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**Occupational knowledge in college students: Examining relations to career certainty,  
career decision-making self-efficacy, and interest congruence**

by

**Kathryn M. Pesch**

A thesis submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of  
**MASTER OF SCIENCE**

Major: Psychology

Program of Study Committee:  
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Ames, Iowa

2014

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## TABLE OF CONTENTS

TABLES	iii
FIGURES	iv
ACKNOWLEDGEMENTS	v
ABSTRACT	vi
CHAPTER 1. INTRODUCTION	1
CHAPTER 2. LITERATURE REVIEW	9
CHAPTER 3. METHODS	50
CHAPTER 4. RESULTS	58
CHAPTER 5. DISCUSSION	70
REFERENCES	81
APPENDICES	
Demographics Questionnaire.....	91
Work Activity Importance Profile.....	92
Occupation Work Activity Importance Profile .....	96
Perceived Occupational Knowledge Scale.....	97
Career Certainty Scale.....	98
Career Decision Self-Efficacy Scale.....	99
Career Exploration Checklist.....	101
O*NET Interest Profiler – Short Form.....	102

**TABLES**

<b>Table 1.</b>	Descriptive Statistics and Variable Correlations.....	60
<b>Table 2.</b>	Multiple Regression Results for Mediation Hypotheses 1 – 4.....	62
<b>Table 3.</b>	Standardized Path Coefficients for the Recursive Model Predicting Career Certainty.....	68

**FIGURES**

<b>Figure 1.</b>	The hypothesized recursive path model predicting career certainty.....	8
<b>Figure 2.</b>	Hypothesis 1 mediation model with multiple regression results.....	63
<b>Figure 3.</b>	Hypothesis 2 mediation model with multiple regression results.....	64
<b>Figure 4.</b>	Hypothesis 3 mediation model with multiple regression results.....	65
<b>Figure 5.</b>	Hypothesis 4 mediation model with multiple regression results.....	66
<b>Figure 7.</b>	Recursive path model predicting career certainty.....	69

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## ABSTRACT

Several career decision-making models describe an ongoing career decision evaluation process in which career decisions are constantly being re-assessed as individuals gain occupational information and self-awareness. However, the relation between career decision certainty and knowledge of one's chosen career has not yet been adequately examined; in part due to the difficult nature of assessing the latter construct in large samples. The present study objectively measured occupational knowledge in 316 college students; specifically regarding the career each student had reportedly been considering. Objective occupational knowledge of participants' chosen careers significantly related to interest congruence only, and neither variable significantly contributed to variance in career certainty. Results indicated career decision-making self-efficacy partially drives participation in career exploration activities and perceived occupational knowledge, and all three variables in turn contributed to the prediction of career certainty through direct and/or indirect effects. This study was the first to objectively assess college students' knowledge of the careers they were actively pursuing, and the first to examine that construct along with other important career decision-making variables. Implications and future research directions are discussed.

## CHAPTER ONE

### INTRODUCTION

The career choice process in college students is unique since these individuals generally have the freedom to pursue whichever careers they desire. The ideal outcome for these students is to have a career they find fulfilling, and that ultimately provides them with high levels of vocational satisfaction. Vocational satisfaction is consistently moderately related to life satisfaction (Bowling, Eschleman, & Wang, 2010); thus, the importance of making a “good” career decision is great. While the career decision process is complex, as is its relation to satisfaction, it is an important developmental challenge and one that will likely affect a good portion of students’ future lives.

A major construct involved in the career decision-making process is occupational knowledge. Occupational knowledge has been defined as the accuracy one has in understanding information related to careers (Schmitt-Wilson & Welsh, 2012); when one has this accurate understanding, he or she is considered to be informed. Being informed about occupations has been emphasized as an important factor in the career decision-making process (Gati, 1986; Grotevant & Durrett, 1980; Hirschi & Lage, 2007; Super, 1983). In order for one to make a decision about which career might be fulfilling, one should have knowledge regarding the careers available to him or her, and also regarding the specific activities and responsibilities involved in those careers. When one has sufficient accurate occupational information, he or she is able to make an informed decision regarding which career to pursue; he or she is knowledgeable of the requirements needed to obtain his or her career-of-interest, the daily activities and responsibilities of the job, and the types of environments one can work in. With

this knowledge, students can evaluate the degree to which careers-of-interest will fit with their personal preferences.

Several career decision-making models explain an ongoing career decision evaluation process in which career decisions are constantly being re-assessed as individuals gain occupational information and self-awareness (Hirschi & Lage, 2007). Following these models, one would expect increasing occupational knowledge to lead individuals to either persist along the same career path or choose an alternative path. In turn, greater persistence along the same career path is reflected in one's degree of career certainty. Career certainty has been described as the commitment individuals have to their decisions to pursue specific careers (Daniels, Clifton, Perry, Mandzuk, & Hall, 2006). It is generally considered to be one of the final stages in the career decision-making process, followed only by the planning and implementation stages (Hirschi & Lage, 2007).

Despite the centrality of career certainty in the career decision-making process, its link to occupational knowledge has not yet been directly examined in terms of individuals' knowledge about their chosen careers. This oversight seems to be due in part to a lack of adequate methods to assess occupational knowledge. Three general types of assessment exist in the literature: those that gauge self-estimated levels of knowledge, those that objectively test either general career information or general aspects of common jobs, and those that objectively test specific jobs' activities and responsibilities. All have inherent problems; namely, none are able to adequately and efficiently measure the accuracy of job-specific knowledge in terms of activities and responsibilities in large participant samples. Further, not only has the literature overlooked the relation between occupational knowledge and career certainty, it has failed to address the

overarching question of whether or not college students are sufficiently knowledgeable of the careers they are choosing to pursue.

### **The Present Study**

The purpose of the present study was three-fold. First, I sought to address a hole in the occupational knowledge literature regarding its objective measurement and its relation to career certainty in college students. Second, since it was the first study to objectively measure occupational knowledge of college students' chosen careers, I sought to explore the relations between that knowledge and four additional vocational constructs: 1) *Interest congruence*, defined as the degree to which a person's interests match those of a given work environment (Spokane & Cruza-Guet, 2005); 2) *career decision-making self-efficacy*, defined as one's belief that he or she is able to successfully engage in and complete tasks necessary to career decision-making (Betz, 2000); 3) *career exploration activities* participants reported, a behavioral indicator of participants' engagement in career exploration; and 4) *perceived occupational knowledge*, a subjective self-assessment of occupational knowledge which has been frequently used in studies as a measure of "occupational knowledge." Third, the present study sought to examine these four variables alongside occupational knowledge in terms of their roles in predicting career certainty.

While vocational researchers have made great strides in understanding the choices people make in their career pursuits, little attention has been given to examining whether college students are knowledgeable about their future occupations. Some students may be confident that their interests are leading them in the right direction, and others may be choosing careers based on insufficient or inaccurate information. These individuals may be at risk of being dissatisfied with their occupations once they enter the workforce and realize the inaccuracy of their expectations. Overall, the present study sought to gain a better understanding of the factors

involved in making career decisions in college students. A path model predicting career certainty was used to test specific mediation hypotheses involving occupational knowledge and the four other variables-of-interest.

### **Hypotheses**

Four mediation hypotheses involving the two primary variables-of-interest, objective occupational knowledge and career certainty, as well as the additional four secondary variables-of-interest were tested using multiple regression.

Career decision-making self-efficacy has been actively researched over the past thirty years in relation to the process of career decision-making, but has not yet been examined alongside occupational knowledge as defined by the present study. Previous research found lower task performance self-efficacy to be associated with low commitment to goals (Locke, Frederick, Lee, & Bobko, 1984). The present study sought to build on this finding and examine the relation between career decision-making self-efficacy and career certainty in the context of occupational knowledge. Based on Locke and colleagues' findings, lower career decision-making self-efficacy was expected to be associated with lower career certainty, as certainty can be thought of as a proxy for goal commitment. Bandura and Cervone (1986) have also found that some individuals with high performance self-efficacy tended to feel content with performance on experimental tasks despite receiving feedback that they only nearly succeeded. These individuals lacked the motivation required to achieve success in their task performance, with their high self-efficacy causing them to settle for sub-par performance. This phenomenon was also examined by Salomon (1984) who found that high performance self-efficacy individuals increased their performance when they considered the task to be difficult, but chose to decrease their performance effort when they considered the task to be easy. Translating these findings to the

present study, it is possible that high career decision-making self-efficacy could compel individuals to put less effort toward obtaining accurate occupational knowledge during their career decision processes. Some high career decision-making self-efficacy students could still put forth the necessary effort; though, there may be others who feel a sense of contentment with the inadequate exploration steps they have taken thus far. These “at risk” students may view career decision-making process tasks as easy and not necessary outlets for their effort, resulting in occupational knowledge deficits. In these ways, career decision-making self-efficacy may contribute to both objective occupational knowledge and career certainty, while objective occupational knowledge also contributes to career certainty.

*H1.* Objective occupational knowledge would partially mediate the relation between career decision-making self-efficacy and career certainty.

Consistent with findings presented here regarding task performance self-efficacy, the present study predicted career decision-making self-efficacy would be involved in both the seeking out occupational knowledge, as well as the process of determining one’s level of certainty about a particular career path. Thus, career decision-making self-efficacy was predicted to significantly relate to both objective occupational knowledge and career certainty, with objective occupational knowledge partially mediating its relation with career certainty. Career decision-making theories (Hirschi & Lage, 2007), however, suggest more variables are involved in the complex prediction of career certainty in college students. The second hypothesis predicted career exploration activities would play a role in the relation between career decision-making self-efficacy and objective occupational knowledge.

*H2.* Career exploration activities would partially mediate the relation between career decision-making self-efficacy and objective occupational knowledge.

This hypothesis proposed a possible reason for the partial mediation predicted in Hypothesis 1, which posited that career certainty is a function of career decision-making self-efficacy, objective occupational knowledge, and an indirect effect of career decision-making self-efficacy through objective occupational knowledge. The number of reported career exploration activities were posited as a mechanism for which career decision-making self-efficacy drives one to seek out objective occupational knowledge.

The third hypothesized mediation effect was of interest congruence on the relation between objective occupational knowledge and career certainty. Congruence theory posits that individuals naturally seek out work environments they believe will be compatible with their own interests, leading them toward occupational satisfaction (Holland, 1997). Thus, when individuals are able to find occupations with characteristics compatible with their own interests, they are more likely to be satisfied with their choices. The literature has provided moderate support for this theory (Tranberg, Slane, & Ekeberg, 1993); though, it is important to note that assessing one's congruence with his or her chosen occupation is an internal judgment. Individuals must assess their own levels of congruence as they navigate through the career decision process. Conceptually, one would expect increasing occupational knowledge to assist individuals in assessing which career will yield the highest congruence. Therefore, if greater knowledge leads to greater likelihood of achieving interest congruence, one might expect level of career certainty would positively relate to both objective occupational knowledge and interest congruence, leading to the third hypothesis.

*H3. Interest congruence would partially mediate the relation between objective occupational knowledge and career certainty.*

Similar to the career decision-making self-efficacy partial mediation hypothesis, Hypothesis 3 predicted objective occupational knowledge would relate to career certainty both

directly and indirectly through interest congruence. Additionally, interest congruence was predicted to serve as its own motivating factor, leading one to continue pursuing a career path or opt for an alternative path. In this way, interest congruence would relate directly to both objective occupational knowledge and career certainty, adding to the model's predictive power.

Occupational knowledge literature often utilized perceived occupational knowledge as a proxy for objective occupational knowledge. The present study included this additional variable in the model, hypothesizing it would be predicted by both objective occupational knowledge and career decision-making self-efficacy through the same partial mediation mechanism presented in Hypothesis 1 for career certainty.

*H4.* Objective occupational knowledge would partially mediate the relation between career decision-making self-efficacy and perceived occupational knowledge; perceived occupational knowledge would add significantly to the prediction of career certainty.

### **Additional Analysis**

After determining whether specific mediation models were supported by the data, a path analysis was run in order to examine relations between all six variables simultaneously. The path model (Figure 1) was recursive and sequenced based on theory. In other words, each variable was thought to have a potential effect on later variables, but not any causal reciprocal effects (Cohen, Cohen, West, & Aiken, 2003). The model contained one exogenous variable, career decision-making self-efficacy, because it has been argued that efficacy beliefs influence and predict behavior (e. g., Bandura, 1987; Betz, 2000). The first endogenous variable was career exploration activities, as it was hypothesized to partially result from career decision-making self-efficacy beliefs and contribute to occupational knowledge. The second endogenous variable was objective occupational knowledge, followed by interest congruence, perceived occupational knowledge, and career certainty.

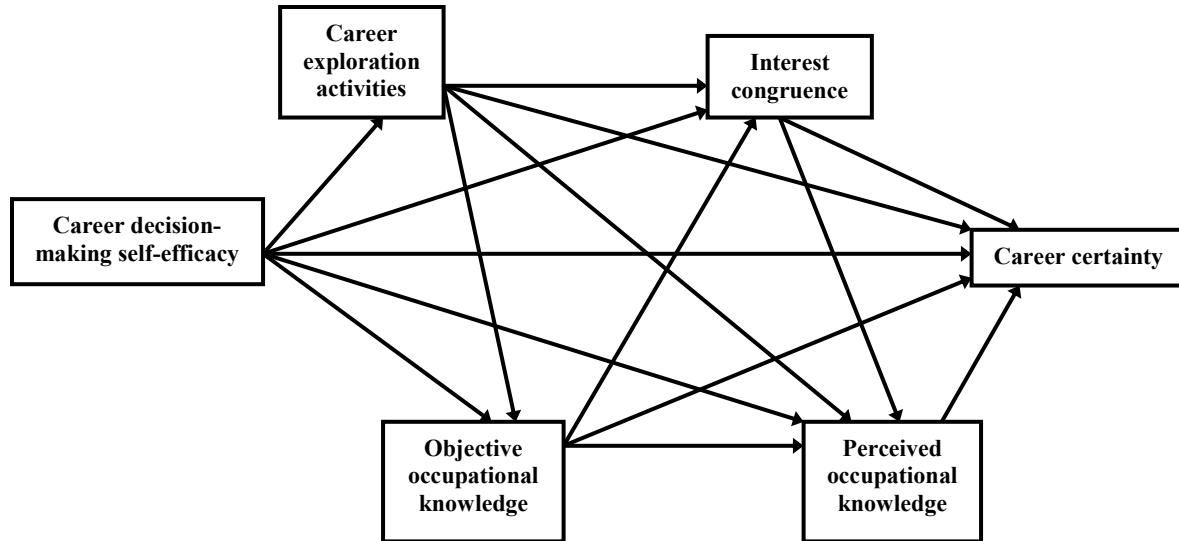


Figure 1. The hypothesized recursive path model predicting career certainty.

