.	92.94	16.12		
Psy.D.	83.13	13.06		
IRQ			-4.79	.000
Ph.D.	59.76	12.66		
Psy.D.	50.39	10.12		
Career			-8.11	.000
Ph.D.	2.88	2.11		
Psy.D.	.38	.97		
SAS			-11.97	.000
Ph.D.	7.80	2.87		
Psy.D.	2.60	1.97		
EBPAS			-1.43	.156
Ph.D.	57.63	7.13		
Psy.D.	55.99	7.17		
PATR			-.37	.711
Ph.D.	14.04	2.52		
Psy.D.	13.90	2.02		
NATR			3.31	.001
Ph.D.	9.50	3.02		
Psy.D.	11.02	2.10		

Note: Ph.D. n=165; Psy.D. n=50; df=213; significance level for Bonferroni corrected alpha is .0002.

Table 10

T-test results for Clinical Psychology and Counseling Psychology variable means

Variable	Mean	SD	t	Significance
AWAI			.28	.781
Counseling	118.48	20.72		
Clinical	117.73	17.70		
RTES			-.46	.647
Counseling	69.97	9.22		
Clinical	70.59	9.52		
ROEQ			-1.31	.191
Counseling	33.30	5.28		
Clinical	34.30	5.24		
SERM			-3.50	.001
Counseling	85.45	16.46		
Clinical	93.37	15.23		
IRQ			-2.31	.022
Counseling	54.91	12.55		
Clinical	59.09	12.52		
Career			-1.94	.054
Counseling	1.90	1.84		
Clinical	2.51	.2.31		
SAS			.59	.556
Counseling	6.79	2.92		
Clinical	6.49	3.71		
EBPAS			-5.22	.000
Counseling	54.06	7.11		
Clinical	59.10	6.45		
PATR			-5.39	.000
Counseling	12.87	2.38		
Clinical	14.64	2.22		
NATR			4.77	.000
Counseling	11.14	2.83		
Clinical	9.23	2.73		

Note: Counseling n=73; Clinical n=139; df=210; significance level for Bonferroni corrected alpha is .0002.

Table 11

T-test results for Scientist-practitioner (S-P) and Practitioner-scholar (P-S) variable means

Variable	Mean	SD	t	Significance
AWAI			.91	.364
S-P	118.43	19.15		
P-S	115.69	17.57		
RTES			4.10	.000
S-P	71.72	9.27		
P-S	65.73	8.50		
ROEQ			5.26	.000
S-P	34.91	5.02		
P-S	30.73	4.74		
SERM			4.39	.000
S-P	93.22	16.06		
P-S	82.42	12.70		
IRQ			4.27	.000
S-P	59.57	12.70		
P-S	51.18	10.61		
Career			-7.74	.000
S-P	2.87	2.12		
P-S	.47	1.16		
SAS			10.77	.000
S-P	7.74	2.96		
P-S	2.90	2.20		
EBPAS			1.42	.157
S-P	57.63	7.13		
P-S	56.01	7.16		
PATR			1.04	.302
S-P	14.11	2.52		
P-S	13.71	2.02		
NATR			-3.47	.001
S-P	9.48	3.00		
P-S	11.06	2.21		

Note: Scientist-Practitioner n=164; Practitioner-Scholar n=51; df=213; significance level for Bonferroni corrected alpha is .0002.

Chapter Five

DISCUSSION

The present study tested a modified and expanded version of Kahn's (2001) model predicting scientific training outcomes in counseling and clinical psychology doctoral graduate students incorporating tenets from both SCCT and RTE. The principle purpose of this study was to extend earlier research training research (e.g., Kahn, 2001; Kahn & Scott; 1997; Bishop & Bieschke, 1998) by expanding the scientific training outcomes from research interest and productivity to include additional characteristics of scientific mindedness such as attitudes towards research and evidence based practice. A second aim of this study was to gather a more complete picture of scientific training within the field of professional psychology, given that much of the previous research is based on a counseling psychology student sample. This objective was accomplished through the inclusion of both clinical and counseling psychology students as well as students from Ph.D. and Psy.D programs within the sample. A third aim was to explore the impact of additional factors predicting scientific training outcomes and thus, the advisory working alliance and career goals were included within the model as predictors of scientific training outcomes. This chapter presents a summary and interpretation of the model findings, a discussion of strengths and limitations of this study, and a discussion of the implications of the results of this study.

Summary of findings

I began by testing the hypothesized model described in Chapter 2. This model is grounded in social cognitive career theory and research training environment theory and the ultimate outcome variable of scientific mindedness was hypothesized to be explained directly by year in program, perceptions of research training environment, advisory

working alliance, research self-efficacy, and career goals. Mediator variables of research outcome expectations and interest in research were expected to indirectly explain scientific mindedness. Results of the SEM analysis show that this model was a “poor fit” to the data. Model 2 was created from the results of this analysis.

Model 2 is a specified version of Model 1. Specifically, a path from year in program to research outcome expectations was added. Additionally, residuals from several variables were allowed to co-vary including the scholarly activity variable with year in program, interest in research, research self-efficacy beliefs, research outcome expectations, and evidence based practice attitudes. Model 2 was tested and provided a moderate fit to the data. Model 2 demonstrates a plausible representation of the causal relations among the data with 44% of the variance of the scientific mindedness variable explained.

Model 3 was designed to replicate as closely as possible Kahn’s (2001) hypothesized model predicting scholarly activity. This model tested differs from Kahn’s model as it does not include investigative interests as an exogenous variable, it uses the advisory working alliance as an exogenous variable instead of a mentoring variable, and, similar to Kahn and Scott’s (1997) model, includes career goals as an endogenous variable. Scholarly activity was hypothesized to be explained directly by year in program, interest in research, research self-efficacy, and career goals. It was expected that research training environment, advisory working alliance, and research outcome expectations would indirectly help explain the variance in scholarly activity. The SEM analysis demonstrated that the data provided an overall “good fit” to the data where 43% of the variance of scholarly activity was explained.

Model 4 was created to provide a better understanding of how well the current research training measures can predict scientific mindedness outcomes outside of scholarly activity. Model 4 is nearly identical to Model 1. The only difference is that the latent construct scientific-mindedness only includes positive attitudes towards research, negative attitudes towards research, and evidence based practice attitudes (scholarly activity was not included). The scientific mindedness variable was hypothesized to be predicted by year in program, research training environment, advisory working alliance, research self-efficacy, and career goals. Research outcome expectations and interest in research were expected to indirectly predict the scientific mindedness outcome. The SEM analysis demonstrates that this model fits the data the best as compared to the other models and that 39% of the variance of scientific mindedness is explained.

Explanation of findings

Outcome variable. As science is a hallmark within the field of psychology, it is necessary to examine the training of psychology scientists. A major objective of this study was to examine and better understand the scientific training outcomes within professional psychology. As past training research has mostly defined scientific outcomes to be the equivalent of research production, the literature has been lacking in an understanding of additional ways that students are trained to be scientific. Certainly the production of research is valuable to the field of psychology, and yet, that should not diminish the importance of additional skills such as the ability to think scientifically within practice or apply the best practice research to practice. Training students to be scientific in multiple realms has become even more important in this time of managed care and more severe pathology coming through the doors of university counseling

centers. Therefore, a specific goal of this study was to broaden the training outcomes from interest in research and scholarly production to include several key scientific competencies identified and outlined in Fouad et al.'s (2009) benchmarks for professional psychology training. Consequently, a chief implication of the measurement model in this study is the creation of a new latent construct of scientific mindedness. This is a first attempt within the literature to operationalize in measurement form a more inclusive outcome of scientific training. This study's latent scientific mindedness construct included positive and negative attitudes towards research, evidence based practice attitudes, and scholarly production within the ultimate outcome. The creation of the scientific mindedness construct is a significant first step in the literature to more comprehensively understanding the impact of professional psychology scientific training on its students.

A deeper examination within the models can also begin to provide some insight into the scientific training outcome. A striking finding within Model 2 and Model 4 (model without the scholarly activity outcome as part of scientific mindedness) is that neither interest in research nor career goals predicted scientific mindedness. Whereas in Model 3, interest in research explains 4% of the variance and career goals explains 9% of the variance of scholarly production. What is striking about these results is that interest in research and career goals do not seem to predict scientific-mindedness as a whole variable but only one aspect of the scientific training—scholarly production. These results are encouraging as it suggests that all students, not just students who desire to pursue a career focused in research, can be scientifically minded. Specifically, it seems interest in research and career goals do not impact the ability to understand, appreciate,

and apply evidence based practice and appropriate clinical research to practice. These results may in fact provide support that the scientist-practitioner model still very much applies to its graduates regardless of employment setting.

Another noteworthy finding is that the research training environment directly predicted the latent scientific mindedness outcome in both Model 2 and Model 4. This is a significant finding as it demonstrates that the perceptions of the research training environment have a direct impact on attitudes towards research, evidence based practice attitudes, and scholarly activity. This is a new finding as the research training environment has not yet been directly examined in relation to these outcomes. Previous research such as Mallickrodt, Gelso, and Royalty's (1990) study have only examined the relation between research training environment and brief measures that assess slightly related concepts of attitudes towards research. Mallinckrodt et al.'s study used a four question measure which included two questions regarding the value and priority of conducting research activities after graduation and in one's future career. Mallinckrodt et al.s' (1990) study did find that the research training environment accounted for some of the variance of this brief measure. The current study extends this previous research by examining how the research training environment directly impacts key aspects of Fouad et al.'s (2009) scientific foundation for professional practice within the scientific knowledge and methods competency in training. These results may demonstrate that students trained in a positive research training environment are more likely than others to understand and apply evidence based practice into clinical work and evaluate scholarly literature on a practice based topic. As the field moves into a managed care era, the skills of critiquing clinical research as well as being able to apply the best practices have

become even more important. Therefore, it is necessary for training programs to understand this link between the research training environment and scientific mindedness outcomes more deeply.