## Implications

Significant findings would have important implications for career counselors and university career centers. Findings in support of the hypotheses would direct career counselors and universities to areas of need among their clients and students. Counselors would be compelled to pay special attention to career certainty levels of their clients, determining whether they are in line with their levels of knowledge about those careers. Specifically, counselors would want to ensure their clients are making decisions based on accurate information regarding work activities involved in their chosen careers. Further, universities may need to bolster their career outreaches and development courses for students in order to increase career decision-making self-efficacy, encourage active exploration as a way of gaining occupational knowledge, and assisting students in finding occupations congruent with their interests.

## CHAPTER TWO

### LITERATURE REVIEW

The career decision-making process of college students is saturated with many different exploration and information-gathering tasks. Central to the present discussion is the process of obtaining occupational information about one's chosen career, which is emphasized in many career decision-making models. Therefore, before discussing occupational knowledge in detail, the prominent career decision-making models are presented for a better understanding of the broad career decision-making process.

#### **Career Decision-Making Models**

The process of career decision-making in college students has been approached from multiple perspectives, resulting in several different models. While these models are often quite complex, simplified versions are discussed here in order to provide a brief overview of the theoretical foundations of the career decision-making process.

Crites (1976) identified five aspects involved in effective career decision-making. First is accurate self-appraisal involving individuals' self-assessment of interests, needs, and values. Second is gathering occupational information which is necessary in order for individuals to determine the characteristics of occupations that might fit their personal characteristics. Gathering information about one's self and occupations is followed by goal selection in which individuals make decisions about which occupation(s) they prefer. The final two elements are making future plans and problem solving. After individuals select their career goals, they must plan how they will obtain those goals and be prepared to face problems that arise in their career pursuits. These five elements comprise "career maturity," which Crites introduced as an overarching developmental characteristic that allows individuals to effectively engage in the

career decision-making process. Crites argued that by engaging in these five elements, and thereby demonstrating career maturity, individuals will be able to make effective career decisions.

Harren (1979) identified the need for career decision-making models specific to certain life stages so that career developmental concepts could be integrated. Thus, his model was created with traditional college students in mind. Central to his model, Harren outlined a sequential four-stage process. First is Awareness, during which one engages in appraisal of one's past, present, and future, and includes analyses of one's current course of action, decision-making confidence, and environmental pressures. Next is Planning, characterized by information gathering about one's career decision and one's self. Once enough information has been acquired, the individual begins narrowing alternatives down to a specific choice in preparation for the next stage. This stage is followed by Commitment, in which one integrates the choice into his or her self-concept and begins planning to implement the choice. Finally, Implementation occurs when the individual carries out the choice and evaluates it, returning to the beginning of the process if he or she is not satisfied.

Alternatively, Gati (1986) has presented a model characterized by systematic elimination in order to identify small subsets of career alternatives, effectively simplifying the career decision-making process. In Gati's Sequential Elimination Model, occupations are considered to be made up of various aspects which determine whether or not a given occupation will be included in or excluded from the career decision-making process. For example, if an individual considers prestige important, occupations may be excluded if they are considered low in prestige. Thus, the first stage of Gati's model involves the identification of occupational aspects one considers relevant to his or her career decision. Aspects are then ranked by importance and

occupation alternatives are eliminated according to the guidelines set by aspect rankings. This process continues until the list of potential careers is of acceptable length. A strength of Gati's model is that it inherently forces individuals to engage in career exploration, providing them with information about the aspects of occupations they find important.

An additional model, the Cognitive Information-Processing Approach for career decision-making (Sampson, Reardon, Peterson, & Lenz, 2004), presents a series of phases that individuals cycle through until a career decision has been made. Individuals first identify the problem (need to choose a career; Communication), identify all components of the problem (Analysis), formulate possible solutions for the problem (career alternatives; Synthesis), rank alternative solutions (Valuing), and choose alternative to implement (Execution). Individuals then return to the Communication stage to evaluate their decisions, continuing on with the process again if problems are identified.

More recently, Hirschi and Lage (2007) noted the similarities existing among the different career decision-making models. They sought to combine the themes identified in previous models, boiling them down to six basic phases. In Phase 1, individuals become aware of the need to make a career decision. Hirschi and Lage note the importance of this stage, since some individuals do not become concerned with career decision-making in the first place. During Phase 2, career alternatives are generated based on individuals' interests, skills, and values. In Phase 3, Alternatives are then eliminated in order to reduce possibilities to a reasonable number in preparation for the exploration phase. Phase 4 constitutes exploration and further reduction of career alternatives. In Phase 5, individuals make a choice and begin committing to it. Finally, in Phase 6 individuals are committed to their choices and implementing action plans. This phase was intentionally included in order to distinguish between individuals still engaged in the career

decision-making process (who would cycle back through the phases) from those who have firmly committed to careers.

As Hirschi and Lage (2007) identified, the different career decision-making models have substantial overlap. Of most interest to the present discussion are the middle phases, Phases 2-5, in which individuals are engaged in the actual career decision-making process rather than in the pre- and post-decision-making phases. During these phases, individuals are gathering information about themselves and potential occupations, identifying which occupations might be appropriate, and then narrowing down those occupations until ultimately one remains.

Importantly, the role of information is salient throughout these phases. Not only do individuals need to gather sufficient, accurate information about all the occupations available to them, they must continually process that information in tandem with the information they have about themselves. The information processing continues until a career choice is made, at which point individuals will likely have to gather more information for planning and implementation purposes. This process, common among the various career decision-making models, makes salient the important role of information in one's ability to make a career decision.

### **The Role of Information in Career Decision-Making**

The career decision-making models presented here have been developed with the purpose of outlining how one goes about reaching a career decision when faced with alternatives (Gati, 1986). The importance of making a good career decision is great, as “there are few other decisions that exert as profound an influence on people’s lives as the choice of a field of work or career” (Hackett & Betz, 1995; p. 249). Gati (1986) identified four sources of problems that can prevent one from reaching an optimal career decision: a) lack of information about one’s self or of career alternatives, b) lack of resources to acquire the necessary information, c) cognitive

limitations in the decision-maker preventing information processing, and d) lack of ability in the decision-maker to integrate and process information about one's self and one's career alternatives. Central to these problem sources is information, both about the person's interests and the career alternatives. By gaining information about one's self and one's occupation of interest, one can be confident that he or she has the information needed to make a good career decision. While the role of self-information is beyond the scope of the present discussion, the role of occupational information is central: When one has sufficient accurate information about his or her occupation alternatives, he or she is able to make an informed decision regarding which of them to pursue.

### **Occupational Knowledge**

In light of the emphasis placed on occupational information by the career decision-making models, the question arises of whether or not college students are approaching career decisions in the most efficient way. That is, whether or not they are fully engaging in the stages laid out by the various models and acquiring the information necessary to reach an optimal career decision. Without any constraints, efficiency may not matter. However, reality compels one to consider the potential disadvantages to approaching career decision in an inefficient way – i.e., making uninformed decisions to pursue occupations that may lead one to desire a change in career paths. The purpose of measuring college students' levels of occupational knowledge then, is to determine whether there is a subset of students making uninformed decisions that may result in future dissatisfaction or distress; to alert professionals of a possible “at risk” group of students. To begin addressing the question of whether or not college students are making informed decisions while they are engaged in the career decision-making process, a discussion of the literature around occupational knowledge is necessary.

## **Assessment of Occupational Knowledge**

Before a review of the occupational knowledge literature findings, it is important to have an understanding of the ways in which this knowledge is assessed. The overview that follows describes the measurement approaches that have been found in the literature. This discussion is necessary since the generalizability of each study's findings are limited by the assessment method used.

**The Career Maturity Inventory (CMI).** The CMI (Crites, 1973, 1978) has been used to test individuals on their knowledge of aspects of common occupations. For example, participants would be asked if they agree or disagree with the statement, "Anita wants to be a lawyer. She must first pass the bar exams and then go to law school." This scale was found to be the most commonly used measure of occupational knowledge, with seven studies incorporating it (Achebe, 1982; Holland & Gottfredson, 1975; Johnson, Johnson, Johnson, & Yates, 1982; Johnson, Johnson, & Yates, 1981; Jordan & Pope, 2001; Omvig & Tulloch, 1975; Pumfrey & Schofield, 1982).

Overall, the CMI is quite useful in assessing broad occupational knowledge for the purposes of measuring career maturity levels as defined by Crites' (1976) model of career decision-making. However, it does not satisfy the requirements of the present discussion in that specific information of individuals' chosen careers is not addressed. It seems that, while career maturity is useful for broadly investigating individuals' potential for making effective career decisions, the construct is not operationally defined in way that provides a solution to the measurement issues at hand. Specifically, the extent to which people are informed about the careers they are choosing to pursue.

**The Career Development Inventory (CDI).** Developed by Super, Thompson, Lindeman, Jordaan, and Myers (1981), the CDI is considered a well-established vocational maturity assessment and has been used in eight studies for the purpose of job knowledge measurement. Of those, only two included the subscale of interest (Hirschi, 2011; Healy & Mourton, 1984); namely, the Planning Scale. The CDI – Planning Scale asks individuals to identify the career they aspire to pursue and are presented with an eight-item questionnaire in which they rated their knowledge of the job's required abilities and education, work context, expected pay, etc., on a five-point scale from (1) *poorly* to (5) *very well*. While this scale of the instrument does address specific aspects of individuals' chosen careers, the issue of job knowledge accuracy remains. It is important to note that all the statistical conclusions made using this scale are based on self-estimated levels of knowledge rather than on objective assessment.

The CDI - Knowledge of Preferred Occupation scale asks individuals to choose one of a number of occupational groups in which their career choice best fits. Individuals are then presented with 40 multiple choice items inquiring about facets of the job related to required abilities, interests and values fulfilled, training requirements, and the environments in which people work. Notably, work activities involved in one's chosen occupation were not assessed. The CDI – Knowledge of Preferred Occupation scale certainly has potential. However, it examines participants' knowledge of occupational categories rather than titles, which are relatively broad and thus the scale does not solve the assessment problem at hand. Further, it does not inquire about work activities, which give important information about what a given job is actually like on a daily basis. The bulk of the recent research using the CDI has been almost exclusive to the Australian version of the CDI (Creed, Patton, & Hood, 2010; Creed, Patton, &

Prideaux, 2007; Patton & Creed, 2007; Patton, Spooner-Lane, & Creed, 2005; Creed & Patton, 2003), which, unfortunately, omitted the Knowledge of Preferred Occupational Group scale in its development (Lokan, 1984; Sadeghi, Baghban, Bahrami, Ahmadi, & Creed, 2011). Therefore, measurement of aspects of one's preferred occupational group knowledge has not been extensively investigated with the CDI.

An earlier version of the CDI which included a scale labeled "Part V" (Super et al., 1981) was used by one study (Crowley, 1981). The scale consisted of 30 multiple choice items designed to gauge participants' knowledge of aspects of common occupations, such as the tools or equipment used, training needed, duties, and employment trends.

**The Jobs-Career Key (JCK).** The JCK (Blank, 1978) was used in one study (Taylor, 1985) and is comprised of 147 multiple choice items across four occupational domains (economic factors, education and training, job parts, and worker relationships) for 18 traditionally feminine and 18 traditionally masculine occupations. This measure is strong in its ability to assess knowledge of various aspects of a variety of occupations, but it does not inquire about specific activities or responsibilities within those jobs and is limited to 36 occupations.

**The Cognitive Vocational Maturity Test (CVMT).** The CVMT (Westbrook & Parry-Hill, 1973) is a 120 multiple choice-item measure with six subscales used in three studies (Fouad, 1995; Westbrook, 1976; Westbrook, Elrod, & Wynne, 1996). The Duties subscale objectively measures individuals' knowledge of the typical duties performed in various well-known occupations. For example, one item asks "Which one fills prescriptions for drugs and medicine? a) Chemist, b) Physicist, c) Pharmacist, d) Pharmacologist, or e) I don't know." Additional scales assess Fields of Work (e.g., "Which one of the following is not in the field of construction?"), Work Conditions (e.g., "Which one of the following does not have to work with

tools?”), Education Required (e.g., “A college education is not required to be a . . .”), Attributes Required (e.g., “Imagination is most important in which occupation?”), and Job Selection which presents short narratives describing a person’s skills and personality, asking participants to indicate which occupation would be most fitting. This method of assessment is relatively strong as it inquires about details specific to occupations. However, it does not assess students’ levels of knowledge of the careers they are interested in pursuing, limiting the knowledge assessment to a small sample of common occupations. Furthermore, the studies that utilized this measure included relatively young samples. Eighth grade (Fouad, 1995) and ninth grade (Westbrook, 1976) students were assessed in two studies, with only one study sampling eleventh and twelfth grade students (Westbrook et al., 1996).

**The Career Planning Inventory (CPI).** Developed by Westbrook (1997), this 10-item scale was designed to measure individuals’ breadth of career knowledge. It was found to be used in only one study (Westbrook & Sloan, 2006) and is comprised of multiple choice questions in which participants choose the occupation that fits the job task description (e.g., “Which of the following designs buildings?” Mechanic, architect, surveyor, engineer, or “I don’t know”). While a good objective measure of broad occupational knowledge, this scale suffers from the same issues as the CVMT.

**The Job Knowledge Survey (JKS).** Developed by Loesch (1977), the JKS was found to be used in two studies (Loesch & Sampson, 1978; Sampson & Loesch, 1981) and consists of 48 occupational titles sampled randomly from each of the RIASEC (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional; Holland, 1997) interest domains which participants are asked to rate the occupational titles’ levels of emphasis on people, data, and things. This measure is strong in that it asks individuals to separate occupational titles based on

the general domains of typical job activities. However, the measure does little to assess knowledge of the occupations' activities and responsibilities beyond broad categorization.

**The Career Decision Profile (CDP).** The CDP (Jones, 1989), has been used by two studies to measure several career development variables, including occupational knowledge (Duffy & Kingaman, 2009; Multon, Heppner, & Lapan, 1995). It includes three items gauging "Knowledge about Occupations and Training" on a 5-point scale of agreement (e.g., "I do not feel I know enough about the occupations I am considering"). While the items in this measure successfully inquire about participants' levels of information about their chosen careers, the subjective nature makes it difficult to interpret responses.

**The Occupational Knowledge Scale (OKS).** Adapted from Tracey's Personal Globe Inventory (2002) for use in one study (Rohlfing, Nota, Ferrari, Soresi, & Tracey, 2012), this measure is comprised of 18 occupational titles of which individuals are to rate their knowledge from (1) *I don't know at all* to (5) *I know a lot*. This method suffers from the same validity issue as that of other self-estimate measures; any conclusions made from its use must be contextualized so as not to confuse objective occupational knowledge with self-estimations.

**Miscellaneous knowledge assessments.** Two studies were found that utilized personnel selection knowledge tests (Ones & Viswesvaran, 2007; Van Iddekinge, Putka, & Campbell, 2011) developed by subject matter experts, human resources specialists, or industrial-organizational psychologists. Using a multiple choice format, they tested specific tasks and activities common in the occupations of interest. While this approach is an improvement upon the methods used by other researchers since it assesses specific job activities and tasks, creating such comprehensive job knowledge measures for any career-diverse sample would be quite time-

consuming. For this reason, this method has only been used with very specific populations and lacks generalizability.

Two studies used a measurement method in which individuals record their knowledge of six dimensions of 20 occupational titles (Schmitt-Wilson & Welsh, 2012; Walls, 2000). The six dimensions, time (training, preparation), availability (positions, jobs), earnings, physical (strength, stamina), mental (thinking, knowledge), and status (respect, prestige), have unique response scale or scales (e.g., the mental dimension was measured by three subscales assessing reasoning development, mathematical development, and language development). Responses are standardized based on information from the Dictionary of Occupational Titles. This measure taps into various important aspects of occupational knowledge; however, it does not specifically address individuals' careers of interest, nor does it assess knowledge of specific occupational activities or responsibilities which hold important information for career decision-making.

Finally, one study measured occupational knowledge through individual interviews (DeFleur & Menke, 1975). Ten occupations were assessed in terms of knowledge of job activities, nature of the work, specializations within the occupation, education and training requirements, salary, prestige, and job availability outlook. Accuracy scores were assigned based on information from the Occupational Outlook Handbook. This methodology is good compared to other approaches in the literature, but it is also largely impractical and inefficient for large sample sizes. Assessment methods are needed that are able to incorporate the level of specificity that these interviews provided, while remaining usable in research with large samples.

**Summary of Assessment Methods.** It seems that the current psychological measurement of job knowledge is largely flawed. Three general types of assessment exist in the literature: those that gauge self-estimated levels of knowledge, those that objectively test either general

career information or relatively common-knowledge aspects of specific jobs, and those that objectively test specific jobs' activities and responsibilities. All have inherent problems; namely, none are able to adequately and efficiently measure accuracy of job-specific knowledge in terms of activities and responsibilities in large participant samples. Those used in personnel selection most closely resemble ideal occupational knowledge assessments, but cannot realistically be used in studies involving diverse career choices. Individual interviews have been conducted in past studies, but are far too inefficient and unrealistic to employ in most empirical studies. Notably, many aspects of occupational knowledge have been assessed in some way; though none of the available literature has investigated the extent to which college students are knowledgeable about the specific job activities they will encounter after entering their occupation of choice.

### **Review of the Occupational Knowledge Literature**

A literature search using PsycInfo and the term *knowledge* with *career, job, or occupation* and *college, undergraduate, high school, or middle school* yielded 190 peer-reviewed articles written in English. Of those 190, 159 articles were excluded because they were deemed irrelevant to the present discussion. Many studies were excluded because they did not report results related to occupational knowledge (e.g., Greenhaus, Hawkins, & Brenner, 1983; Patterson, Curtis, & Reid, 2008; Reardon, Senier, & Lewis, 1972; Theophilides, Terenzini, & Lorang, 1984), were based on operational definitions of occupational knowledge that deviated from the definition used by the present discussion (e.g., by measuring knowledge of general job market patterns or career development tasks, having participants list occupational titles as a measure of knowledge; e.g., Gunkel, Schlaegel, Langella, & Peluchette, 2010; Rottinghaus, Buelow, Matyja, & Schneider, 2012; Rottinghaus, Day, & Borgen, 2005; Watson, Foxcroft, &

Horn, 1997), or if the target population was not assessed (e.g., middle school teachers' knowledge was measured; e.g., Arzi & White, 2008; Beswick, Callingham, & Watson, 2012; Gable, Tonelson, Sheth, Wilson, & Park, 2012). Empirical findings presented in the remaining 31 articles are reviewed below, organized by finding categories.

**Career intervention effects.** Ten studies were found that investigated the effectiveness of career interventions, measured at least in part by changes in occupational knowledge. These interventions have been found to be effective in increasing self-estimations of occupational knowledge in college students on academic probation (Williams, 2011), undergraduate psychology students (Atchley, Hooker, Kroska, & Gilmour, 2012), primarily Caucasian middle school students (Crowley, 1981; Johnson, Johnson, & Yates, 1981; Omvig, Tulloch, & Thomas, 1975), Black economically disadvantaged middle school students (Johnson, Johnson, Johnson, & Yates, 1982), ethnically diverse eighth grade students (Fouad, 1995), and middle school students in England (Pumfrey & Schofield, 1982). Holland's Self-Directed Search (1971) was used as a career intervention in two studies, though neither found significant intervention effects (Healy & Mourton, 1984; Holland & Gottfredson, 1975).

**Age/grade and gender.** Six studies analyzed the effects of age and grade on occupational knowledge levels. Cross-sectional studies have found that occupational knowledge increases by age or grade in samples of 7<sup>th</sup>-10<sup>th</sup> grade Nigerian students (Achebe, 1982), 6<sup>th</sup> and 8<sup>th</sup> grade students (Omvig et al., 1975), 3<sup>rd</sup>, 6<sup>th</sup>, 9<sup>th</sup>, and 12<sup>th</sup> grade students (Walls, 2000), 4<sup>th</sup>-7<sup>th</sup> grade rural students (Schmitt-Wilson & Welsh, 2012), and high school males (DeFleur & Menke, 1975). However, Fouad's (1995) one-year longitudinal study using the CVMT did not produce significant effects related to age in a sample of ethnically diverse eighth grade students. Fouad also reported no gender differences in her sample. Conversely, Miller and Hayward (2006) found

that high school females' self-estimations of occupational knowledge were higher than those of males, and two studies reported higher levels of objectively measured occupational knowledge in females (Rohlfing, et al., 2012; Westbrook & Sloan, 2006). Notably, none of these studies looked at age or gender in relation to knowledge of individuals' chosen occupations.

**Cognitive ability/academic achievement.** Six studies examined occupational knowledge scores in relation to participants' cognitive abilities or academic achievement. Jordan and Pope (2001) found longitudinal evidence that broad, objectively-measured occupational knowledge in their sample of 17-year-olds was significantly predicted by mothers' vocabulary when participants were at age 4 and participants' vocabulary at age 14. Other studies have found broad, objectively-measured occupational knowledge to be moderately and positively related to achievement measured by self-reported high school achievement (Westbrook, Elrod, & Wynne, 1996), middle school grade point average (GPA; Schmitt-Wilson & Welsh, 2012), and high school GPA (DeFleur & Menke, 1975; Westbrook & Sloan, 2006). Additionally, Van Iddekinge et al. (2011) reported a moderate correlation between cognitive aptitude measured by the Armed Forces Qualification Test and Army job activity-specific occupational knowledge ( $r = .52$ ).

**Performance.** Three studies investigated the relation between occupational knowledge and performance. Ones and Viswesvaran (2007) found that the job activity-specific knowledge tests created for factory worker selection related significantly to "maximal performance" ( $r = .42$ ), operationally defined by participants' observed performance during a hands-on work sample test. Similarly, Van Iddekinge et al. (2011) found a significant relation between Army job activity-specific occupational knowledge and task proficiency ( $r = .29$ ), measured by multiple ratings of task performance. One study sought to determine the unique contributions of occupational knowledge and cognitive ability to task performance (Palumbo, Miller, Shalin, &

Steele-Johnson, 2005). College students' scores on a cognitive ability test and a truck driving job knowledge test both separately predicted performance on a truck dispatching job simulation task, explaining 12% and 26% of performance variance, respectively. Additionally, cognitive ability accounted for 23% of the variance in job knowledge. However, after controlling for the effect of knowledge on performance, cognitive ability no longer made a significant contribution in predicting performance. The authors concluded that job knowledge fully mediated the effect of cognitive ability on task performance in this context, calling into question the findings of Ones and Viswesvaran, and Van Iddekinge and colleagues.

**Exposure/experience.** Two studies addressed the relation between exposure to, or experience with, occupations on occupational knowledge. Pumfrey and Schofield (1982) administered the CMI after middle school students participated in week-long real-world work experiences and compared their scores to students in a control group who did not have the work experience. The authors found a significant main effect of the intervention on broad, objectively-measured occupational knowledge, suggesting that even one week of real-world work experience can increase levels of general occupational knowledge. Additionally, DeFleur and Menke (1975) found that out of ten common traditionally-male occupations, high school males were most accurate in their occupational knowledge of truck driving (57.51% accuracy) and least accurate for accounting (34.46% accuracy). The authors suggest that knowledge accuracy in this context may be related to the degree of exposure individuals have to a given occupation, supported by the finding that participants had greater accurate knowledge related to an occupation they likely see frequently compared to one that they do not. Importantly, DeFleur and Menke utilized individual participant interviews which included open-ended questions regarding the activities involved in each of the ten occupations assessed.

**Vocational interests.** Five studies have examined the relation between vocational interests and occupational knowledge to some degree. Rohlfing et al. (2012) assessed 3<sup>rd</sup>-6<sup>th</sup> grade students' general self-estimated occupational knowledge and domain-specific knowledge estimations separated by Personal Globe Inventory domains (People/Things, Ideas/Data, and Prestige; Tracey, 2002). Significant correlations were found between domain knowledge scores and corresponding interest ratings: People/Things knowledge was positively and significantly related to People/Things interest ( $r = .30$ ); though the opposite pattern was found for the Ideas/Data domain ( $r = -.12$ ). These results indicate that participants tend to rate their knowledge higher in domains they are interested in. Contrary to these findings however, Loesch and Sampson (1978) found no relationship between RIASEC (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional; Holland, 1997) interest scores and corresponding domain knowledge scores. These results conflict with those of Rohlfing et al., suggesting that knowledge may not be driven by interest. Notably, Loesch and Sampson produced these findings using an objective knowledge measure while Rohlfing and colleagues employed self-estimates.

A different approach to the interest-knowledge relationship was taken by Westbrook and Parry-Hill (1973). They used the six CVMT subscales (Duties, Fields of Work, Work Conditions, Education Required, Attributes Required, and Job Selection) that objectively and broadly assess knowledge of different aspects of common occupations. The authors found significant differences on all subscales between middle school participants who had chosen "appropriate" career choices and those who had not. Career decisions were considered appropriate when they were of the same interest domain as the individual's reported vocational interests (categorized based on the Kuder Preference Record; Kuder, 1944). This finding suggests that more knowledge of common occupations is related to one's ability to identify

career paths that are congruent with his or her vocational interests. Conversely, Holland and Gottfredson (1975) found no relations between objectively-measured broad occupational knowledge and degree of congruence between one's interests and career choice (categorized based on the RIASEC domains). Thus this relation remains equivocal.

Van Iddekinge and colleagues (2011) examined vocational interests and occupational knowledge specific to common activities and responsibilities of Army soldiers. Entered as a composite in a regression predicting occupational knowledge, RIASEC interest scores measured by the Work Preferences Inventory (Amabile, Hill, Hennessey, & Tighe, 1994) yielded an  $R^2$  of .46, indicating that 46% of the variance in occupational knowledge was explained by vocational interest. Individually, Realistic (prefer hands-on, practical activities) and Investigative (prefer scientific, intellectual activities) interests significantly related to occupational knowledge ( $r = .20$  and  $.29$ , respectively). No other RIASEC types yielded significant relations. These findings supported the authors' hypothesis in that Army-related interests significantly related to Army occupational knowledge, suggesting that greater interest in a given field may lead one to seek out and acquire more knowledge of activities in that field. This implication is especially important given the associations between occupational knowledge and performance. It may be that interests serve to drive knowledge acquisition, which in turn drives job performance; a model that has received great support in the literature (e.g., Ackerman & Heggestad, 1997; Holland, 1997). Of further importance is the similarity between this finding and that of Westbrook and Parry-Hill: occupational knowledge is greater when one's interests and career choice are congruent. In conjunction with previously discussed relations between occupational knowledge and performance, these studies support the notion that occupational knowledge is an important variable within the career decision-making process.