While the results of this study demonstrate the continued need to examine scientific competencies beyond scholarly production, others might argue that there are some counterbalancing results within the study: Model 3 and Model 4 had nearly comparable overall fits to the data. A possible take away message from the fit of Model 3 is that the majority of the measures used in this study have been used with scholarly activity or interest in research as the outcome variable (Bieschke, 2006). The research training environment, advisory working alliance, research outcome expectations, and research self-efficacy have been created to measure interest in conducting research and producing research. These measures have not been used to examine attitudes towards using research or evidence based practice in clinical practice prior to this study. Therefore, it makes intuitive sense that a model predicting scholarly outcome would provide a good fit to the data. However, what is apparent from the current results is that these measures are also capable of predicting additional aspects of scientific mindedness such as attitudes towards research and evidence based practice attitudes. All of these results taken together provide genuine support for the importance of examining additional competencies of scientific training beyond scholarly production as well as developing new measures which more clearly operationalize scientific training in full.

Program and training model differences. A purpose of this study was to examine whether there are differences in factors predicting scientific training outcomes as a function of training philosophy including degree type, subfield type, and training model.

Examining potential differences in types of programs and training models yielded some noteworthy results. The results suggest that the training model and degree type have more of an impact on research production and factors leading to research production. Specifically, Ph.D. programs and scientist-practitioner programs produced significantly higher perceptions of the research training environment, research outcome expectations, research self-efficacy, interest in research, career goals and scholarly activity as compared to Psy.D. programs or practitioner-scholar training models. These findings corroborate previous research examining differing outcomes of academic training programs based on training model in which more scientifically oriented training models were associated with higher levels of scholarly publication (Cherry et al, 2000; Neimeyer et al., 2005) and student presentations at professional conferences (Neimeyer et al., 2005).

Differences between subfield type (e.g., clinical and counseling) did not yield the same results as model or degree differences. In fact, no differences were found between clinical and counseling psychology in perceptions of research training environment, advisory working alliance, research outcome expectations, research self-efficacy, interest in research, career goals and scholarly activity. A very important take away from these results is that the scientific training literature can be generalized to clinical psychology doctoral students. This is an important addition to the field demonstrating that previous studies focusing on elements of research training also apply to clinical psychology. This has been a void within the literature until this study.

Subfield differences did seem to have more of an impact on attitudes towards research and evidence based practice attitudes, however. Students in clinical psychology

programs reported significantly higher evidence based practitioner attitudes and positive attitudes towards research than counseling psychology students. One potential explanation for these program differences may be that clinical programs attract students who wish to conduct research and enter the program with a high esteem for research. Another possibility may be the progression of training within subfields. One possibility is that students within counseling psychology Ph.D. programs may have earned a terminal master's in a related field prior to completing the Ph.D. degree that might not have emphasized the value of research in clinical practice. This might leave students valuing their own clinical judgment over current research and less open to learning about the positive contributions research can produce on clinical work.

A very recent study, by Kahn and Schlosser (2010), was published based on their poster presentation results while the current study was being conducted. Kahn and Schlosser's (2010) research examined the graduate research training environment on a program and individual level. The researchers found programmatic differences in the research training environment as well as individual differences. Programs with higher perceptions of the research training environment also had students with higher interest in research as well as advisory working alliances. Additionally, Kahn and Schlosser (2010) found that clinical psychology Ph.D. programs had higher perceptions of the research training environment than school psychology Ph.D. programs. These results support the current study and this author's postulation that training outcomes are not only influenced by the individual student characteristics but also may be influenced by programmatic differences. It will be imperative for future research to continue to explore possible differences due to the training environment.

Advisory working alliance and career goals. This study has added to the literature by including the advisory working alliance as an additional element of the training environment predicting scientific training outcomes. One key finding is the identification of a positive relationship between the advisory working alliance and research outcome expectations in all three models. This finding demonstrates that the advising relationship can impact research outcome expectations above and beyond the research training environment. These results are exciting and different than what Kahn (2001) found when he examined the mentoring relationship as a predictor of scholarly activity. This study's results may be different than Kahn's as the definition of an advisor in this study is one who has the "greatest responsibility for helping guide you through your graduate program". In the doctoral programs, this responsibility most likely includes an emphasis on research requirements for the program. In Kahn's study, however, a mentor does not necessarily include a relationship which includes or emphasizes research production. These different operationalizations may explain the differences in the results. In addition, these results also seem to further prior research (e.g., Bard et al., 2000) that found interpersonal elements of the research training environment to impact research outcome expectations.

Surprisingly, unlike previous research (Schlosser & Gelso, 2001), the advisory working alliance was not important in the prediction of research self-efficacy or interest in research. In previous research by Schlosser and Gelso (2001), the advisory working alliance was found to correlate positively with research self-efficacy and interest in research. The present study may have yielded different results due to differences in the measures of research self-efficacy and interest in research. The current study utilized the

self-efficacy in research measure and interest in research while Schlosser and Gelso (2001) utilized the research attitudes measure to measure the research self-efficacy and attitudes towards research to measure interest in research. In addition, the advisory working alliance may not be a strong predictor of research self-efficacy as students may gain research self-efficacy from additional sources such as experience on research teams.

This study also reintroduced the variable career goals to predict scientific mindedness. As mentioned previously, career goals did not help explain the scientific mindedness variable. However, career goals did help explain scholarly productivity in Model 3. Model 3's fit was very similar to Kahn's (2001) model, however, in this study, Model 3 was able to better account for scholarly activity (43%) as compared to Kahn's (2001) model which only explained 19% of the variance of scholarly activity. One possible explanation for this could be the inclusion of career goals. These results seem to suggest that career goals may be important in predicting scholarly activity but not scientific mindedness.

SCCT vs RTE. Another purpose of this study included continuing to investigate the interplay of SCCT and RTE in predicting scientific training outcomes. Previous models that have been influenced by both RTE and SCCT to predict research interest and production have utilized Lent et al.'s (1994) SCCT models of interest and career choice behavior. The hypothesized model for this study was grounded in the RTE and SCCT frameworks, and specifically the career choice model, as well.

Within all three models developed for this study, many relationships could be explained by the SCCT framework. For instance, similar to previous research (e.g., Bishop & Bieschke, 1998; Kahn, 2001; Szymanski et al., 2007), the perceptions of

research training environment were found to predict research self-efficacy and research outcome expectations. In addition, the relationships among the endogenous variables, research self-efficacy, research outcome expectations, research interest, and career goals were specified by SCCT and were supported. Model 3 continued to remain consistent with past research (e.g., Kahn, 2001; Kahn & Scott, 1997; Szymanksi et al., 2007) where interest in research and career goals predicted the ultimate outcome, scholarly activity.

While considerable hypothesized SCCT relationships were found to be significant within the models, the SCCT interest and career choice behavior model framework does not seem to fit overall with predicting scientific mindedness. As mentioned in the previous paragraphs, the results have shown that Model 3, which is based on the career choice model within SCCT, explained the data very well when examining scholarly productivity only. However, Models 2 and 4, where scientific mindedness is the ultimate outcome, neither career goals nor interest in research predicted scientific mindedness. As mentioned previously, one suggested interpretation of this is that the measures used in this study better predict research production than additional scientific training outcomes (Bieschke, 2006). Another possible interpretation is that in trying to explain or predict the scientific mindedness outcome, the data more favorably fit Gelso's research training environment theory and in trying to explain scholarly production, the data support utilizing an SCCT framework. How can one make sense of these varying theoretical implications? It is likely that students do not enter programs already having much knowledge of evidence based practice or fully formulated attitudes towards treatment research. Thus, these are characteristics that may be influenced directly through the environment and emphasis of the training program. This may be true for additional

scientific training outcomes not yet explored such as incorporation of research into practice, applying the scientific process to clinical work, and the ability to compare and contrast treatment interventions.

Limitations of study

There are several limitations that must be taken into account when considering the conclusions from this study. Many relate to sampling issues. The sample was not random, as the programs were selected by this author for representativeness of the population. While the participant sample is representative of the population, the participants self-selected into the study. There is the possibility of a self-selection bias based on participants' attitudes towards research. The less than optimal response rate may impact the generalizability of the findings to all students. In addition, a large majority of the student sample was female and Caucasian. While these demographics represent the reality of doctoral students in professional psychology (APA, Center for Workforce Studies, 2009), generalizability to men and racial and ethnic minorities must be done with caution. Past research has found no gender differences as a factor in research training, however, no current research has yet addressed race or ethnicity differences.

A second concern relates to adequacy of sample size. Kline (1998) states that as the number of cases to the number of parameters decreases, the statistical stability of the estimates becomes more doubtful. Kline shares that a case to parameter ratio of less than 10 to 1 may be cause for concern. In this study, the case to parameter ratio ranges from 5 to 1 to 8 to 1. Therefore, these models were tested on a somewhat small participant sample. Replicating these models with a larger sample may lend additional support to the findings. In addition, as all three models only moderately fit the data, this suggests that

there are several models that can best explain the data. It is possible that alternative models may be more consistent with the data than those examined in this study.

Strengths of study

While there are limitations within this study, there are also some methodological strengths. This study endeavored to collect a sample of the doctoral professional psychology students more closely representative of the field at large. This is demonstrated in the selection of programs from both clinical and counseling psychology, doctoral programs including both Ph.D. and Psy.D., programs that are smaller, less research intensive and larger, more research intensive programs, and programs from all geographical areas in the U.S. Fewer programs were invited into this study so that recruitment efforts could focus on obtaining as many students from each program as possible. Fourteen out of the original invited 17 programs responded to the recruitment notices which represent an 82% program level response rate. Additionally, within each program approximately 7 to 30 students responded to the survey. It was estimated that approximately 782 possible students could be reached through their program email list serv. This study included a final sample of 215 participants which represents 27.5% response rate. As this recruitment represents a more inclusive representative population of doctoral students in professional psychology, these results are more generalizable than previous studies that only included counseling psychology Ph.D. students.

Implications for Research and Training

Research. The findings of the current study certainly lay a foundation for future research in scientific training outcomes. This study is an advancement of previous research as it demonstrates that it is evident that the research training literature must be

expanded to include additional scientific training competencies. While research production is certainly an important activity of professional psychology, utilizing current research and evidence based practice interventions within clinical work are also necessary skills. In addition, more clinical and counseling psychology doctoral graduates end up employed in clinical settings as compared to research settings (APA Center for Workforce Studies, 2009). Thus, it is essential for the field at large to explore and understand factors that impact professional psychology programs training students in all scientific activities that directly impact clinical practice.

As this study is the first to attempt to broaden the research training literature to include additional scientific training competencies, additional research needs to be conducted in this area. It will be important to re-examine the use of the measures included in this study. All of the measures, with the exception of positive and negative attitudes towards research and evidence based practitioners attitudes scale, were created with the goal of predicting interest in research and research productivity in mind (Bieschke, 2006). Revised measures may need to be created to include an emphasis on additional scientific activities beyond creating research. The internship research training environment measure (Phillips, Szymanski, Ozegovic, and Briggs-Phillips, 2004) may be an important scale to utilize in future research as it examines how research activities are encouraged in a full time clinical work setting. While including the internship research training environment scale is an important first step, it will also be important to examine how integrating science into practice occurs throughout the graduate training process. A measure that specifically explores the scientific practice training environment might examine critical thinking and in particular the application of the scientific method during

the therapy process, critically evaluating interventions and their outcomes, ways supervisors encourage the use of research into practice, and practicing vigilance about how sociocultural variables influence the scientific process (Bieschke, 2006; Gelso & Lent, 2000; Szymanski et al., 2007). Ideal future research would include a longitudinal study which followed students from the start of a program through a few years post-doctoral to gather information about the process of integrating science and practice. It may be particularly important to conduct longitudinal research to explore this study's finding that year in program can negatively influence research outcome expectations. The future study could include not only student self-report measures but also measures completed by their program. As the professional field is embracing the culture of competence, it will be important to develop a scientific training measure that specifically measures the competencies as outlined in Fouad et al.'s (2009) research. Many programs already assess some core aspects of scientific knowledge such as the scientific foundation of psychology through program requirements such as comprehensive exams. If a measure was created with Fouad et al.'s (2009) competencies for all scientific knowledge and methods, it could be utilized by students to evaluate their own progress as well as by programs as part of their assessment of readiness. Creating a competency based measure from Fouad et al.'s (2009) research could be beneficial to the field at large as it could standardize the ways programs assess training.

As there were differing results between training programs both in degree type and model, namely the scientist-practitioner model and Ph.D. students had higher levels of perceptions of research training environment, research outcome expectations, research self-efficacy, interest in research, career goals, and scholarly productivity, it demonstrates

that the type of training model and degree type impact the scientific training of its students. While it is encouraging that no differences exist between the training models and degree type on the attitudes towards research and evidence based practice, it may be necessary to gather more in depth knowledge of the process of how these training programs influence students. In Kahn and Schlosser's (2010) recent research exploring the research training environment across professional psychology, results found that the number of required courses in research methods and statistics and conducting a thesis prior to a dissertation was not related to perceptions of the research training environment. This is indeed important information however, future research may also need to explore whether students who have to conduct dissertations and other research projects as a part of their programs have differing levels of abilities in applying scientific methods to their clinical practice. Are students who are conducting research more familiar with clinical research and therefore more able to apply it to practice? In addition, as differences were found between clinical psychology and counseling psychology programs in regards to evidence based practice attitudes and positive attitudes towards research, it will be important to understand how these differences emerge. Are students in these programs completing different coursework? Are there differing expectations on the use of evidence supported interventions within clinical work? Do clinical rotation sites produce differences in integrating research into practice? These results examining degree type, subfield, and training model certainly have implications for the field of professional psychology at large and training within the field.

Finally, as much of the previous research has been conducted from an inadequacy in research production perspective, it will be important for future research to reduce the

emphasis on deficiencies of science within the field and instead approach future research from a strength-based perspective. This might include generating research questions about understanding clinical expertise and judgment within practitioners. This might also include understanding how and when research is beneficial and useful to practitioners and when clinical research is impractical. Research conducted from this constructive viewpoint may further aid in the integration of science and practice and the promotion of the scientist-practitioner model.

Training. As the scientific mindedness variable was predicted by research self-efficacy and the perceptions of the research training environment, efforts to enhance both should occur. From this current study and previous research, we understand that by increasing the perceptions of the research training environment, research self-efficacy is often increased as well. Enhancing the perceptions of the research training environment could include teaching statistics courses within the program department instead so that an emphasis can be placed on relevant statistical methods in psychological practice. Kahn and Schlosser (2010) also suggest the addition of a course focusing specifically on research in clinical practice. A way to increase both the research training environment and research self-efficacy might be for programs to develop annual colloquia which could comprise of local practitioners, academicians, and older students presenting their integration of research into practice (Drabick & Goldfried, 2000). A colloquia such as this could demonstrate program excitement about research and provide an opportunity for modeling so that vicarious learning may take place. For advanced students, a colloquia could directly enhance performance accomplishment. Additionally, programs could create research teams comprised of local practitioners, faculty, and students within

programs to focus on developing research projects with meaningful clinical applications. Students could be encouraged to join these teams early within their programs to provide them exposure and experience to the integration of science and practice.

In all three models, the advisory working alliance directly impacted research outcome expectations and indirectly impacted interest in research. Therefore, the advisory working alliance has the ability to influence the value students place on being involved with research as well as some of the interest to pursue research. The results demonstrated that the advisory working alliance was stronger for students who selected to work with their advisors as compared to assigned to their advisors. Programs may want to explore how they match students with their advisors and be sure to include student input into the selection process. It might also be important for programs to develop clear and supportive procedures for when a poor advisor-advisee relationship develops. It might be necessary to terminate these relationships so that a student may select an advisor who represents a better fit to the student's needs (Kahn & Schlosser, 2010). Advisors might be able to enhance research outcome expectations and even interest in research by inviting students to attend conferences early on in their training with them. Spending time with their advisees outside of their program in an alternate professional manner may enhance the bond aspect of the relationship. Additionally, at conferences, advisors might demonstrate the value of sharing research results of their own at the conference, the importance of keeping up to date with the newest clinical research for their own practice, and even assist a student in networking at a research conference so that students could meet individuals who are involved in research in a variety of capacities.

Finally, as most programs evaluate their students on a semester or annual basis, it might also be important to conduct program evaluations. This might provide an opportunity for programs to assess their strengths and growth edges in relation to scientific training outcomes as well provide an opportunity for student perceptions to be shared. This program evaluation may examine the perceptions of the research training environment, the advisory working alliances, and student progress on scientific training outcomes. As this current study as well as Kahn and Schlosser's (2010) study demonstrate, positive student perceptions of the training environment and the working alliance are important factors in interest in research, research self-efficacy, and attitudes towards clinical research and evidence based practice. In regards to gathering information on scientific training outcomes, programs could begin to examine the length of time it takes for students to complete specific scientific training competencies such as developing a topic for a research project, using evidence based practice in case conceptualization, or evaluating the scholarly literature on clinical related topic. These program evaluations could allow programs to prevent any potential value mismatches or misunderstandings between the students and programs. Finally, as the APPIC internship match continues to remain imbalanced where there are not enough internship positions for the students applying, it might become even more important for programs to be evaluating their student readiness as well as the program ability to prepare students for internship across all training dimensions prior to internship applications.

Appendix A: Training Director Recruitment Letter—First Contact

Dear _____,

Dr. Kathy Bieschke and I need your assistance. While we understand you and your students are often invited to participate in research, we hope that you will consider our research invitation carefully. We only need a small bit of assistance from you. We would like you to send the attached invitation to your program listserv to invite your current students (first year through internship) to participate in brief online survey. Your institution's graduate program is one of 17 programs selected for possible inclusion in this research. As we understand the time demands of a training director, we would be pleased to work with a department staff assistant to assist us in this task. We are also more than happy to obtain Institutional Review Board (IRB) approval from your university if it is required for your students to participate in research.

Your counseling/clinical psychology doctoral program has been selected to participate in a research project which examines factors that contribute to scientific training among counseling and clinical psychology doctoral students. We are interested in understanding more about the contributions of a variety of factors on scientific activity. Given the importance of the scientific training within psychology doctoral programs, studies of this kind are very important. This dissertation research has been determined to be exempt by the Office of Research Protections at Pennsylvania State University and is being conducted by Margaret Marks under the direction of Dr. Kathy Bieschke.

This research project is an online survey which contains questions which inquire about advisory working alliance, research training environment, research self-efficacy, outcome expectations, interest in research, career goals, and attitudes towards treatment research. The survey should only require 15-30 minutes. All responses will be confidential and will not be connected to names or demographic information of participates or graduate programs. Names of the participants or of the graduate programs will not be identified in the write up of the research. One student from your program will be awarded a $20.00 Amazon.com gift certificate for their participation.