**Career certainty.** This career decision-making construct is arguably one of the more important, as it is generally the goal of the career decision-making process. The final stage in all of the career decision-making models described previously involves commitment to a career decision and subsequent planning and implementation. Career certainty, or career decidedness in some of the literature, is the degree of certainty one has regarding his or her chosen career (Durr & Tracey, 2009). This variable has been assessed alongside occupational knowledge in four studies. One study reported a small but significant correlation between career certainty and self-estimated levels of occupational knowledge ( $r = .24$ ; Multon et al., 1995), but another study examining objectively-measured occupational knowledge and certainty yielded no relation ( $r = .00$ ; Westbrook & Sloan, 2006). Similarly, a study of high school students by Westbrook and colleagues (1996) failed to find a significant relation between the CVMT – Duties scale and career certainty ( $r = .20$ ,  $N = 91$ ). However, the same authors found a strong correlation between certainty (measured by the Career Choice Questionnaire – Stability, Certainty, and Satisfaction of One's Career Choice; Westbrook, 1985) and self-estimated knowledge of the attributes (e.g., abilities and education) required for participants' chosen careers ( $r = .65$ ). This self-estimated knowledge of attributes scale was comprised of seven Likert scale items from (1) *definitely no* to (5) *definitely yes* in which participants responded to statements such as, *Know the duties required in career choice* and *Have information about career choice*. Conceptually, this relatively strong relation makes sense; greater knowledge of one's career choice is associated with greater career certainty. However, given that self-estimated knowledge was used, it remains unknown whether participants' self-estimations are accurate.

One study assessed the effects of a teacher observation intervention on undergraduate secondary education students (Thomas & Bruning, 1984). Thirty-three of the 224 participants

dropped out of the program after the intervention, and had significantly lower career certainty than their peers who remained in the program. The dropout students were not statistically different regarding career certainty before the intervention; though, after observing the occupation they were pursuing at the time, their certainty levels decreased significantly. This finding may suggest that some of the students did not have a good understanding of what teaching career would be like and, once they obtained that information, they no longer wanted to pursue it.

**Other career development constructs.** Various additional career-related variables have been examined in relation to objectively-measured broad occupational knowledge. Sampson and Loesch (1981) assessed occupational knowledge's relation to work values, but found no patterns among RIASEC domains of knowledge and domains of work values. Achebe (1982) found that urban middle and high school students in Nigeria had more occupational knowledge than their rural counterparts, possibly relating to the number or type of occupations students were exposed to in their communities. Hirschi (2011) found that self-estimated knowledge of seventh grade students' chosen careers significantly correlated with generalized self-efficacy and self-esteem, although the magnitude of the correlations were small ( $r = .27$  and  $.26$ , respectively). These relations make sense given the subjective self-report nature of the occupational knowledge measure: Higher self-efficacy and self-esteem may lead participants to rate their levels of occupational knowledge has higher than those with lower self-efficacy and self-esteem. Regarding competence perceptions, Rohlfing and colleagues (2012) found significant correlations between the People/Things knowledge domain and People/Things competence perceptions ( $r = .25$ ) of 3<sup>rd</sup>-6<sup>th</sup> grade students. However, these results were based on self-

estimates of knowledge for individual occupational titles, indicating that these students tend to perceive higher competence in the occupations with which they are familiar.

**Knowledge of chosen occupations.** Of particular interest to the present discussion is the extent to which individuals are making informed career decisions; that is, whether or not they are knowledgeable of the occupations they are choosing to pursue. Much of the occupational literature concerns general knowledge of common occupations, and only three studies have examined individuals' knowledge of their chosen occupations. A significant relation was found between female participants' self-estimates of knowledge and their preferences for occupations, while no significant relation was found for male participants (Miller & Hayward, 2006). This result suggests that females estimate their levels of knowledge in accordance with their levels of preference for those occupations; though, it is unknown whether their self-estimates of knowledge are accurate or if they perceive more knowledge about occupations which they prefer. Westbrook and colleagues (1996) found a significant relation between self-estimated knowledge of the attributes required in participants' chosen occupations and occupational knowledge measured by the CVMT – Duties scale ( $r = .28$ ). The CVMT – Duties scale objectively measures general knowledge of duties required in a subset of common occupations. Thus, this result indicates that individuals with higher general knowledge of common occupational duties self-estimate higher knowledge levels of the attributes (e.g., abilities and education) required for their chosen careers.

One study was found that objectively measured college students' knowledge of their chosen careers to an extent. Healy and Mourton (1984) employed the CDI - Knowledge of Preferred Occupation scale, which asks participants to choose one of a number of occupational groups in which their career choice best fits. Participants are then presented with 40 multiple

choice items inquiring about facets of the job related to required abilities, interests and values fulfilled, training requirements, and work environment. Notably, work activities were not assessed. The Self-Directed Search (SDS; Holland, 1971) was used as an intervention and hypothesized to increase career exploration, with results indicating no effect of the intervention on occupational knowledge. Descriptive statistics for the experimental ( $M = 2.06$ ,  $SD = .93$ ) and control ( $M = 1.87$ ,  $SD = .89$ ) groups were reported; however, interpretation of these statistics is uncertain since, traditionally, the CDI standardizes scores to a mean of 100 (Hansen, 1985).

**Self-estimates and objective measures of knowledge.** As Kruger and Dunning (1999) established, oftentimes individuals who are unaware of certain information are also unaware of their knowledge deficit. After testing this effect using an English grammar test, Kruger and Dunning found that bottom-quartile participants scored, on average, in the 10<sup>th</sup> percentile, while they had estimated their test score to be in the 67<sup>th</sup> percentile. Translating this concept to the present discussion of occupational knowledge, three studies were found that investigated both objective and self-estimated levels of occupational knowledge.

Yanico and Mihlbauer (1983) examined the relationship between self-estimated and objectively-measured occupational knowledge with regards to gender traditional and nontraditional occupations. After completing the Jobs-Career Key test of 36 occupations, college student participants were asked to indicate how much they thought they knew about each occupation on a scale from 1 to 100. No significant differences were found between estimated and objective knowledge levels; however, all participants underestimated knowledge levels of their respective nontraditional occupations. These results were later replicated (Yanico & Hardin, 1986) and suggest that college students are accurate in their estimations of knowledge regarding the traditional and nontraditional occupational domains on the Jobs-Career Key. Importantly, this

study did not assess knowledge of chosen occupations. Participants' objective and self-estimated knowledge was only measured in relation to common gender-stereotyped occupations.

Grotevant and Durrett (1980) reported findings from their investigation of high school seniors. Participants reported their first-choice career, stated how well they understood that career on a 1 to 5 Likert scale, then indicated their educational goals. Students' vocational interests were also assessed for the purpose of measuring their occupational congruence. Grovetant and Durrett found that, of the students who claimed to have at least a "considerable" understanding of their first career choice, only half of them planned to obtain the occupation's required level of education.

While the literature on the accuracy of self-estimated occupational knowledge is not abundant, Grovetant and Durrett's study provides solid evidence of a discrepancy solely between self-estimated knowledge and appropriate educational goals. If high school seniors do not have enough knowledge about a career to plan to obtain the required education, one might expect an even larger discrepancy between their perceived and actual knowledge of the daily job activities their occupational choice entails. This expectation is concerning and has not been addressed thus far in the literature, largely due to the paucity of appropriate assessment tools currently in use.

### **Summary**

There are important findings from this literature that can be used to inform future research on the topic of occupational knowledge. The self-estimated knowledge literature has shown that subjective occupational knowledge is slightly related to self-efficacy and self-esteem (e.g., Hirschi, 2011) and strongly related to career certainty (e.g., Westbrook et al., 1996). However, the studies utilizing objectively measured occupational knowledge provide somewhat more useful information going forward. Objectively measured occupational knowledge has been

shown to be related to academic achievement (e.g., Schmitt-Wilson & Welsh, 2012; Westbrook, Elrod, & Wynne, 1996), work experience (e.g., Pumfrey & Schofield, 1982), job performance (e.g., Ones & Viswesvaran, 2007), and interests (e.g., Rohlfing et al., 2012; Van Iddekinge et al., 2011). It has been shown to increase by age and grade (e.g., Achebe, 1982; Pumfrey & Schofield, 1982) and to predict career decisions congruent with one's interests (e.g., Westbrook & Parry-Hill, 1973). Further, there is evidence that occupational knowledge is related to work exposure (e.g., DeFleur & Menke, 1975), cognitive aptitude, and job proficiency (Van Iddekinge et al., 2011).

These studies have objectively investigated many aspects of occupational knowledge, including training and education requirements, job availability, earnings and prestige, mental and physical requirements, and interests and values fulfilled. Job activities have even been assessed on a job-specific level by one study (DeFleur & Menke, 1975) but the authors did not report the level of specificity used in coding participant responses nor did they assess participants' knowledge of their chosen occupations. Furthermore, this study utilized interview methods, making it quite impractical for most large sample research endeavors. Overall, while many aspects of occupational knowledge have been assessed in some way, none of the available literature has investigated the extent to which college students are knowledgeable about the careers they are choosing to pursue.

### **Measurement Solutions**

It seems that the current psychological measurement of job knowledge is largely flawed. Three general types of assessment exist in the literature: those that gauge self-estimated levels of knowledge, those that objectively test either general career information or relatively common-knowledge aspects of specific jobs, and those that objectively test specific jobs' activities and

responsibilities. All have inherent problems; namely, none are able to adequately and efficiently measure accuracy of job-specific knowledge in terms of activities and responsibilities across large participant samples. Activities and responsibilities one will encounter upon entering his or her chosen occupation are of interest because they are often the aspects of jobs for which people must seek information to be fully knowledgeable. Of course, the major activities of jobs tend to be obvious; accountants work with numbers, physicians treat medical patients, interior designers decorate rooms, etc. However, beyond these general activities are duties and responsibilities that may not enter the minds of some individuals as they pursue these careers. Currently, there are no practical methods of measuring these important aspects of occupational knowledge in large samples. Those used in personnel selection most closely resemble ideal occupational knowledge assessments, but cannot realistically be used in studies involving diverse career choices. Individual interviews have been conducted in past studies, but are far too inefficient and unrealistic to employ in most empirical studies.

One assessment method that could potentially address these measurement issues and produce information regarding college students' knowledge of the work activities involved in their chosen occupations is inherent in the O\*NET online career exploration system. The system includes a Detailed Work Activities database which consists of a set of 41 work activities rated by importance for each of the 974 O\*NET occupational titles (National Center for O\*NET Development, 2003). Average importance ratings for each activity are scored from 0 to 100 for each occupation based on data collected from occupation experts and random samples of workers (Research Triangle Institute, 2006). For each item, respondents were to respond to the question, "How important is the activity to your current job?" Respondents' answers were then averaged for each item to create the importance score for each work activity within a given

occupation. The 41 work activities are the same across 974 occupations in the database which allows for practical, efficient comparison of occupational knowledge in large research samples. As an example, the occupation activity importance profile for an accountant is presented in Appendix C.

A strength of this measurement method is that it allows for the use of a profile correlation ( $Q$  correlation; Cronbach & Gleser, 1953) in analyzing the results. The  $Q$  correlation, which provides scores ranging from -1.00 to +1.00, would provide a standardized measurement of the agreement between a participant's work activity rating profile for his or her chosen occupation and the corresponding O\*NET rating profile for the occupation. A score of .00 would indicate no pattern of similarity between profiles, scores nearing +1.00 would indicate greater profile matches, and scores reaching -1.00 would indicate nearly opposite profiles (Armstrong, Fouad, Rounds, & Hubert, 2010). This statistic is not descriptive of elevation differences between two profiles, but of differences in shape. This point is important because, given that a scale from 0 to 100 is not descriptive in and of itself, participants' knowledge would not be assessed based on their ratings of the importance of a given activity, but rather on the importance they assign a given activity relative to all the other activities.

### **Career Certainty**

#### **Selected Literature Review**

The present discussion has already demonstrated the importance of occupational knowledge in career decision-making. However, the question of interest is regarding the relation between college students' knowledge of their chosen occupations and their levels of certainty with those choices. As career certainty is an important career decision-making outcome variable, it has a large literature foundation. For that reason and because the population of interest in the

present discussion is specific, the literature related to college students will be reviewed. In addition, it will be limited to studies addressing the topics of vocational interests, self-efficacy, and occupational knowledge. A PsycInfo search of *career* with *certainty* or *decidedness*, and *college* or *undergraduate* yielded 71 peer-reviewed articles written in English. Twenty-one of the 71 articles examined career certainty with either interests, self-efficacy, or occupational knowledge. Within this search, career certainty is predominantly measured by the Certainty Scale of the Career Decision Scale (Osipow, Carney, & Barak, 1976), a two-item scale reflecting the extent to which participants have made definite decisions about a career. Other measures comprised of similar item content have been used as well (e.g., Career Decision Profile, Jones, 1989; Occupational Alternatives Question, Zener & Schnuelle, 1976).

**Interests.** Nine studies were found that looked at both career certainty and interests. Four studies examined the relation between certainty and interest differentiation. Contrary to Holland's (1997) predictions regarding differentiation, none found evidence for the power of the degree of differentiation among people's interest profiles in predicting career certainty (Alvi, Khan, & Kirkwood, 1990; Hirschi, 2009; Larson, Heppner, Ham, & Dugan, 1988; Sackett & Hansen, 1995). Notably, the Hirschi and Sackett and Hansen studies failed to find significant relations between these two constructs concurrently or longitudinally. These results suggest that relative elevation of interests are not predictive of one's certainty regarding his or her chosen career. Two studies looked at interest consistency, which refers to degree of similarity between interest types based on Holland's hexagon model (1997). Larson and colleagues (1988) found no differences between decided and undecided students in interest profile consistency; however, deviation from Holland's hexagon structure interests was found to be negatively related to career

certainty in a more recent study (Tracey & Darcy, 2002). Thus, the evidence regarding the relation between interest consistency and career certainty is mixed.

Another construct of Holland's is congruence, which refers to the degree of similarity between one's career choice and one's vocational interests (Holland, 1997). Three studies were found that examined congruence and they produced opposing results (Slaney & Slaney, 1986; Tracey, 2008; Tracey, 2010). Slaney and Slaney (1986) found no differences in career certainty between students whose interests were congruent with their career choices and students whose interests were incongruent. However, Tracey (2008, 2010) found interest-occupation congruence to be significantly related to career certainty in two separate samples ( $r = .29$  and  $.26$ , respectively). Similar to the research examining consistency and certainty, congruence has yielded mixed findings. In addition to Holland's constructs, one study was found that examined the stability of interests over four to six weeks, finding that stability was unrelated to career certainty (Berk & Fekken, 1990).