We urge you to consider participating in this study. If you have any questions or concerns related to this study, please contact Margaret (Megan) Marks (mmm452@psu.edu) or Dr. Kathy Bieschke (kxb11@psu.edu). We will be calling you within a week to follow up and discuss the IRB requirements of your university. Upon request, a copy of the exemption determination from the Office for Research Protections at The Pennsylvania State University may be provided.

Sincerely,

Margaret (Megan) Marks, M.A.
The Pennsylvania State University
Mmm452@psu.edu
(814) 865-2191

Kathleen Bieschke, Ph.D.
The Pennsylvania State University
kxb11@psu.edu
(814) 865-3296

Appendix B:Doctoral Student Recruitment Letter—First contact

Dear _____ current students,

Hello! Your program is one of **17** selected to participate in a dissertation research project which explores factors that contribute to scientific training among counseling and clinical psychology doctoral students. Given the importance of the scientific training in doctoral programs, studies of this kind are very important. As your program was invited to participate, your input is very necessary! As a fellow graduate student, I know just how valuable your time is. Therefore we are conducting this survey online and anticipate that it should only take approximately 15-30 minutes to complete. For participating in this survey, you can chose to enter a raffle for one gift certificate worth $20.00 to amazon.com. This drawing will ***only*** include students from your psychology program.

All information and survey responses will remain confidential. Your responses will not be able to be linked to your name, contact information, IP address, or identifiable demographic information. Your training director or advisor will not have access to your responses or your decision to participate. This dissertation research has been determined to be exempt by the Office of Research Protections at the Pennsylvania State University. Additional details regarding the study may be found in the informed consent.

To review the informed consent and complete the online questionnaires, please click on the following link:

https://www.psychdata.com/s.asp?SID=127860

If you have any questions, please email me at mmm452@psu.edu. I greatly appreciate your participation in this dissertation research study and would be happy to send you the results upon completion.

Sincerely,

Margaret (Megan) Marks, M.A.
The Pennsylvania State University
Mmm452@psu.edu
(814) 865-2191

Appendix C: Training Director Recruitment Letter—Second Contact

Dear Training Director,

Two weeks ago I contacted you inviting your clinical/counseling psychology doctoral students to participate in my dissertation research examining factors which impact scientific training of counseling and clinical psychology doctoral students. I greatly appreciate you forwarding the invitation to the online survey to your current counseling/clinical psychology doctoral student listserv.

At this time, approximately XX% of the students in your program have participated in this study. As your program is one of 17 counseling/clinical psychology doctoral programs invited to participate in this research, we are hoping to have high response rates from each program invited. We would appreciate you forwarding the attached reminder invitation letter to your listserv of current (first year through internship) doctoral students.

Again, I would be happy to be in touch with a program or staff assistant to complete this request if that would work better for you and your busy schedule.

Thank you again for your assistance and support. If you have any questions, please do not hesitate to contact me.

Sincerely,

Margaret (Megan) Marks, MA
The Pennsylvania State University
Mmm452@psu.edu

Appendix D: Doctoral Student Recruitment Letter—Second contact

Hello _____doctoral students!

Two weeks ago, you were sent an email with a link that invites you to participate in my dissertation research study investigating factors that influence scientific training in doctoral psychology programs. _____'s counseling/clinical psychology program was one of only **17** programs specifically invited to participate in this research. At this time, approximately **XX%** of the currently enrolled counseling/clinical psychology doctoral students at _____ have completed the survey.

If you have already participated, we ***greatly*** appreciate your time and efforts! If you have decided to participate, but have not yet had an opportunity to complete the survey, we would like to remind you to do as soon as it is convenient for you. We anticipate that responding to the survey will take approximately 15-30 minutes to complete. Your responses to the survey questions will not be able to be connected to you or any identifying information. _____ and your advisor will not know whether you have participated.

As we understand that your time is valuable, you will have the opportunity to win a $20.00 gift certificate to Amazon.com (one certificate will be awarded to YOUR counseling psychology program at _____ and will only include participants from ___).

We have included the link to the informed consent and online survey for your convenience:

https://www.psychdata.com/s.asp?SID=127860

If you have any questions or concerns related to this study, please feel free to email Megan Marks (mmm452@psu.edu) or Dr. Kathy Bieschke (kxb11@psu.edu).

Sincerely,

Margaret (Megan) Marks, M.A.
Pennsylvania State University
Mmm452@psu.edu

Appendix E: Training Director Recruitment Letter—Final Contact

Dear Training Director,

Thank you very much for forwarding the invitation to my dissertation survey examining scientific training to your current clinical/counseling psychology doctoral students listserv. I greatly appreciate your assistance in reaching your clinical/counseling psychology students.

At this time, approximately XX% of the students in your program have participated in this study. As your program is one of 17 psychology doctoral programs invited to participate in this research, it is imperative to have a high participation rate from your program. We have added an additional incentive in the hopes to obtain at least an overall 30% response rate so that we can draw some meaningful conclusions from the data. Every participant is so important to us. As the semester is coming to a close, this will be our last reminder to your students to complete the survey. We would appreciate you forwarding this attached final reminder invitation letter to your listserv of current (first year through internship) doctoral students.

Again, I would be *happy* to be in touch with a program/staff assistant or list administrator to complete this request if that would work better for you and your busy schedule.

Thank you again for your continued assistance and support. If you have any questions, please do not hesitate to contact me.

Margaret (Megan) Marks, MA
The Pennsylvania State University
Mmm452@psu.edu

Appendix F: Doctoral Student Recruitment Letter—Final Contact

Hello again _____ counseling/clinical psychology doctoral students!

Please help us understand the many ways YOU use science in research and clinical practice. We are interested in understanding ALL views of clinicians and researchers to help professional psychology training. For your time, you can enter a raffle for a chance to win either a $20.00 Amazon Gift card or a $5.00 Starbucks card which ONLY includes entries from _____ counseling/clinical psychology doctoral program (NOW two people from your program will receive a gift card) if you complete this online survey regarding your training in your doctoral psychology program:

https://www.psychdata.com/s.asp?SID=127860

At this time, approximately XX% of the currently enrolled counseling psychology doctoral students at _____ have completed the survey. If you have already completed the survey, THANK YOU! We are grateful for your time. If you have not yet had the chance to complete the survey, the time is now! The survey will *only* take 15-20 minutes of your time. This is our *last* follow-up inviting you to participate in this study.

As _____'s counseling/clinical psychology program is one of only 17 psychology doctoral training programs invited to participate, it is VERY important that we hear from you! YOUR participation in this dissertation research is very important and WILL make a difference.

Remember: Your responses to the survey questions will not be able to be connected to you or any identifying information. _____ and your advisor will not know whether you have participated. This dissertation study is being conducted for research purposes and has been determined to be exempt by the Office of Research Protections at the Pennsylvania State University. Additional details regarding the study may be found in the informed consent.

If you have any questions or concerns related to this study, please feel free to email Margaret (Megan) Marks (mmm452@psu.edu) or Dr. Kathy Bieschke (kxb11@psu.edu).

Sincerely,

Margaret (Megan) Marks, M.A.
The Pennsylvania State University
Mmm452@psu.edu

Appendix G: Informed Consent

Informed Consent Form for Social Science Research

The Pennsylvania State University

Title of Project: Factors that impact the scientific training of counseling and clinical doctoral psychology Students

Principal Investigator: Margaret Marks, M.A., Doctoral Student
Department of Counselor Education, Counseling Psychology, and Rehabilitation Services
Pennsylvania State University
316 CEDAR Building, University Park, PA 16802
Mmm452@psu.edu

Advisor: Kathleen Bieschke, Ph.D., Professor
Department of Counselor Education, Counseling Psychology, and Rehabilitation Services
Pennsylvania State University
306 CEDAR Building, University Park, PA 16802
814-865-3296; kbieschke@psu.edu

Purpose of the Study: The purpose of this research study is to examine the factors that influence the scientific training of counseling and clinical psychology students. We are interested in learning more about the contributions of a variety of variables on scientific activity.

Procedures to be followed: You will be asked questions on an online survey. These questions will ask you to report on your relationship with your advisor, research training environment, self-efficacy, interest, outcome expectations, and ways in which you are a scientist.

Benefits: You may be able to reflect on your scientific experiences in your training program. For some participants, such an experience may be meaningful.

By examining variables which are related to the scientific training of psychologists, this research will provide knowledge which can help to address the training needs of psychologists.

Duration: It will take approximately 15-20 minutes to complete the survey.

Statement of Confidentiality: Your confidentiality will be kept to the degree permitted by the technology being used. No guarantees can be made regarding the interception of data sent via the Internet by any third parties. However, this study will use

www.psychdata.net online survey system to collect and store data. This system is a professionally developed server and many studies have used it. All of the participant responses will be encrypted using 128 bit SSL technology (Secure Socket Layer), which is equivalent to the industry standard for securely transmitting credit card information over the internet. Once research data is stored on the psychdata sever, it will be held in an isolated database that can only be access by a principal investigator. Your survey responses will not be connected to your personally identifiable information. In the event of a publication or presentation resulting from the research, no personally identifiable information will be shared (e.g. name, graduate program, or graduate advisor).

Right to Ask Questions: Please contact Margaret Marks, M.A. by emailing mmm452@psu.edu with questions, complaints, or concerns about this research.

Voluntary Participation: Your decision to participate in this study is voluntary. You may refuse to participate, withdraw your consent to this research and discontinue your participation in the study at any time without penalty. You do not have to answer questions you do not want to answer.

Payment for participation: At the end of the survey, you will be provided with the opportunity to participate in a drawing. One participant from each participating psychology training program will be randomly selected to receive a $20 gift certificate to Amazon.com. An additional participant from each participating psychology program will be randomly selected to receive a $5 gift certificate to Starbucks. Therefore, two students from each program will receive a gift certificate (one $20.00 Amazon.com; five $5.00 Starbucks). In order to participate in the drawings, you will be asked to submit an email address so that you can be contacted in the event that you are selected. Your email address will be stored separately from you survey responses.

You must be 18 years of age or older to consent to take part in this research study. In addition, you must be enrolled in a Counseling or Clinical 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 does not apply to you, please disregard this letter.

If you have read the information in this form and are willing to participate in the research, please press the continue button and follow instructions for participating in a confidential online survey.

Completion and submission of the survey is considered your implied consent to participate in this study. Please print this form for your records.

Continue

Appendix H: PARTICIPANT DEMOGRAPHIC 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. Are you currently enrolled in a psychology graduate doctoral program?
   1=Yes
   2=No

2. What is your gender?
   1= female
   2= male
   3= transgender

3. What is your age? _____

4. With which racial/ethnic/cultural group do you identify?
   1=African American/Black
   2=Asian/Asian American
   3=Caucasian/White
   4=Hispanic/Latino/Latina
   5=American Indian/Alaska Native
   6=Native Hawaiian/Pacific Islander
   7=Biracial
   8=Other (please specify:_____

5. What is your present relationship status?
   1=single
   2=married
   3=partnered (living together but not married)
   4=separated
   5=divorced
   6=widowed
   7=other (please specify_____)

6. Please indicate the highest degree which will be conferred to you upon graduation from your CURENT program:
   1=Terminal master's
   2=Psy.D.
   3=Ph.D.

7. Please select the item which best describes the progression of your graduate training:
   1= Earning a terminal master's degree
   2= Earning a terminal master's degree in a related (e.g., psychology, counseling, social work, etc) field and accepted into a psychology doctoral program
   3=Earning a doctoral degree without earning a master's degree
   4=Earning a doctoral degree and previously earned a related (e.g., psychology, counseling, social work, etc) terminal master's degree
   5=Earning a doctoral degree with earning a psychology master's degree as part of doctoral degree
   6=Other (please specify)

8. Including this academic year, how many years have you been enrolled in your current doctoral program (excluding time spent in any other doctoral or masters programs)?
   1= first year
   2= second year
   3=third year
   4=fourth year
   5=fifth year
   6=sixth year
   7=higher than sixth year

9. What is your subfield of your doctoral program in psychology?
   1=Counseling Psychology
   2=Clinical Psychology
   3=Other (please specify: _____)

10. What is the accreditation status of your training program?
    1=APA accredited
    2=APA accredited, on probation
    3= Not accredited
    4=Other (please specify_____)

11. With which theoretical orientation do you most identify?
    1=Behavioral
    2=Cognitive
    3=Family Systems
    4=Gestalt
    5=Humanistic/Existential
    6=Interpersonal
    7=Integrative

8=Psychodynamic
9=Other (please specify:_____)

12. Please indicate the training model of your program:
    1=Scientist-Practitioner
    2=Practitioner-Scholar
    3=Clinical Scientist
    4=Scholar-Practitioner
    5=Local Clinical Scientist
    6=Practitioner-Scientist
    7=Practitioner

13. Please indicate the emphasis which is placed on research and practice in your program:
    1= More emphasis on science and research activities than clinical activities
    2=More emphasis on clinical activities than on science and research activities
    3=Equal emphasis on both clinical activities and science and research activities

14. 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)
    1=Yes
    2=No

15. Please indicate how you and your advisor were matched within your program:
    1= Your advisor was assigned to you
    2=You selected to work with your advisor
    3= Other (please specify)

Appendix I: RESEARCH TRAINING ENVIRONMENT SCALE-REVISED SHORTENED

Kahn, J.H. and Miller, S.A. (2000). Measuring global perceptions of the research training environment using a short form of the RTES-R. *Measurement and Evaluation in Counseling and Development*, 33, 103-119.

Below is a series of statements concerning research training.

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

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

Consider each statement using the following scale:

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

_____1. Many of our faculty do not seem to be very interested in doing research.

_____2. The faculty does what it can to make research requirements such as the thesis and dissertation as rewarding as possible.

_____3. My advisor understands and accepts that any piece of research will have its methodological problems.

_____4. I have felt encouraged during my training to find and follow my own scholarly interests.

_____5. Statistics courses here are taught in a way that is insensitive to students' level of development as researchers.

_____6. The statistics courses we take do a good job, in general, of showing students how statistics are actually used in psychological research.

_____7. There is a sense around here that being on a research team can be fun, as well as intellectually stimulating.

_____8. Faculty members in my program use an extremely narrow range of research methodologies.

_____9. Generally, students in my training program do not seem to have intellectually stimulating and interpersonally rewarding relationships with their research advisors.

_____10. It is unusual for first-year students in this program to collaborate with advanced students or faculty on research projects.

_____11. I have the feeling, based on my training, that my thesis (or dissertation) needs to be completely original and revolutionary for it to be acceptable to the faculty.

_____12. Our faculty seems interested in understanding and teaching how research can be related to counseling practice.

_____13. Most faculty do not seem to really care if students are genuinely interested in research.

_____14. During our coursework, graduate students are taught a wide range of research methodologies, e.g., field, laboratory, survey approaches.

_____15. 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.

_____16. Students here seem to get involved in thinking about research from the moment they enter the program.

_____17. Students in this program are rarely taught to use research findings to inform their work with clients.

_____18. The faculty members of my graduate program show excitement about research and scholarly activities.

Appendix J: The Advisory Working Alliance Inventory –Student Version (AWAI-S)

Schlosser and Gelso, 2001

These 30 items pertain to your perceptions about your relationship with your advisor. For the purposes of this study, the term advisor is referring to the faculty member that has the greatest responsibility for helping guide you through your graduate program (e.g. advisor, major professor, committee chair, dissertation chair). Please respond to the items using the following scale:

1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree
5= Strongly Agree

1. _____ I get the feeling that my advisor does not like me very much.

2. _____My advisor introduces me to professional activities (E.g. conferences, submitting articles for journal publication)

3. _____ I do not want to be like my advisor.

4. _____My advisor welcomes my input into our discussions.

5. _____My advisor helps me conduct my work within a plan.

6. _____I tend to see things differently from my advisor.

7. _____My advisor does not encourage my input into our discussions.

8. _____My advisor has invited me to be a responsible collaborator in his/her own work.

9. _____I do not want to feel similar to my advisor in the process of conducting work.

10. _____My advisor is not kind when commenting about my work.

11. _____My advisor helps me establish a timetable for the tasks of my graduate training.
12. _____My advisor and I have different interests.

13. _____I do not feel respected by my advisor in our work together.

14. _____My advisor is available when I need her/him.

15. _____I feel like my advisor expects too much from me.

16. _____My advisor offers me encouragement for my accomplishments.

17. _____Meetings with my advisor are unproductive.

18. _____I do not think that my advisor believes in me.

19. _____My advisor facilitates my professional development through networking.

20. _____My advisor takes my ideas seriously.

21. _____My advisor does not help me stay on track in our meetings.

22. _____I do not think that my advisor has my best interests in mind.

23. _____I learn from my advisor by watching her/him.

24. _____ I feel uncomfortable working with my advisor.

25. _____ I am an apprentice of my advisor.

26. _____I am often intellectually “lost” during my meetings with my advisor.

27. _____I consistently implement suggestions made by my advisor.

28. _____My advisor strives to make program requirements as rewarding as possible.

29. _____My advisor does not educate me about the process of graduate school.

30. _____My advisor helps me recognize areas where I can improve.

Appendix K: SELF-EFFICACY IN RESEARCH MEASURE (BRIEF FORM)

Kahn, J. H., & Scott, N. A. (1997). Predictors of research productivity and science-related career goals among counseling psychology graduate students. The Counseling Psychologist, 25, 38-67.

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

0----------1----------2----------3----------4----------5----------6----------7----------8----------9
no confidence total confidence

1. _____Keeping records during a research project

2. _____Designing an experiment using traditional methods (e.g., experimental, quasi experimental designs)

3. _____Writing the introduction and literature review for a dissertation

4. _____Writing the introduction and discussion sections for a research paper for publication

5. _____Formulating hypotheses

6. _____Writing the method and results sections of a thesis

7. _____Utilizing resources for needed help

8. _____Understanding computer printouts

9. _____Defending a thesis or dissertation

10. _____Using multivariate statistics (e.g., multiple regression, factor analysis, etc.)

11. _____Using statistical packages (e.g., SPSS-X, SAS, etc.)

12. _____Operationalizing variables of interest

Appendix L: RESEARCH OUTCOME EXPECTATIONS QUESTIONNAIRE (SHORT-FORM)

Bieschke, 2000

Directions: Using the 5-point scale provided, please indicate the degree to which you agree with each statement.

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

1. _____Involvement in research will enhance my job/career opportunities.

2. _____People I respect will approve of my involvement in research.

3. _____Involvement in research will allow me to contribute to practitioners' knowledge base.

4. _____Research involvement will lead to a sense of satisfaction.

5._____Being involved in research will contribute to my development as a professional.

6._____I believe research skills will be fruitful for my career.

7._____My involvement in research will lead to meaningful contributions to the field.

8._____My analytical skills will become more developed if I am involved in research activities.

Appendix M: Interest in Research Questionnaire.

Unpublished scale. Bishop, R. M., & Bieschke, K.J. (1994).

Directions: Using the 5-point scale provided, please indicate the degree of current interest you have in the activities listed. Please remember that the term research encompasses both quantitative and qualitative approaches.

1= Very Disinterested 2=Disinterested 3=Indifferent 4=Interested 5=Very Interested

1. _____Reading a research journal article.