**Career decision-making self-efficacy.** Five studies were located that examined the relation between career decision-making self-efficacy (CDMSE) and career certainty. CDMSE, defined as one's belief that he or she is able to successfully engage in and complete tasks necessary to career decision-making (Betz, 2000), has been shown to relate moderately with career certainty in four studies ( $r = .28$  to  $.46$ ; Creed & Patton, 2003; Restubog, Florentino, & Garcia, 2010; Taylor & Popma, 1990; Tracey, 2008). Creed, Prideaux, and Patton (2005) found that individuals who were certain about their future careers had significantly greater CDMSE than their uncertain counterparts,  $F(1, 221) = 22.75, p < .001$ . In addition, Tracey (2008) found that career certainty moderately relates to CDMSE concurrently, but not to CDMSE measured 13 months later at Time 2. However, Time 1 certainty significantly correlated with Time 2 certainty

( $r = .25$ ), which in turn correlated moderately with Time 2 CDMSE ( $r = .44$ ). These results are consistent with career decision-making models, as CDMSE is thought to increase one's ability to navigate the career decision-making process.

**Occupational knowledge.** Four studies were found that examined both occupational knowledge and career certainty in college students. As previously reviewed in the occupational knowledge section, small relations have been found between career certainty and self-estimated levels of occupational knowledge (Multon et al., 1995; Westbrook et al., 1996). However, studies examining objective occupational knowledge and career certainty have revealed null relations with career certainty (Westbrook et al., 1996; Westbrook & Sloan, 2006). While none of these findings are addressing knowledge specific to one's chosen career, Westbrook and colleagues (1996) participants did find a strong correlation between certainty and self-estimated knowledge of the attributes required for participants' chosen careers ( $r = .65$ ,  $N = 91$ ; e.g., "Know the duties required in career choice," "Have information about career choice"). This strong relation makes sense; greater knowledge of one's career choice is associated with greater career certainty. However, given that self-estimated knowledge was used, it remains unknown whether participants' self-estimations are accurate. Notably, this latter finding is the only one addressing individuals' knowledge of their chosen occupations rather than broad occupational knowledge. This relation is of importance to the present discussion, especially since it produced such a high correlation. The fact that participants in that study perceived their knowledge of their career choices to be high when their certainty was high is an association one might expect based on conceptual knowledge. This association could be interpreted such that greater knowledge of a specific occupation leads one to be more certain that it is the correct decision, or greater certainty

about pursuing a certain career leads one to seek more knowledge about it. Either way, this relation is expected based on the career decision-making models.

The fourth study examined occupational knowledge and certainty in more depth by investigating college students majoring in secondary education who participated in a 40-hour teacher observation course assignment (Thomas & Bruning, 1984). They found that 33 of the 224 participants dropped out of the secondary education major program after spending a week observing a teacher in their subjects of interest. Before the observation, the non-dropout and dropout groups had equal levels of career choice satisfaction and career certainty. At post-intervention, the dropout group had decreased on all of those variables, effectively separating themselves from the non-dropout group. Furthermore, the authors found significant differences in the proportions of each group that had decided to major in secondary education within the past year (52% for dropouts vs. 29% for non-dropouts) as opposed to more than one year ago.

While the size of the dropout group is quite small, especially compared to the sample as a whole, the findings of this study are of great conceptual importance. The 33 dropout participants had previously committed to the secondary education major; yet, after observing what teaching actually entails, these students realized that they no longer desired to pursue a teaching degree. In addition, 17 of those 33 dropout students had made a decision to major in education within the past year, suggesting that the career may still have been new to them and their knowledge about it may have been lacking. This study demonstrates an important point: there may be a portion of college students who feel they are certain about their chosen careers, but are also uninformed about the careers they are pursuing until they are forced to experience them first-hand in the real world. Luckily, the students in this study had key exposure experiences early in their college

educations. Other students may not get this knowledge until they begin applying for jobs after graduation.

An additional study was found that examined the role of job information on one's intent to remain in that job. Assessing employed sales agents at several different companies, Pitt and Ramaseshan (1995) examined the extent to which participants retrospectively felt they received realistic job information during their interviews now that they had actually been hired and were experiencing the job first-hand. Participants indicated the amount, personal relevance, depth, and accuracy of job information they received during their interviews. They also indicated the frequency with which they currently considered quitting their recently obtained jobs. The authors then compared those who "never/seldom" considered quitting their jobs and people who "occasionally/often/all the time" considered quitting. Significant differences found on all information indices, with people never/seldom considering quitting reporting lower amount, relevance, depth, and accuracy of information. Further, a regression model including all information indices accounted for 44% of the variance in quitting intentions. These results suggest that those who were informed about the job they were committing to are the same individuals who intended to remain in that job.

Translating these findings to college students, it may be that some students are not fully informed regarding what they will be doing in their jobs on a daily basis. Being uninformed could lead to dissatisfaction with jobs, intentions to quit, and possibly the desire to pursue a different occupation altogether. The available literature suggests that students perceive themselves to be certain to the extent they are knowledgeable about the careers they are pursuing. However, due to the paucity of valid and reliable occupational knowledge assessment methods, the relation between objectively measured occupational knowledge students have about

their chosen careers and career certainty remains unknown. Grotevant and Durrett (1980) were able to provide evidence that some students' estimates of knowledge about their chosen careers was overestimated, at least with regards to one important aspect which was the level of education needed to obtain their chosen occupations. When considered along with Westbrook and colleagues' (1996) .65 correlation between self-estimated knowledge of chosen careers and certainty, this finding causes concern. If Grotevant and Durrett's results are representative of students' judgments of their knowledge, then Westbrook and colleagues' finding may be a gross overestimation. If the true relation is closer to zero, which would be contrary to many conceptually-based expectations, perhaps it is more complex and involves more variables than previously thought.

### **Variables Predicting Career Certainty Alongside Occupational Knowledge**

A mediator is a variable that explains at least part of the relation between two other variables (Frazier, Tix, & Barron, 2004). In other words, a mediator is a mechanism through which one variable influences another variable. Frazier and colleagues describe an example in which a counseling intervention has an effect on well-being. However, when social support is introduced to the relation, it is revealed that the intervention actually increases social support, which, in turn, increases well-being. Thus, the relation between the intervention and well-being is fully mediated by social support.

The present discussion has thus far argued, conceptually, that knowledge about one's chosen occupation should be positively related to one's level of career certainty. However, no literature has been found that directly supports this argument. This is partly due to measurement methodology flaws; though it could also be due to confounding variables. In addition, the career decision process may be more complex, leading to the equivocal nature of findings presented in

the literature. Therefore, four additional constructs found in the career decision-making literature were examined for their potential roles in predicting career certainty alongside occupational knowledge: career decision-making self-efficacy, interest congruence, career exploration activities, and perceived occupational knowledge.

### **Career Decision-Making Self-Efficacy**

Self-efficacy, theorized as one's perception of his or her probable effectiveness in a given situation in the near future (Bandura, 1977), has received significant attention in the career development literature due to its broad applicability to both the content and process domains of career decision-making. Based on Bandura's (1977, 1986, 1997) work, self-efficacy is grounded in social cognitive theory and is a mechanism determining one's response to new or threatening situations. Bandura and others (e.g., Betz, 2004; Betz & Hackett, 1981; Lent, Brown, & Hackett, 1994) posit that higher self-efficacy leads individuals to approach new or threatening situations with the belief that they will be able to cope successfully. Conversely, lower self-efficacy may result in avoidant behavior leading to preference for the familiar and safe instead of the new and uncertain.

Specific to the career decision process, career decision-making self-efficacy has been the focus of a substantial amount of research. This term refers to one's belief that he or she is able to successfully engage in and complete tasks necessary to career decision-making (Betz, 2000). The Career Decision Self-Efficacy Scale (CDSES; Taylor & Betz, 1983), previously named the Career Decision-Making Self-Efficacy Scale, is the most well-established measure of this construct. Anchored in Crites' (1976) five career choice competencies, the short and long forms of the CDSES include five subscales: self-appraisal, occupational information, goal selection, planning, and problem solving. These subscales key in to the important domains of career

development that require action on the part of the individual. In other words, these areas comprise the different stages of information gathering and implementation needed to facilitate mature career development.

**Career certainty.** As reviewed previously, career decision-making self-efficacy has not been frequently examined in the literature with career certainty. The five studies that did look at this relation utilized the CDSES, with three studies finding that it correlated moderately with career certainty ( $r = .38$  to  $.46$ ; Creed & Patton, 2003; Restubog et al., 2010; Taylor & Popma, 1990). The latter authors also examined this relation in terms of the CDSES subscales, finding significant correlations between career certainty and one's perceived ability to assess his or her vocational interests, values, and abilities ( $r = .43$ ); obtain occupational information ( $r = .32$ ); select career goals ( $r = .55$ ); make plans to pursue a career ( $r = .46$ ); and solve career-related problems ( $r = .30$ ). Creed, Prideaux, and Patton (2005) found that individuals who were certain about their future careers had significantly greater CDMSE than their uncertain counterparts,  $F(1, 221) = 22.75, p < .001$ . In addition, Tracey (2008) found career certainty moderately related to the CDSES concurrently ( $r = .41$ ), but not to the CDSES measured 13 months later at Time 2 ( $r = .13$ ). However, Time 1 certainty had a small to moderate relation to Time 2 certainty ( $r = .25$ ), which in turn correlated moderately with Time 2 CDSES ( $r = .44$ ). These results are consistent with career decision-making theories, as career decision-making self-efficacy is conceptually thought to increase one's ability to navigate the career decision-making process.

**Occupational knowledge.** Career decision-making self-efficacy has thus far not been examined in relation to occupational knowledge. Two studies have measured “career knowledge” and career decision-making self-efficacy measured by the CDSES, but career knowledge in both cases was operationally defined as knowledge of decision-making skills and

world of work information rather than as knowledge of specific aspects of occupations (Creed & Patton, 2003; Creed, Patton, & Prideaux, 2007). However, given that the CDSES – Occupational Information scale measures one's belief in his or her ability to obtain information about occupations, it is possible that a relation between the CDSES and occupational knowledge could exist. For example, as reviewed previously, occupational knowledge has been shown to moderately relate to academic achievement and cognitive ability in several studies. Additionally, academic performance measured by GPA has been shown to be related to scores on the CDSES ( $r = .20$ ; Restubog et al., 2010). It is possible that a spurious relationship between the CDSES and occupational knowledge could account for some of the variance in GPA's relationship with the two variables separately.

#### **Career decision-making self-efficacy, occupational knowledge, and career certainty.**

Career decision-making self-efficacy has been actively researched over the past thirty years, predominantly due to the development of the Career Decision Self-Efficacy Scale by Taylor and Betz in 1983. However, it has not yet been examined alongside both objective occupational knowledge and career certainty. Therefore, the present study sought to investigate whether career decision-making self-efficacy, measured by the CDSES, has a significant relation with participants' objective occupational knowledge of their chosen careers. In addition, the interplay between career decision-making self-efficacy and objective occupational knowledge will be examined in terms of their roles in predicting career certainty. A mediation effect was predicted, such that career decision-making self-efficacy will relate to career certainty both directly and indirectly, through objective occupational knowledge.

The relations between these three variables is important to understand because college students' career certainty, according to career decision-making theories (Hirschi & Lage, 2007),

should be influenced largely by knowledge of the occupations they are considering. However, career decision-making self-efficacy may be involved by providing some students with greater senses of contentment with their perceived abilities to make career decision, or greater self-efficacy regarding their abilities to seek out further occupational knowledge. Conversely, career decision-making self-efficacy may impede students' abilities to make career decisions with which they are comfortable, or leave them paralyzed in the career decision process by preventing them from seeking occupational knowledge necessary for making decisions. In these ways, objective occupational knowledge may partially mediate the relation between career decision-making self-efficacy and career certainty.

### **Vocational Interest**

Vocational interests describe individuals' preferences regarding work activities, situations, and environments (Su, Rounds, & Armstrong, 2009), and have been established as predictors of college students' academic majors (e.g., Gasser, Larson, & Borgen, 2007). This construct has received substantial attention in the literature, with a large part dedicated to John Holland's (1997) work on one of the most well-known theories of vocational interests. He identified six factors that largely encompass the types of interests people have regarding work, referred to as the RIASEC model (Realistic: constructing, mechanical, outdoor interests; Investigative: inquiry and discovery; Artistic: creating, designing; Social: serving, helping others; Enterprising: persuading others; Conventional: organizing and structuring things/data). This six-domain model has emerged as the dominant model vocational psychology employs to organize vocational interests. Part of the utility of Holland's model is its application to both people's interests and their work environments. For both people and environments, interest profiles can be created based on the degree to which each factor fits with the individual or

environment. The order of the three highest scores when the six domains are measured comprises one's "Holland Code" (e.g., "IAS" for investigative, artistic, and social interests), with the first letter representing the interest type with the highest score. These codes are computed for people based on their responses to interest inventories, while work environments' codes are computed based on the types of activities involved in occupations and are similarly organized around the RIASEC domains (Spokane & Cruza-Guet, 2005).

**Person-environment fit.** Holland's RIASEC model fits within a larger vocational outcome variable, person-environment fit (PE fit). PE fit is the extent to which a person's interests and his or her current or prospective work environment are compatible (Dawis, 2005). The general understanding is that no person's interests will fit perfectly with the activities in his or her work environment; however, the goal is for individuals to decide which career path will likely be most compatible with their vocational interests. Career indecision can arise when people have difficulty finding an acceptable fit, which is a realization that can occur anywhere from the initial stages of the decision process to years after one has committed to a career and entered the workforce.

**Interest Congruence.** Person-Environment fit can be assessed in terms of a number of vocational variables. Regarding interests however, Holland's RIASEC model is commonly used to measure PE fit. Holland (1997) described "congruence" as an indicator of PE fit, typically referring to congruence between an individual's interest and his or her occupation. Specifically, congruence is the degree to which a person's Holland code matches that of a given work environment (Spokane & Cruza-Guet, 2005).

Congruence was hypothesized by Holland to predict several positive vocational outcomes, including one's job satisfaction. The importance of assessing the ability of congruence

to predict job satisfaction comes from the fact that, for many individuals, a career constitutes a substantial portion of life; people tend to desire careers with which they will be satisfied.