2. _____Being a member of a research team (remember, the term **research** encompasses both quantitative and qualitative approaches).

3. _____Conceptualizing a research study.

4. _____Conducting a literature review.

5. _____Developing funding proposals.

6. _____Having research activities as part of every work week.

7. _____Conducting research at site of counseling practice.

8. _____Taking a research design course.

9. _____Taking a statistics course.

10. _____Developing a data analysis.

11. _____Analyzing data.

12. _____Discussing research findings.

13. _____Writing for publication/presentation.

14. _____Leading a research team.

15. _____Designing a study.

16. _____Collecting data.

Appendix N: CAREER GOALS MEASURE-REVISED

Kahn and Scott, 1997

Directions: The following is a list of 11 post-graduation occupational settings within the psychology field. Please rank order your top three choices by placing either a 1, 2, or 3 next to your first, second, and third choice for occupational setting, respectively.

_____ 1. Academic (large university)

_____ 2. Academic (small college)

_____ 3. Counseling center

_____ 4. Veterans Administration hospital

_____ 5. Research facility

_____ 6. Government agency

_____ 7. Industry

_____ 8. Community mental health center

_____ 9. Private practice

_____ 10. Full-time consultation

_____ 11. Other (please indicate_____)

Appendix O: SCHOLARLY ACTIVITY SURVEY REVISED

MARKS, 2009

The following 16 items inquire about your research accomplishments and current involvement in research activities. Please answer the following questions based on your past and current research involvement.

_____ 1. How many published empirical manuscripts have you authored or coauthored in a refereed journal? (include manuscripts in press)

_____ 2. How many published non-empirical (e.g. theoretical) manuscripts have you authored or coauthored in a refereed journal? (include manuscripts in press)

_____ 3. How many unpublished empirical manuscripts have you authored or coauthored (not including your thesis or dissertation)?

_____ 4. How many unpublished non-empirical manuscripts have you authored or coauthored (not including your thesis or dissertation)?

_____ 5. How many articles have you submitted to refereed journals?

_____ 6. How many manuscripts are you currently in the process of preparing to submit for publication (i.e., writing the manuscript)?

_____ 7. How many published books or book chapters have you authored or coauthored? (including in press)

_____ 8. How many unpublished books or book chapters have you authored or coauthored?

_____ 9. How many other works have you published? (e.g. grants, training manuals, or book reviews)

_____ 10. How many other works are you currently in the process of preparing to submit for publication? (e.g. grants, training manuals, or book reviews)

_____ 11. How many presentations have you made at local, regional, or national professional conferences? (includes poster presentations)

_____ 12. How many presentations are you currently in the process of preparing to submit for presentation (i.e., writing an abstract)?

_____ 13. How many local, regional, or national professional conferences have you attended?

_____ 14. How many professional leadership roles have held or currently hold? (e.g., officer of professional association, committee chair or member in professional association)

_____ 15. Are you currently involved in gathering data (do not include your thesis or dissertation)?

_____ 16. Are you currently conducting statistical analyses on data (do not include your thesis or dissertation)?

Appendix P: EVIDENCED BASED PRACTICE ATTITUDE SCALE

Aarons, 2004

The following 15 questions ask about your feelings about using new types of therapy, interventions, or treatments. Manualized therapy, treatment, or intervention refers to any intervention that has specific guidelines and/or components that are outlines in a manual and/or that are to be followed in a structured or predetermined way. Indicate the extent to which you agree with each item using the following scale.

0=	1=	2=	3=	4=
Not at all	To a slight extent	To a moderate extent	To a great extent	To a very great extent

_____ 1. I like to use new types of therapy/interventions to help my clients.

_____ 2. I am willing to try new types of therapy/interventions even if I have to follow a treatment manual.

_____ 3. I know better than academic researchers how to care for my clients.

_____ 4. I am willing to use new and different types of therapy/interventions developed by researchers.

_____ 5. Research based treatments/interventions are not clinically useful.

_____ 6. Clinical experience is more important than using manualized therapy/interventions.

_____ 7. I would not use manualized therapy/interventions.

_____ 8. I would try a new therapy/intervention even if it were very different from what I am used to doing.

For questions 9-15: If you received training in a therapy or intervention that was new to you, how likely would you be to adopt it if:

_____ 9. it was intuitively appealing?

_____ 10. It “made sense” to you?

_____ 11. it was required by your supervisor?

_____ 12. it was required by your agency?

_____ 13. it was required by your state?

_____ 14. it was being used by colleagues who were happy with it?

_____ 15. you felt you had enough training to use it correctly?

Appendix Q: POSITIVE AND NEGATIVE ATTITUDES TOWARD TREATMENT RESEARCH SCALE

Nelson and Steele, 2007

The following 8 questions are interested in your preferences regarding research. The term "treatment research" refers to investigation of the efficacy and effectiveness of specific treatments. Indicate the extent to which you agree with each item using the following scale.

1=	2=	3=	4=	5=
Completely Disagree	Disagree	Neutral	Agree	Completely Agree

_____ 1. Most treatment research published in the last 10 years is directly relevant to me in my clinical work.

_____ 2. Clinical research should be the foundation of clinical practice.

_____ 3. Researchers understand the needs of practitioners.

_____ 4. Clinical research addresses questions that are important to me.

_____ 5. Clinical judgment is more important than clinical research in determining appropriate treatment.

_____ 6. Efforts to empirically evaluate treatment effects are overly simplistic and therefore of little value to me.

_____ 7. Reading and applying research findings it too time-consuming.

_____ 8. I would like to apply treatment research in my practice but most research does not address questions that are important to me.

Appendix R: End of the Survey Raffle Drawing Question

You have completed 100% of the survey!

As a token of our appreciation, you may now enter a raffle to win one $20.00 Amazon gift certificate or one $5.00 Starbucks gift card. Two participants from YOUR graduate program will each be awarded one certificate.

Would you like to enter YOUR program's raffle for one $20.00 Amazon gift certificate or one $5.00 Starbucks gift card? (Remember: your survey responses will not be able to be connected to your raffle entry)

1=Yes (skip to raffle drawing)
2=No (end survey)

Thank you for participating in this dissertation research! Good luck in all of your future endeavors!

Raffle Entry Drawing

Please complete the following questions to be entered into a raffle for one $20.00 Amazon gift certificate or one $5.00 Starbucks gift card. Two participants from YOUR program will be awarded one gift certificate.

Name:

Institution (graduate program):

Program subfield:

Email address:

Phone number (only used if cannot be reached by email):

If you win the raffle, may we notify your program that you won your program’s raffle?

Thank you for participating in this dissertation study! Good luck as you complete your doctoral program!

Appendix S: Receipts for Gift Cards

amazon.com

Details for Order #002-9419503-0045829
Print this page for your records.

Order Placed: September 2, 2010
Amazon.com order number: 002-9419503-0045829
Order Total: $280.00

Gift Certificates/Cards

E-mail Gift Card to: [redacted] — **Amount** $20.00
- Status: Not yet sent
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

---

E-mail Gift Card to: [redacted] — **Amount** $20.00
- Status: Not yet sent
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

---

E-mail Gift Card to [redacted] — **Amount** $20.00
- Status: Not yet sent
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

---

E-mail Gift Card to: [redacted] — **Amount** $20.00
- Status: Not yet sent
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

---

E-mail Gift Card to: [redacted] — **Amount** $20.00
- Status: Not yet sent
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation

research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

E-mail Gift Card to: [redacted] **Amount** $20.00
- Status: Not yet sent
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

E-mail Gift Card to: [redacted] **Amount** $20.00
- Status: Not yet sent
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] hank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

E-mail Gift Card to: [redacted] **Amount** $20.00
- Status: Not yet sent
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

E-mail Gift Card to: [redacted] **Amount** $20.00
- Status: Not yet sent
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

E-mail Gift Card to: [redacted] **Amount** $20.00
- Status: Not yet sent
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] hank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

E-mail Gift Card to: [redacted] **Amount** $20.00
- Status: Not yet sent

- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

---

E-mail Gift Card to: [redacted] **Amount**
- Status: Not yet sent $20.00
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

---

E-mail Gift Card to: [redacted] **Amount**
- Status: Not yet sent $20.00
- To: [redacted]
- From: Megan Marks
- Message: H[redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

---

E-mail Gift Card to: [redacted] **Amount**
- Status: Not yet sent $20.00
- To: [redacted]
- From: Megan Marks
- Message: Hi [redacted] Thank you for participating in my dissertation research last spring. Enjoy your $20 Amazon.com raffle prize! Take care, Megan Marks

---

If you want to cancel a gift card, please send an e-mail to customer service. We will do our best to fulfill your request.

Payment Information

Payment Method:
Visa | Last digits: [redacted]

Item(s) Subtotal:	$280.00

Total Before Tax:	$280.00
Estimated Tax:	$0.00

Grand Total:	**$280.00**

To view the status of your order, return to Order Summary.

Please note: This is not a VAT invoice.

** STARBUCKS COFFEE COMPANY **

KINGSTON PIKE & M #11655
KNOXVILLE TN37919

1 STARBUCKS CARD 5.00
ACCT#: 6062368281769996
Current Balance : 5.00

1 STARBUCKS CARD 5.00
ACCT#: 6062368281751632
Current Balance : 5.00

1 STARBUCKS CARD 5.00
ACCT#: 6062368281747138
Current Balance : 5.00

1 STARBUCKS CARD 5.00
ACCT#: 6062368281738812
Current Balance : 5.00

1 STARBUCKS CARD 5.00
ACCT#: 6062368281722049
Current Balance : 5.00

1 STARBUCKS CARD 5.00
ACCT#: 6062368129786890
Current Balance : 5.00

1 STARBUCKS CARD 5.00
ACCT#: 6062368129798933
Current Balance : 5.00

1 STARBUCKS CARD 5.00
ACCT#: 6062368141571449
Current Balance : 5.00

1 STARBUCKS CARD 5.00
ACCT#: 6062368141588443
Current Balance : 5.00

1 STARBUCKS CARD 5.00
ACCT#: 6062368141598862
Current Balance : 5.00

1 STARBUCKS CARD 5.00
ACCT#: 6062368141613936
Current Balance : 5.00

SUBTOTAL 55.00
TOTAL 55.00
VISA 55.00
CARD#: XXXXXXXXXXXX6462
CHANGE DUE 0.00

11655 02C1 701807 001534800E
09/01/10 19:51
Make a purchase prior to 2pm
Bring receipt in today after
2pm for a Grande cold drink
$2+tax,if any.Select US stores
Same day only. Value 1/2 cent

References

Aarons, G.A. (2004). Mental health provider attitudes toward adoption of evidence-based practice: The evidence-based practices attitude scale (EBPAS). *Mental Health Services Research*, 6 (2), 61-72.

Aarons, G.A., McDonald, E.J., Sheehan, A.K., & Walrath-Greene, C.M. (2007). Confirmatory factor analysis of the evidenced-based practice attitude scale (EBPAS) in a geographically diverse sample of community mental health providers. *Administration Policy Mental Health*, 34, 465-469.

Addis, M.E. & Jacob, K. (2000). On the process and outcome of graduate training in clinical psychology: Where do we want to go, how will we get there, and who will join us? *Clinical Psychology: Science and Practice*, 7, 364-367.

American Psychological Association (2005, March). *APA Research Office: Data on education and employment*. Retrieved March 21st, 2009 from http://research.apa.org/data.html

Arbuckle, J.L. (2009). *Amos 18 user's guide*. Chicago: Amos Development Corporation.

Aspenson, D., & Gersh, T. (1993). Graduate psychology students' perceptions of the scientist-practitioner model of training. *Counselling Psychology Quarterly*, 6. Retrieved May 19th, 2008 from Professional Development Collection Database.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84(2),* 191-215.

Bard, C.C., Bieschke, K.J., Herbet, J.T., & Eberz, A. B. (2000). Predicting research interest among rehabilitation counseling students and faculty. *Rehabilitation Counseling Bulletin*, 44, 48-55.

Barrom, C.P., Shadish, W.R., & Montgomery, L.M. (1988). PhDs, PsyDs, and real-world constraints on scholarly activity: Another look at the boulder model. *Professional Psychology: Research and Practice*, 19 (1), 93-101.

Bieschke, K.J. (2006). Research self-efficacy beliefs and research outcome expectations: Implications for developing scientifically minded psychologists. *Journal of Career Assessment*, 14, 1-15.

Bieschke, K.J. (2000). Factor structure of the research outcome expectations scale. *Journal of Career Assessment*, 8 (3), 303-313.

Bieschke, K.J., Bishop, R.M., & Garcia, V.L. (1996). The utility of the research self-efficacy scale. *Journal of Career Assessment*, 4, 59-75.

Bieschke, K.J., Fouad, N.A., Collins, F.L., & Halonen, J.S. (2004). The scientifically minded psychologist: science as a core competency. *Journal of Clinical Psychology*, 60 (1), 1-11.

Bieschke, K.J., Herbert, J.T., Bard, C. (1998). Using a social cognitive model to explain research productivity among rehabilitation counselor education faculty. *Rehabilitation Education*, 12, 1-16.

Bishop, R.M. & Bieschke, K.J. (1998). Applying social cognitive theory to interest in research among counseling psychology doctoral students: A path analysis. *Journal of Counseling Psychology*, 45, 182-188.

Brems, C., Johnson, M.E., & Gallucci, P. (1996). Publication productivity of clinical and counseling psychologists. *Journal of Clinical Psychology*, 52, 723-725.

Brown, S.D. & Lent, R.W. (1996). A social cognitive framework for career choice counseling. *The Career Development Quarterly*, 44, 354-366.

Byrne, B. (2001). *Structural equation modeling with amos*. Mahwah, NJ: Lawrence Erlbaum Associates.

Brown, S.D., Lent, R.W., Ryan, N.E., & McPartland, E.B. (1996). Self-efficacy as an intervening mechanism between research training environments and scholarly productivity: A theoretical and methodological extension. *The Counseling Psychologist*, 24, 535-544.

Chwalisz, K. (2003). Evidenced-based practice: A framework for twenty-first century scientist-practitioner training. *The Counseling Psychologist*, 31, 497-528.

Deemer, E.D., Martens, M.P., and Podchaski, E.J. (2007). Counseling psychology students' interest in research: examining the contribution of achievement goals. *Training and Education in Professional Psychology,* 1, 193-203.

Duffy, R.D., Martin, H.M., Bryan, N.A., and Raque-Bogdan,T.L. (2008). Measuring individual research productivity: A review and development of the integrated research productivity index. *Journal of Counseling Psychology*, 55, 518-527.

Diegelman, N.M. & Subich, L.M. (2001). Academic and vocational interests as a function of outcome expectancies in social cognitive career theory. *Journal of Vocational Behavior*, 59, 394-405.

Field, A. (2005). Discovering statistics using SPSS (2nd ed.). Thousand Oaks: Sage.

Forester, M., Kahn, J.H., and Hesson-McInnis, M. S. (2004). Factor structures of three measures of research self-efficacy. *Journal of Career Assessment*, 12, 3-16.

Fouad, N.A. & Guillen, A. Outcome expectations: Looking to the past and potential future. *Journal of Career Assessment*, 14 (1), 130-142.

Fouad, N.A., Grus, C.L., Hatcher, R.L., Kaslow, N.J., Hutchings, P.S., Madson, M.B.,

Collins, F.L., & Crossman, R.E. (2009). Competency benchmarks: A model for understanding and measuring competence in professional psychology across training levels. *Training and Education in Professional Psychology*, 3 (4 suppl), S5-S26.

Fouad, N.A. & Smith, P.L. (1996). Test of a social cognitive model for middle school students: Math and science. *Journal of Counseling Psychology*, 43, 338-346.

Forehand, R.L. (2008). The art and science of mentoring in psychology: A necessary practice to ensure our future. *American Psychologist*, 63 (8) 744-755.

France, C.R., Masters, K.S., Belar, C.D., Kerns, R.D., Klonoff, E.A., Larkin, K.T., Smith, T.W., Suchday, S., & Thorn, B.E. (2008). Application of the competency model to clinical health psychology. *Professional Psychology: Research and Practice*, 39 (6), 573-580.

Galassi, J.P., Brooks, L., Stoltz, R.F., & Trexler, K.A.(1986). Research training environments and student productivity: An exploratory study. *The Counseling Psychologist*, 14, 31-36.

Gelso, C.J. (1979). Research in counseling: Methodological and professional issues. *The Counseling Psychologist*, 8 (3), 7-35.

Gelso, C.J. (1993). On the making of a scientist-practitioner: A theory of research training in professional psychology. *Professional psychology: Research and Practice*, 24 (4), 468-476.

Gelso, C.J. (1997). The 1995 Leona Tyler address: The making of a scientist in applied psychology: An attribute by treatment conception. *The Counseling Psychologist*, 25, 307-320.

Gelso, C.J. (2006). On the making of a scientist-practitioner: A theory of research training in professional psychology. *Training and Education in Professional Psychology*, S, 3-16.

Gelso, C.J. & Lent, R.W. (2000). Scientific training and scholarly productivity: The person, the training environment, and their interaction. In S.D. Brown & R.W. Lent (Eds.), *Handbook of counseling psychology* (3rd ed., pp. 109-139). New York: Wiley.

Gelso, C.J., Mallinckrodt, B., & Judge, A.B. (1996). Research training environment, attitudes toward research, and research self-efficacy: The revised research training environment scale. *The Counseling Psychologist*, 24, 304-322.

Gelso, C.J., Raphael, R., Black, S.M., Rardin, D., & Skalkos, O. (1983). Research training in counseling psychology: some preliminary data. *Journal of Counseling Psychology*, 30 (4), 611-614.

Garson, D. (2011). *Statnotes: Topics in Multivariate Analysis.* Retrieved June 3, 2011 from http://faculty.chass.ncsu.edu/garson/pa765/statnote.htm.

Halonen, J.S., Bosack, T., Clay, S., McCarthy, M., Dunn, D.S., Hill, G.W., McEntarffer, R., Mehrotra, C., Nesmith, R., Weaver, K.A., & Whitlock, K. (2003). A rubric for learning, teaching, and assessing scientific inquiry in psychology. *Teaching of psychology*, 30 (3), 196-208.

Haynes, S.N., Lemsky, C., and Sexton-Radek, K. (1987). Why clinicians infrequently do research. *Professional Psychology: Research and Practice*, 18, 515-519.

Holttum, S. and Goble, L. (2006). Factors influencing levels of research activity in clinical psychologists:A new model. *Clinical Psychology and Psychotherapy*, 13,

339-351.

Hoyle, R. H (Ed.). (1995). *Structural equation modeling: Concepts, Issues, and Applications.* Thousand Oaks: Sage.

Hu, L. and Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling,* 6, 1-55.

Jiao, Q.G. & Onwuegbuzie, A. J. (1998). Perfectionism and library anxiety among graduate students. *The Journal of Academic Librarianship,* September, 365-371.

Kahn, J.H. (2001). Predicting the scholarly activity of counseling psychology students: A refinement and extension. *Journal of Counseling Psychology*, 48 (3), 344-354.