However, the literature in support of Holland's congruence-job satisfaction hypothesis is somewhat mixed. Between congruence and job satisfaction, an overall mean correlation of .20 was found across 17 studies meta-analyzed by Tranberg and colleagues (1993). Mean correlations ranged from .12 and .45 depending on the type of congruence index used. Overall, Tranberg and colleagues found no significant effect of congruence on job satisfaction, concluding that it cannot predict satisfaction alone. A more recent meta-analysis again examining the congruence-job satisfaction relation produced similar findings (Tsabari, Tziner, & Mier, 2005). They found mean congruence-job satisfaction correlations across 36 samples to range from .07 to .35 depending on the congruence index used.

The authors of both meta-analyses were compelled to conclude that the congruence-job satisfaction relation was not well-supported in the literature. However, this finding was due in part to the heterogenous nature of congruence indices utilized in research. While various congruence indices exist and most have both advantages and disadvantages, the profile correlation (*Q* correlation; Cronbach & Gleser, 1953) has been identified as one of the statistically stronger methods of measuring congruence (Armstrong et al., 2010). It utilizes participants' and occupations' full interest profiles (i.e., all 6 RIASEC scores) in order to get the most comprehensive estimate of congruence. Measuring the extent to which two interest profiles have similar shapes, the *Q* correlation is also consistent with Holland's (1997) original conceptualization of congruence (Armstrong et al., 2010).

The Euclidean distance index, another method of measuring congruence, has been argued as the best measure of interest profile similarity as it describes elevation differences in addition

to shape differences (Armstrong et al., 2010; Cronbach & Gleser, 1953). However, the present study is concerned only about the degree to which participants' highest interests match those of their chosen occupations. In other words, relative interest elevation is important rather than absolute elevation. Thus, in the context of the present study the Q correlation is supported as an appropriate measurement of congruence.

**Career certainty.** While the discussion of congruence and job satisfaction is more applicable to currently employed adults, this relation can be prospectively assessed in college students by examining more proximal, related constructs. Congruence has been found to relate to career certainty (e.g., Tracey, 2010), which in turn has been related to college students' academic major satisfaction (e.g., Ware & Pogge, 1980). Career certainty has also been associated with persistence in academic major programs 18 months later (Restubog et al., 2010), a construct considered to be conceptually related to major satisfaction (Nauta, 2007). Persistence measured in a sample of working adults also revealed that individuals who were persisting in their current jobs, compared to those who were changing careers, had higher levels of congruence after controlling for age and career tenure (Donohue, 2006). Overall, the available literature does provide support for the congruence-career certainty relation, both directly and indirectly.

**Occupational knowledge.** Few studies have examined occupational knowledge in relation to congruence. Significant differences between individuals with and without congruent career choices (measured based on the KPR interest scales; Roe, 1956) were found on objectively measured broad occupational knowledge and self-estimated knowledge of chosen careers' required education and attributes (Westbrook & Parry-Hill, 1973). These findings suggest that greater knowledge of common occupations is related to one's identification of congruent career paths, and that congruence may contribute to one's self-estimated knowledge of

aspects of his or her chosen career. In a more specific study, Van Iddekinge et al. (2011) found that levels of Realistic interests, a domain congruent with the Army work environment, are associated with Army-related job task knowledge. Knowledge in this study was objectively measured, indicating that greater interest in a given field may lead one to seek out and acquire more knowledge of activities in that field. Notably, however, this study examined a relatively unique sample of individuals and the results may not generalize to general college student samples.

**Interest congruence as a mediator.** The theory behind interest congruence suggests individuals naturally seek out work environments they believe will be compatible with their own interests, leading them toward occupational satisfaction (Holland, 1997). The literature has provided moderate support for this theory (Tranberg, Slane, & Ekeberg, 1993); though, it is important to note that assessing one's congruence with his or her chosen occupation is an internal judgment. Individuals must assess their own levels of congruence as they navigate through the career decision process. Conceptually, one would expect increasing occupational knowledge to assist individuals in assessing which career will yield the highest congruence. Therefore, if greater knowledge leads to greater likelihood of achieving interest congruence, one might expect level of career certainty to positively relate to both objective occupational knowledge and interest congruence. In other words, interest congruence may act as a partial mediator between objective occupational knowledge and career certainty, so objective occupational knowledge would have both a direct effect on career certainty, and an indirect effect through interest congruence.

## Career Exploration Activities

Career exploration activities are specific ways of gaining occupational knowledge, both broadly and in-depth, which comprise an important career exploration phase of most career decision-making models (Hirschi & Lage, 2007). The present study operationalized this construct by creating an checklist-style inventory to gauge the types of career exploration activities in which participants have already engaged (Appendix G). The ability to engage in these activities has been deemed a “fundamental competence” for individuals immersed in the career decision-making process (Blustein, 1997).

The present study examined this construct in relation to career decision-making self-efficacy and objective occupational knowledge. The Career Decision Self-Efficacy Scale (Taylor & Betz, 1983) includes ten items gauging participants’ self-efficacy related to actively seeking occupational knowledge through various common career exploration activities. These activities, in turn, are central to gaining occupational knowledge. Therefore, number of reported career exploration activities was examined as a potential mediator between career decision-making self-efficacy and objective occupational knowledge. Specifically, the relation between career decision-making self-efficacy and objective occupational knowledge was hypothesized to be fully mediated by career exploration activities. In other words, career decision-making self-efficacy was thought to influence engagement in career exploration activities, which would then influence amount of occupational knowledge gained.

## Perceived Occupational Knowledge

This construct was added to the model predicting career certainty in part because of its prominent role in previous studies measuring “occupational knowledge.” Perceived, or self-estimated, occupational knowledge has been frequently employed as a proxy to examining

objectively measured knowledge of participants' chosen occupations. While its use is understandable given the inherent difficulty in measuring this construct across large participant samples, it remains unknown whether college students' perceptions of their occupational knowledge are accurate. Thus, the present study included perceived occupational knowledge for the primary purpose of determining whether it is a sufficient substitution for the difficult objective measurement of occupational knowledge. In addition, perceived occupational knowledge was thought to mediate the relation between career decision-making self-efficacy and career certainty. While career decision-making self-efficacy measures students' beliefs about their future effectiveness in navigating career decision-making tasks, perceived occupational knowledge forces students to specifically gauge the amount of occupational knowledge they have already obtained. Therefore, career decision-making self-efficacy may influence students' perceptions of their occupational knowledge, which in turn may influence whether students believe they are certain about the careers they have chosen. In this way, perceived occupational knowledge may act as a mediator in the relation between career decision-making self-efficacy and career certainty.

## CHAPTER THREE

### METHODS

#### **Design**

The present study utilized a descriptive correlational design as it allowed for assessment of statistical relations between variables within participants. The primary variables were objective occupational knowledge and career certainty. Career decision-making self-efficacy, interest congruence, reported career exploration activities, and perceived occupational knowledge were also examined alongside objective occupational knowledge in predicting career certainty.

#### **Participants**

The target population of the present study was undergraduate college students. Data were collected in the fall semester of 2013 from undergraduate students in introductory psychology courses at Iowa State University. Data from 357 participants were originally collected. Forty-one participants' data were excluded prior to analysis for various reasons. As a single career-of-focus was needed for analysis of the Work Activities Profile, 21 were excluded because they identified a) no careers of focus, b) more than one career of focus (e.g., "a sales representative or a coach"), c) ambiguous or invalid careers (e.g., "something in the business field"), d) careers for which O\*NET does not yet have data (e.g., "military officer"), or e) if the career they indicated at the beginning of the survey did not match the career they used to fill out the Work Activity Importance Profile items. Additional exclusions included two participants who reported being under 18 years of age, and 18 participants due to duplicate or incomplete survey responses.

The final sample consisted of 316 participants. Two hundred twenty-seven participants identified as female (71.8%) and 89 identified as male (28.2%). Participant ages ranged from 18

to 67 years ( $M = 19.36$ ,  $SD = 3.71$ ); one participant did not indicate age. One hundred seventy-six participants were first-year students (55.7%), 75 were second-year students (23.7%), 39 were third-year students (12.3%), 13 were fourth-year students (4.1%), 10 were fifth-year students (3.2%), 2 were sixth-year students (0.6%), and 1 was a graduate student (0.3%). Two hundred thirty-seven participants had declared their majors at the time of the study (75%) and 79 had not (25%). Regarding the ethnic diversity of the sample, 254 identified as European American (80.4%), 15 as Pacific Islander/Asian American (4.7%), 4 as African American (1.3%), 8 as Latino/a American (2.5%), 7 as multiracial American (2.2%), and 28 as international students (8.9%).

## **Measures**

**Objective occupational knowledge.** Objective occupational knowledge was measured by the Work Activity Importance Profile (WAIP), adapted for the present study based on O\*NET's Detailed Work Activity database (National Center for O\*NET Development, 2003). The database includes a set of 41 work activities (Appendix B) rated by importance for each of the 974 O\*NET occupational titles. Average importance ratings for each activity are scored on a scale from (0) *not important* to (100) *extremely important* for each occupation based on data collected from occupation experts and random samples of workers (Research Triangle Institute, 2006). For each item, respondents answered the question, “How important is the activity to your current job?” Respondents’ answers were then averaged for each item to create the importance score for each work activity within a given occupation. The 41 work activities are the same across 974 occupations in the database which allows for practical, efficient comparison of occupational knowledge in large research samples. As an example, a portion of the occupation activity importance profile for an accountant is presented in Appendix C.

To measure participants' objective occupational knowledge in the present study, they were asked to indicate the degree to which each of the 41 activities of the WAIP is important with regards to the career choice each participant listed at the beginning of the survey. Eight activities were seen on a page at a time. Participants responded on a 5-point Likert scale ranging from (1) *not important* to (5) *extremely important*. The coefficient alpha for this scale in the present study was .93. Additional reliability statistics were unavailable as this was the first study to utilize these items in this manner.

**Accuracy of occupational knowledge.** A profile correlation ( $Q$  correlation; Cronbach & Gleser, 1953) was computed for each participant to produce occupational knowledge scores. The  $Q$  correlation, with scores ranging from -1.00 to +1.00, provided a standardized measurement of the agreement between a participant's WAIP ratings for his or her chosen occupation and the corresponding O\*NET work activity rating profile for the same occupation. A score of .00 would indicate no pattern of similarity between profiles, scores nearing +1.00 would indicate greater profile matches, and scores reaching -1.00 would indicate nearly opposite profiles (Armstrong et al., 2010). This statistic is not descriptive of elevation differences between two profiles, but of differences in shape. Since the importance scale is not descriptive in and of itself, participants' knowledge was not assessed based on their ratings of the importance of a given activity, but rather on the importance they assigned a given activity relative to all other activities. Computed in this way, a score of +1.00 indicates the highest level of occupational knowledge, and as scores move further away from +1.00 they become associated with lower occupational knowledge.

**Perceived occupational knowledge.** A subjective measure of occupational knowledge, the Perceived Occupational Knowledge Scale developed by the author (Pesch, 2014a; Appendix D), was also administered. Each participant was asked to estimate the knowledge he or she has

about the activities involved in his or her chosen career. The 3-item scale created by the author was used to assess self-estimated knowledge on a 6-point scale from (1) *strongly disagree* to (6) *strongly agree* with one reverse-scored item. Mean scores were computed. This measure provided information about the relation between objectively- and subjectively-measured occupational knowledge. The coefficient alpha for this scale in the present study was .73.

**Career certainty.** Career certainty was measured using the Career Certainty Scale (CCS), a 3-item scale adapted from the Career Decision Scale (Osipow et al., 1976; Appendix E). This scale assessed the extent to which participants were certain about pursuing the career they indicated as their current career of choice. Response options were on a 6-point scale from (1) *strongly disagree* to (6) *strongly agree*. Mean scores were computed. The coefficient alpha for this scale in the present study was .92. The 2-item original version of this scale (Osipow et al., 1976) has been established with internal consistency estimates between .80 and .85 (Hartman, Fuqua, & Hartman, 1983; Tracey, 2008). Osipow (1980) reported a two-week test-retest correlation of .82, and its validity has been well-established (Betz, 1992; Osipow, 1980).

**Career decision-making self-efficacy.** In order to assess for career decision-making self-efficacy, the present study employed the Career Decision Self-Efficacy Scale (CDSES; Taylor & Betz, 1983; Appendix F). The CDSES is among the most well-established measures of this construct. It was designed to measure one's belief that he or she will be able to successfully engage in and complete tasks necessary to career decision-making (Betz, 2000). Anchored in Crites' (1976) five career choice competencies, the short and long forms of the CDSES include five subscales: self-appraisal, occupational information, goal selection, planning, and problem solving. Participants responded by indicating their perceived abilities to complete career decision-making tasks on a 5-point Likert scale from (1) *no confidence at all* to (5) *complete*

*confidence.* Mean scores were used, with higher scores reflecting stronger beliefs regarding one's probable effectiveness in career decision-making tasks.

Internal consistency has been established for the 5-level continuum scoring method of the CDSES ( $\alpha = .78$  to  $.87$ ) and for the total score ( $\alpha = .93$  to  $.95$ ; Betz, Hammond, & Multon, 2005; Betz & Voyten, 1997; Betz, Klein, & Taylor, 1996). Moderate estimates of concurrent validity with vocational identity have been shown (.40 to .66; Betz et al., 1996). Meta-analytic findings have also provided evidence of concurrent validity with self-esteem (mean  $r = .49$ ) and career indecision (mean  $r = -.52$ ; Choi et al., 2012), which refers to a general inability to make career-related decisions.

In the present study, the CDSES subscales were found to be highly related with all correlations above .74. Therefore, the whole CDSES mean score was used in analyses. The coefficient alpha for this scale was .96.

**Career exploration activities.** The Career Exploration Checklist, developed by the author (Pesch, 2014b), was used to assess the extent to which participants have engaged in career exploration activities. Items were derived from career exploration activities described in the Career Decision Self-Efficacy Scale (Taylor & Betz, 1983), career decision-making models (Crites, 1976; Gati, 1986; Harren, 1979, Hirschi & Lage, 2007), and Iowa State University's Career Exploration Services program. This 17-item checklist (Appendix G) asked each participant to indicate the extent to which he or she has engaged in the various exploration activities related to his or her chosen career. Responses were recorded on a 3-point scale, (0) *never*, (1) *once*, and (2) *more than once*. Sum scores were computed. The present study utilized this measure to assess the level of correspondence between participants' career decision-making

self-efficacy beliefs specific to career exploration activities, and actual engagement in those activities. The coefficient alpha for this scale was .84.

**Vocational interests.** The O\*NET Interest Profiler – Short Form (IP; Rounds, Su, Lewis, & Rivkin, 2010; Appendix H) is a public domain 60-item instrument designed to measure Holland's (1997) six types of occupational interests (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional). Each of Holland's interest types comprises its own 10-item subscale. Each item presented an activity and participants responded by indicating their preference for the activity on a 5-point scale from (0) *strongly dislike* to (4) *strongly like*. Summed scores were calculated for each subscale with higher scores indicating more interest in a given interest category. Rounds and colleagues reported internal consistency estimates ranging from .78 to .90, and test-retest reliability estimates ranging from .78 to .86. Furthermore, convergent and discriminant validity evidence was found with the RIASEC scales of the Interest-Finder (Wall & Baker, 1997). Correlations for same-named subscales ranged from .74 to .82, and from .12 to .48 for differing subscales. The coefficient alpha for this scale in the present study was .93. The O\*NET Interest Profiler – Short Form was used by the present study in tandem with the Occupational Interest Profiles for O\*NET to construct a measure of interest congruence (both described below).

**Occupational interest profiles.** Interest profiles for occupations were determined using the Occupational Interest Profiles for O\*NET (OIP; Rounds, Smith, Hubert, Lewis, & Rivkin, 1999). As part of a larger occupational information database, occupational interest profiles were created. The profiles are based on Holland's RIASEC model (1997), and thus comparable to the person interest profiling instruments. Each of O\*NET's 1172 occupational titles is paired with a RIASEC interest profile, with unique values for each interest type based on the occupation's

characteristics. Job incumbent interest profiles, discriminant function analysis, and expert judgments were used in determining interest profiles for each occupation. This system, created for organizing and describing occupations, has replaced the Dictionary of Occupational Titles for the U.S. Department of Labor and is currently the only comprehensive system available.

Evidence for external and structural validity is presented in O\*NET's developmental report (Rounds et al., 1999).

**Interest congruence.** Interest congruence scores were computed using the O\*NET Interest Profiler – Short Form for participants' interest scores and the Occupational Interest Profiles for O\*NET (both described above). Congruence is the degree to which a person's Holland code matches that of a given work environment (Spokane & Cruza-Guet, 2005). In the present study, congruence was illustrated using the Q correlation (Cronbach & Gleser, 1953) which is a correlation of two response profiles. Each participant's interest profile across the RIASEC, measured by the IP, was correlated with the O\*NET occupation interest profile of his or her chosen career. In the context of the present study, the Q correlation was supported as an appropriate measurement of congruence (Armstrong et al., 2010). It is consistent with Holland's (1997) original conceptualization of congruence and measures the extent to which two interest profiles have similar shape. Validity for less stringent, but more frequently used congruence calculations (e.g., 1<sup>st</sup> letter agreement, 2-letter agreement) are presented in the meta-analysis by Tranberg and colleagues (1993). The specific congruence calculation method used in the present study has not yet been used in the literature, but is more comprehensive; comprising scores on all six interest categories for both participants and careers.

## Procedure

Approval by the Institutional Review Board at Iowa State University was obtained prior to data collection in order to ensure the present study is in compliance with the ethical standards defined by the American Psychological Association.

Participants were recruited using the Department of Psychology's online research participation system that moderates undergraduate students' participation in department-associated research projects. The present study was one of many web-based survey options in which students were able to participate. Qualtrics was used to create the survey and collect responses. Undergraduate students who opted to partake in the survey received one credit for participating. Prior to their participation in the survey, students were presented with an informed consent statement containing a brief description of the study's purpose and procedures (Appendix I). They indicated their informed consent in order to begin the survey, though they were informed of their right to discontinue study participation at any time without forfeiting participation credit.

Students were first presented with demographic questions that included items asking each participant to provide the career he or she is pursuing or seriously considering pursuing. Subsequent pages of the survey presented participants with the Perceived Occupational Knowledge Scale, Career Certainty Scale, Career Decision Self-Efficacy Scale, Career Exploration Checklist, O\*NET Interest Profiler – Short Form, and the Work Activity Importance Profile. Upon reaching the end of the survey, participants were debriefed regarding the purpose of the study (Appendix J). The researcher's contact information was provided if participants had questions or concerns regarding the study.

## CHAPTER FOUR

### RESULTS

#### **Descriptive Statistics and Preliminary Analyses**

SPSS 20 and Mplus Version 6.0 (Muthén & Muthén, 2010) were used for data analysis. Fisher  $z$  prime ( $z'$ ) transformations were conducted on two variables before running descriptive statistics and preliminary analyses (Cohen et al., 2003). This transformation was statistically appropriate for the occupational knowledge and interest congruence  $Q$  score distributions, given they ranged from -1.00 to +1.00. The resulting distributions for those two variables are presented as  $z$ -scores; they were used throughout data analysis in place of the original  $Q$  scores. To calculate  $z$ -scores, the following equation was used:  $z' = \frac{1}{2} (\ln(1+r) - \ln(1-r))$ , where  $r$  represents each individual's  $Q$  score for the respective variable. This transformation adjusts the distributions to make them symmetrical and normalize the standard error, allowing for more accurate confidence intervals when estimating standardized beta values in path analysis (Cohen et al., 2003). The ranges for objective occupational knowledge and interest congruence remain between -1.00 and +1.00, with scores near zero indicating no relation between participant and occupation profiles, and scores near +1.00 indicating greater similarity between the two profiles.

Means, standard deviations, coefficient alphas, and zero-order Pearson product moment correlations among the six variables are presented in Table 1. A comparison between the present study's sample statistics for the Career Decision Self-Efficacy Scale was compared to that of Tracey's (2008) sample, comprised of a similar distribution of first- through fourth-year college students. The present study's sample ( $N = 316$ ,  $M = 3.72$ ,  $SD = 0.54$ ) was statistically different from Tracey's Time 1 data using the Short Form of the scale ( $N = 283$ ,  $M = 3.40$ ,  $SD = 0.96$ ;  $t = 5.09$ ,  $p < .001$ ), but not statistically different from Tracey's Time 2 data collected three months

later ( $N = 283$ ,  $M = 3.82$ ,  $SD = 1.07$ ;  $t = 1.47$ ,  $p = .143$ ). This was the only comparable sample since all other studies utilized high school samples or the 10-point response scale of the Career Decision Self-Efficacy Scale.

Career decision-making self-efficacy positively correlated with career certainty ( $r = .47$ ,  $p < .001$ ), reported number of career exploration behaviors ( $r = .42$ ,  $p < .001$ ), and perceived occupational knowledge ( $r = .39$ ,  $p < .001$ ). All of these relations were medium effect sizes (Cohen, 1992). Career certainty also positively correlated with career exploration behaviors ( $r = .28$ ,  $p < .001$ ), but did not significantly correlate with interest congruence ( $p > .05$ ). Objective occupational knowledge correlated significantly with interest congruence ( $r = .20$ ,  $p < .001$ ). Although the effect was small, this correlation provides some support for the validity of the Work Activity Importance Profile as a measure of occupational knowledge in this sample. Objective occupational knowledge did not significantly correlate with career certainty, perceived occupational knowledge, reported number of career exploration activities, or career decision-making self-efficacy ( $p > .05$ ). Correlations and descriptive statistics are presented in Table 1.

Table 1.  
*Descriptive Statistics and Variable Correlations (N = 316)*

Variable <sup>a</sup>	1	2	3	4	5	6
1 Career Decision-Making Self-Efficacy	1.00	.42*	.06	.04	.39*	.47*
2 Career Exploration Activities		1.00	.00	.00	.41*	.28*
3 Objective Occupational Knowledge			1.00	.20*	.06	-.02
4 Interest Congruence				1.00	.08	.10
5 Perceived Occupational Knowledge					1.00	.39*
6 Career Certainty						1.00
Mean	3.72	15.55	0.65	0.63	4.48	4.72
Standard Deviation	0.54	6.97	0.32	0.58	1.06	1.06
Coefficient Alpha	.96	.84	.93	.93	.73	.92

\*Indicates significance at  $p \leq .001$

<sup>a</sup>For all constructs, higher values indicate higher levels of the construct.

*Note.* Career decision-making self-efficacy as measured by the Career Decision-Making Self-Efficacy Scale (Taylor & Betz, 1983); career exploration activities as measured by the Career Exploration Checklist (Pesch, 2014b); objective occupational knowledge as measured by the Work Activity Importance Profile (adapted from National Center for O\*NET Development, 2003); interest congruence as measured by the O\*NET Interest Profiler (Rounds et al., 2010); perceived occupational knowledge as measured by the Perceived Occupational Knowledge Scale (Pesch, 2014a); career certainty, as measured by the Career Certainty Scale (adapted from Osipow et al., 1976).

## Hypotheses

The four hypotheses were tested through multiple regression based on the mediation testing model presented by Baron and Kenny (1986). They identified three conditions that must be met in order for a variable to function as a mediator: 1) the independent variable must significantly relate to the hypothesized mediator (Path A), 2) the hypothesized mediator must significantly relate to the dependent variable (Path B), and 3) the previously significant relation between the independent and dependent variables significantly decreases (or becomes null) when Paths A and B are controlled. Three-step multiple regression models were run to test these mediation hypotheses. Results are described below and presented in Table 2.

Table 2.  
*Multiple Regression Results for Mediation Hypotheses 1 – 4*

	Step	Predictor(s)	Criterion	$\beta$	t	p
Hypothesis 1	1	CDMSE	OOK	.064	1.14	.256
	2	CDMSE	CC	.466	9.35	< .001
	3	CDMSE OOK	CC	.470 -.049	9.39 -0.97	< .001 .331
Hypothesis 2	1	CDMSE	CEA	.419	8.18	< .001
	2	CDMSE	OOK	.064	1.14	.256
	3	CDMSE CEA	OOK	.080 -.038	1.29 -0.61	.199 .544
Hypothesis 3	1	OOK	IC	.202	3.65	< .001
	2	OOK	CC	-.019	-0.33	.742
	3	OOK IC	CC	-.040 .108	-0.70 1.88	.482 .061
Hypothesis 4	1	CDMSE	POK	.405	7.86	< .001
	2	CDMSE	CC	.466	9.35	< .001
	3	CDMSE POK	CC	.371 .234	7.00 4.42	< .001 < .001

Note. CDMSE = Career decision-making self-efficacy as measured by the Career Decision-Making Self-Efficacy Scale (Taylor & Betz, 1983); CEA = Career exploration activities as measured by the Career Exploration Checklist (Pesch, 2014b); OOK = Objective occupational knowledge as measured by the Work Activity Importance Profile (adapted from National Center for O\*NET Development, 2003); IC = Interest congruence as measured by the O\*NET Interest Profiler (Rounds et al., 2010); POK = Perceived occupational knowledge as measured by the Perceived Occupational Knowledge Scale (Pesch, 2014a); CC = Career certainty, as measured by the Career Certainty Scale (adapted from Osipow et al., 1976).

Hypothesis 1 predicted objective occupational knowledge would partially mediate the relation between career decision-making self-efficacy and career certainty (Figure 2). In Step 1, multiple regression results revealed a non-significant effect of career decision-making self-efficacy on objective occupational knowledge, and Step 2 revealed a significant effect of career decision-making self-efficacy on career certainty ( $\beta = .466, p < .001$ ). Step 3 included both career decision-making self-efficacy and objective occupational knowledge in the prediction of career certainty. No significant changes occurred in this step; career decision-making self-efficacy had a significant effect on career certainty ( $\beta = .470, p < .001$ ), while objective occupational knowledge did not (see Table 2). This hypothesis was not supported by the data. Instead, a significant relation existed between career decision-making self-efficacy and career certainty after all other variables have been accounted for in the model; objective occupational knowledge does not significantly relate to either variable. Like the figure

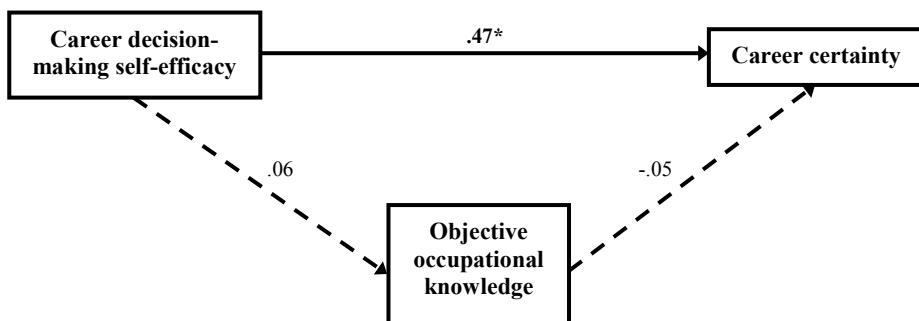


Figure 2. Hypothesis 1 mediation model with multiple regression results.

\*Indicates significance at  $p < .001$

Note: Solid lines indicate significant paths; dashed lines indicate non-significant paths. Career decision-making self-efficacy as measured by the Career Decision-Making Self-Efficacy Scale (Taylor & Betz, 1983); Objective occupational knowledge as measured by the Work Activity Importance Profile (adapted from National Center for O\*NET Development, 2003); Career certainty, as measured by the Career Certainty Scale (adapted from Osipow et al., 1976).

Hypothesis 2 predicted career exploration activities would partially mediate the relation between career decision-making self-efficacy and objective occupational knowledge (Figure 3).

In Step 1, multiple regression results revealed a significant effect of career decision-making self-efficacy on career exploration activities ( $\beta = .419, p < .001$ ), and Step 2 revealed a non-significant effect of career decision-making self-efficacy on objective occupational knowledge. Step 3 included both career decision-making self-efficacy and career exploration activities in the prediction of objective occupational knowledge. No significant changes occurred in this step; neither career decision-making self-efficacy nor career exploration activities had a significant effect on objective occupational knowledge (see Table 2).