Kahn, J.H. & Gelso, C.J. (1997). Factor structure of the research training environment scale-revised: Implications for research training in applied psychology. *The Counseling Psychologist*, 25, 22-37.

Kahn, J.H. & Miller, S.A. (2000). Measuring global perceptions of the research training environment using a short form of the RTES-R. *Measurement and Evaluation in Counseling and Development*, 33, 103-119.

Kahn, J.H. & Schlosser, L.Z. (2010). The graduate training environment in professional psychology: a multilevel analysis. *Training in Education and Professional Psychology*, 4(3), 183-193.

Kahn, J.H. & Schlosser, L.Z. (2009). Research training environments and educational/vocational outcomes: a program level analysis. *Poster presentation at Society for Vocational Psychology, July, 2009.*

Kahn, J.H. & Scott, N.A. (1997). Predictors of research productivity and science-related

career goals among counseling psychology doctoral students. *The Counseling Psychologist*, 25 (1), 38-67.

Kaslow, N.J., Rubin, N.J., Bebeau, M.J., Leigh, I.W., Lichtenberg, J.W., Nelson, P.D., Portnoy, S.M., & Smith, I., L. (2007). Guiding principles and recommendations for the assessment of competence. *Professional Psychology: Research and Practice*, 38 (5), 441-451.

Kline, RB (1998). Principles and practice of structural equation modeling. New York: Guilford.

Knox, S., Schlosser, L.Z., Pruitt, N.T., & Hill, C.E. (2006). A qualitative examination of graduate advising relationships: The advisor perspective. *The Counseling Psychologist*, 34, 489-518.

Krebs, P., Smither, J., & Hurley, R. (1991). Relationship of vocational personality and research training environment to the research productivity of counseling psychologists. *Professional Psychology: Research and Practice*, 22, 362-367.

Lent, R. W. & Brown, S.D. (1996). Social cognitive approach to career development: an overview. *The Career Development Quarterly*, 44 (4), 310-321.

Lent, R.W., Brown, S.D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior, 45(1),* 79-122.

Lent, R.W., Brown, S.D., Hackett, G. (2000). Contextual supports and barriers to career choice: A social cognitive analysis. *Journal of Counseling Psychology*, 47, 36-49.

Lent, R. W., Brown, S.D., & Hackett, G. (2002). Social cognitive career theory. In D. Brown, *Career Choice and Development* (pp. 255-311). San Francisco, CA:

Jossey-Bass.

Lent, R.W., Brown, S. D., Talleyrand, R., McPartland, E.B., Davis, T., Chopra, S.B., Alexander, M.S., Suthakaran, V., & Chai, C.-M. (2002). Career choice barriers, supports, and coping strategies: College students' experiences. *Journal of Vocational Behavior*, 60. 61-72.

Love, K.M., Bahner, A.D., Jones, L.N., & Nilsson, J.E. (2007). An investigation of early research experience and research self-efficacy. *Professional Psychology: Research and Practice*, 38, 314-320.

Luebbe, A.M., Radcliffe, A.M., Callands, T.A., Green, D., & Thorn, B.E. (2007). Evidenced-based practice in psychology: Perceptions of graduate students in scientist-practitioner programs. *Journal of Clinical Psychology*, 63 (7), 643-655.

Mallincrokdt, B. & Gelso, C.J. (2002). Impact of research training environment and Holland personality type: A 15-year follow-up of research productivity. *Journal of Counseling Psychology*, 49 (1), 60-70.

Mallincrokdt, B., Gelso, C.J., & Royalty, G.M. (1990). Impact of the research training environment and counseling psychology students' Holland personality type on interest in research. *Professional Psychology: Research and Practice*, 21 (1) 26-32.

McFall, R.M. (1991). Selection scientific models to revere. *The Scientist Practitioner*, 1, 4-11.

Martens, M.P. (2005). The use of structural equation modeling in counseling psychology research. *The Counseling Psychologist*, 33, 269-298.

Nauta, M.M. (2004). Self-efficacy as a mediator of the relationships between personality factors and career interests. *Journal of Career Assessment, 12(4),* 381-394.

Neimeyer, G. J., Saferstein, J., & Rice, K.G. (2005). Does the model matter? The relationship between science-practice emphasis and outcomes in academic training programs in counseling psychology. *The Counseling Psychologist*, 33, 635-654.

Nelson, T.D. & Steele, R.G. (2007). Predictors of practitioner self-reported use of evidenced-based practices: Practitioner training, clinical setting, and attitudes towards research. *Administration Policy Mental Health and Mental Health Services*, 34, 319-330.

Niles, S.G. & Harris-Bowlsbey, J. (2005). Career development interventions in the 21st century (2nd ed.). Upper Saddle River, NJ, US:Pearson Merrill Prentice Hall.

Onwuegbuzie, A. (2001). Critical thinking skills: A comparison of doctoral and master's level students. *College Student Journal*, 35 (3) 477.

Petersen, C.A. (2007). A historical look at psychology and the scientist-practitioner model. *American Behavioral Scientist*, 50 (6), 758-765

Phillips, J.C & Russell, R.K. (1994). Research self-efficacy, the research training environment, and research productivity among graduate students in counseling psychology. *The Counseling Psychologist*, 22, 628-641.

Phillips, J.C., Szymanski, D.M., Ozegovic, J.J., & Briggs-Phillips, M. (2004). Preliminary examination and measurement of the internship research training environment. *Journal of Counseling Psychology*, 51 (2), 240-248.

Roberts, M.C., Borden, K.A., Christiansen, M.D., & Lopez, S.J. (2005). Fostering a

culture shift: Assessment of competence in the education and careers of professional psychologists. *Professional Psychology: Research and practice*, 36 (4), 355-361.

Royalty, G.M., Gelso, C.J., Mallinckrodt, B. & Garrett, K.D. (1986). The environment and the student in counseling psychology: Does the research training environment influence graduate students' attitudes toward research? *The Counseling Psychologist*, 14, 9-30.

Royalty, G.M. & Magoon, T.M. (1985). Correlates of scholarly productivity among counseling psychologists. *Journal of Counseling Psychology*, 32, 458-461.

Royalty, G.M. & Reising, G.N. (1986). The research training of counseling psychologist: What the professionals say. *The Counseling Psychologist*, 14, 49-60.

Schlosser, L.Z. & Gelso, C.J. (2001). Measuring the working alliance in advisor-advisee relationships in graduate school. *Journal of Counseling Psychology*, 48, 157-67.

Schlosser, L.Z. & Gelso, C.J. (2005). The advisory working alliance inventory-Advisor version: Scale development and validation. *Journal of counseling Psychology*, 52 (4), 650-654.

Schlosser, L.Z. & Kahn, J.H. (2007). Dyadic perspectives on advisor-advisee relationships in counseling psychology doctoral programs. *Journal of Counseling Psychology*, 54, 211-217.

Schlosser, L.Z., Knox, S., Moskovitz, A.R., & Hill, C.E. (2003). A qualitative examination of graduate advising relationships: The advisee perspective. *Journal of Counseling Psychology*, 50 (2), 178-188.

Stoltenberg, C.D., Pace, T.M., Kashubeck-West, S., Biever, J.L., Patterson, T., & Welch, I.D. (2000). Training models in counseling psychology:Scientist-practitioner versus practitioner-scholar. *The Counseling Psychologist*, 28, 622-638.

Szmanski, D.M., Jovanovic, J.J., Phillips, J.C., & Briggs-Phillips, M. (2007). Fostering scholarly productivity through academic and internship research training environments. *Training and Education in Professional Psychology*, 1, 135-146.

Tabachnick, B. G., and Fidell, L. S. (2007). *Using Multivariate Statistics , 5th ed.* Boston: Allyn and Bacon.

Witcher, L.A., Alexander, E.S., Onwuegbuzie, A.J., Collins, K. M.T., and Witcher, A.E. (2007). The relationship between psychology students' levels of perfectionism and achievement in a graduate-level research methodology course. *Personality and Individual Differences*, 43, 1396-1405.

Margaret M. Marks, M.A.

Email mamarks_99@yahoo.com

EDUCATION

The Pennsylvania State University **University Park, PA**
College of Education
Doctor of Philosophy in Counseling Psychology (APA Accredited), August 2011

Dissertation title: Factors that help and hinder scientific training in counseling and clinical psychology students.

The George Washington University **Washington, DC**
Graduate School of Education and Human Development
Master of Arts in Education and Human Development, emphasis in Community Counseling, May 2006

Vassar College **Poughkeepsie, NY**
Bachelor of Arts in Psychology, May 1999

CLINICAL EXPERIENCE

APA Pre-doctoral Internship

Counseling Center **August 2010-July 2011**
Pre-doctoral intern
University of Tennessee-Knoxville, Knoxville, TN

- Provide individual and couple's counseling services for undergraduate and graduate students who present with a wide range of clinical issues and pathology.
- Provide 3 hours weekly of walk-in crisis and triage assessment.
- Co-facilitate an interpersonal process group for graduate students. Provide approximately two hours per week of brief stress and wellness appointments focusing on coping skills, managing stress symptoms, and biofeedback.
- Administer, score, and interpret several ADHD and psychological assessment batteries, including instruments such as the Brown ADD Scales, TOVA, PAI, MCMI, FIRO-B, BDI, MBTI, IBS, SASSI, Schema Questionnaire, and CCAPS.
- Engage in community intervention through conducting needs assessment on student veterans' needs, presenting on topics such as suicide prevention and wellness coping skills.
- Certified as a QPR Gatekeeper Instructor, which authorizes its instructors to teach QPR suicide prevention programs in their communities.
- Serve the on Center's Training and Community Intervention committees.