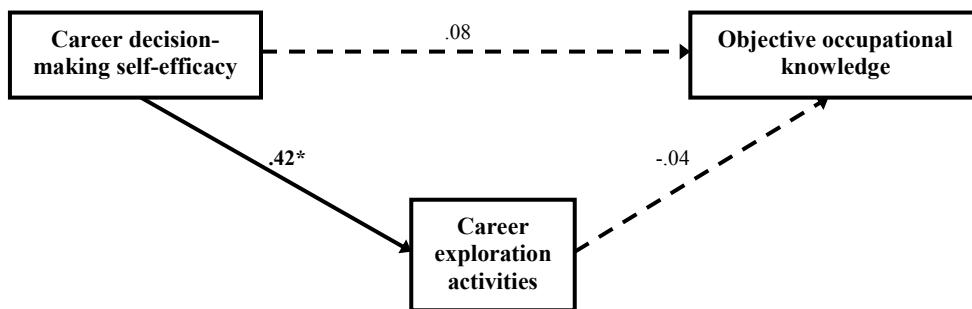


Figure 3. Hypothesis 2 mediation model with multiple regression results.

\*Indicates significance at  $p < .001$

Note: Solid lines indicate significant paths; dashed lines indicate non-significant paths. Career decision-making self-efficacy as measured by the Career Decision-Making Self-Efficacy Scale (Taylor & Betz, 1983); Objective occupational knowledge as measured by the Work Activity Importance Profile (adapted from National Center for O\*NET Development, 2003); Career exploration activities as measured by the Career Exploration Checklist (Pesch, 2014b).

Hypotheses 2 was not supported by the data. Results indicated career exploration activities did not mediate the relation between career decision-making self-efficacy and objective occupational knowledge as predicted. Objective occupational knowledge did not significantly relate to either variable; though career decision-making self-efficacy did have a significant direct effect on career exploration activities. Neither mediation hypothesis was supported.

Hypothesis 3 predicted interest congruence would partially mediate the relation between objective occupational knowledge and career certainty (Figure 4). In Step 1, multiple regression results revealed a significant effect of objective occupational knowledge on interest congruence

( $\beta = .202, p < .001$ ), and Step 2 revealed a non-significant effect of objective occupational knowledge on career certainty. Step 3 included both objective occupational knowledge and interest congruence in the prediction of career certainty. No significant changes occurred in this step; neither objective occupational knowledge nor interest congruence had a significant effect on career certainty (see Table 2). This partial mediation hypothesis was not supported by the data. Results indicated objective occupational knowledge and interest congruence were significantly related; though neither had a significant relation with career certainty.

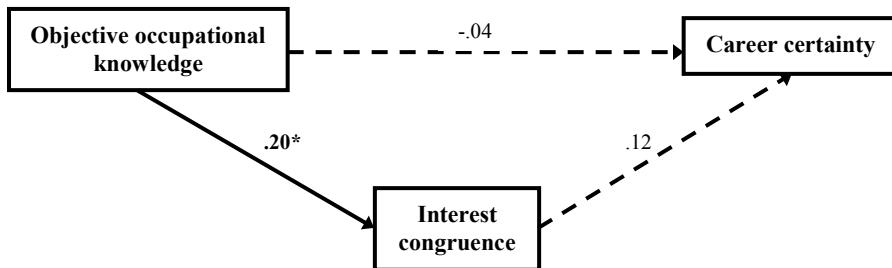


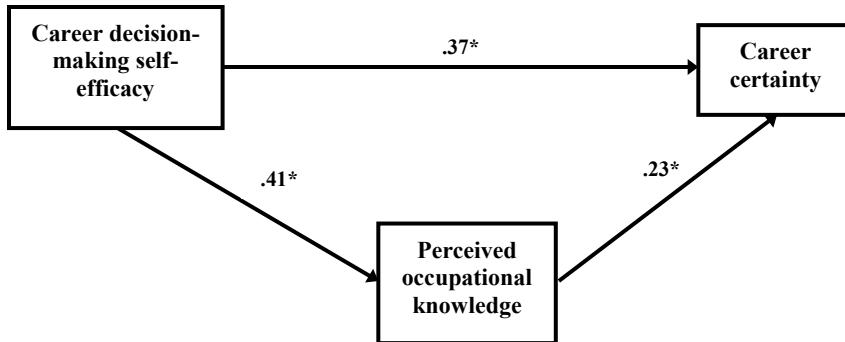
Figure 4. Hypothesis 3 mediation model with multiple regression results.

\*Indicates significance at  $p < .001$

Note: Solid lines indicate significant paths; dashed lines indicate non-significant paths. Objective occupational knowledge as measured by the Work Activity Importance Profile (adapted from National Center for O\*NET Development, 2003); Interest congruence as measured by the O\*NET Interest Profiler (Rounds et al., 2010); Career certainty, as measured by the Career Certainty Scale (adapted from Osipow et al., 1976).

Hypothesis 4 predicted perceived occupational knowledge would partially mediate the relation between career decision-making self-efficacy and career certainty (Figure 5). In Step 1, multiple regression results revealed a significant effect of career decision-making self-efficacy on perceived occupational knowledge ( $\beta = .405, p < .001$ ), and Step 2 revealed a significant effect of career decision-making self-efficacy on career certainty ( $\beta = .466, p < .001$ ). Step 3 included both career decision-making self-efficacy and perceived occupational knowledge in the prediction of career certainty. Significant effects of both career decision-making self-efficacy ( $\beta = .371, p < .001$ ) and perceived occupational knowledge ( $\beta = .234, p < .001$ ) on career certainty

remained (see Table 2). While the effect of career decision-making self-efficacy decreased with the addition of perceived occupational knowledge, the change was not significant; results did not support this partial mediation hypothesis.



*Figure 5.* Hypothesis 4 mediation model with multiple regression results.

\*Indicates significance at  $p < .001$

Note: Career decision-making self-efficacy as measured by the Career Decision-Making Self-Efficacy Scale (Taylor & Betz, 1983); Career certainty, as measured by the Career Certainty Scale (adapted from Osipow et al., 1976); POK = Perceived occupational knowledge as measured by the Perceived Occupational Knowledge Scale (Pesch, 2014a).

### Additional Analyses

In order to examine relations between all six variables simultaneously, a path analysis was run using the recursive model (i.e., direct effects of each predictor variable on all subsequent variables in the model were tested, with no reciprocal effects; Cohen et al., 2003) illustrated in Figure 1. Table 3 presents the standardized path coefficients for the series of five steps involved in the model predicting career certainty. The predictor variables are listed on the left side of the table in the order they were hypothesized in the model. Criterion variables for each equation are listed across the top, associated with the five steps. The direct effects of each predictor variable on each criterion variable are listed under the corresponding step. Indirect effects are indicated with arrows below the associated predictor variable. The standardized path coefficients listed in the table represent the unique contributions of the corresponding predictor variables on the

criterion variable, after taking into account the other predictor variables included in that particular model. Both direct and indirect effects are reported in the table; though indirect effects involving more than two predictor variables were not reported. Summary statistics are reported in the table, including the proportion of variance explained by the predictor variable(s) for each model ( $R^2$ ), the sums of squares regression (sum of the squared differences predicted and observed values) and the mean squared errors (indicators of quality of the estimated model; Cohen et al., 2003).

The proposed model contained one exogenous variable, career decision-making self-efficacy. The first endogenous variable was career exploration activities, followed by objective occupational knowledge, interest congruence, perceived occupational knowledge, and career certainty. The previous mediation hypotheses examined specific relations among these variables, but not all of them simultaneously. Figure 7 presents the full model with the standardized path coefficients from Table 3. While objective occupational knowledge was central to this model, it only significantly related to interest congruence. Upon examination of the full model predicting career certainty, results indicated 27% of the variance in career certainty could be explained by the interplay of three variables: career decision-making self-efficacy, career exploration activities, and perceived occupational knowledge. In general, it appears career decision-making self-efficacy drives the model through its direct and indirect effects involving career exploration activities and perceived occupational knowledge, while objective occupational knowledge and interest congruence play no significant roles in predicting career certainty.

Table 3.  
*Standardized Path Coefficients for the Recursive Model Predicting Career Certainty (N = 316)*

Predictor Variables	Criterion Variables				
	Step 1: Career Exploration Activities	Step 2: Objective Occupational Knowledge	Step 3: Interest Congruence	Step 4: Perceived Occupational Knowledge	Step 5: Career Certainty
Career Decision-Making Self-Efficacy (CDMSE)	<b>.42**</b>	.08	.04	<b>.28**</b>	<b>.36**</b>
CDMSE → Career Exploration Activities		-.02	-.01	<b>.12**</b>	.02
CDMSE → Objective Occupational Knowledge			.02	.00	-.01
CDMSE → Interest Congruence				.00	.00
CDMSE → Perceived Occupational Knowledge					<b>.06*</b>
Career Exploration Activities (CEA)	-.04		-.02	<b>.29**</b>	.04
CEA → Objective Occ. Knowledge			-.02	.00	.00
CEA → Interest Congruence				.00	.00
CEA → Perceived Occ. Knowledge					<b>.06*</b>
Objective Occupational Knowledge (OOK)			<b>.20**</b>	.04	-.07
OOK → Interest Congruence				.01	.02
OOK → Perceived Occ. Knowledge					.01
Interest Congruence (IC)				.06	.08
IC → Perceived Occ. Knowledge					.01
Perceived Occupational Knowledge					<b>.22**</b>
<i>R</i> <sup>2</sup>	<b>.18**</b>	.01	.04	<b>.24**</b>	<b>.27**</b>
Sum of Squares Regression	2690.51	.18	4.44	52.20	96.44
Mean Squared Error	40.18	.11	.33	.54	.82

\*Indicates significance at  $p < .003$

\*\*Indicates significance at  $p < .001$

*Note:* All path coefficients are listed in the table. Empty cells indicate that particular path was not analyzed. Career decision-making self-efficacy as measured by the Career Decision-Making Self-Efficacy Scale (Taylor & Betz, 1983); career exploration activities as measured by the Career Exploration Checklist (Pesch, 2014b); objective occupational knowledge as measured by the Work Activity Importance Profile (adapted from National Center for O\*NET Development, 2003); interest congruence as measured by the O\*NET Interest Profiler (Rounds et al., 2010); perceived occupational knowledge as measured by the Perceived Occupational Knowledge Scale (Pesch, 2014a); career certainty, as measured by the Career Certainty Scale (adapted from Osipow et al., 1976).

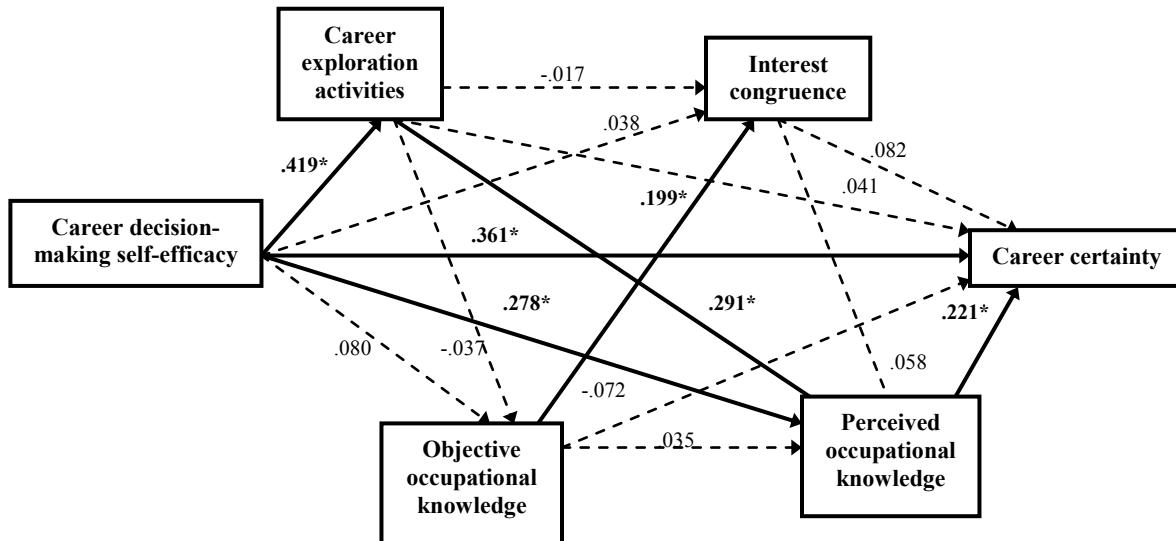


Figure 7. Recursive path model predicting career certainty.

Note. Career decision-making self-efficacy as measured by the Career Decision-Making Self-Efficacy Scale (Taylor & Betz, 1983); career exploration activities as measured by the Career Exploration Checklist (Pesch, 2014b); objective occupational knowledge as measured by the Work Activity Importance Profile (adapted from National Center for O\*NET Development, 2003); interest congruence as measured by the O\*NET Interest Profiler (Rounds et al., 2010); perceived occupational knowledge as measured by the Perceived Occupational Knowledge Scale (Pesch, 2014a); career certainty, as measured by the Career Certainty Scale (adapted from Osipow et al., 1976). Solid lines indicate significant paths; dashed lines indicate non-significant paths.

\*Indicates significance at  $p < .003$

\*\*Indicates significance at  $p < .001$

## CHAPTER FIVE

### DISCUSSION

A major construct involved in the career decision-making process is occupational knowledge. Occupational knowledge has been defined as the accuracy one has in understanding information related to careers (Schmitt-Wilson & Welsh, 2012). Occupational knowledge has been emphasized as an important factor in the prominent career decision-making models (Hirschi & Lage, 2007). Following these models, one would expect increasing occupational knowledge to lead individuals to either persist along the same career path or choose an alternative path. In turn, greater persistence along the same career path is reflected in one's degree of career certainty, which is the commitment individuals have to their decisions to pursue specific careers (Daniels et al., 2006). It is generally considered to be one of the final stages in the career decision-making process, followed only by the planning and implementation stages (Hirschi & Lage, 2007).

Despite the centrality of career certainty in the career decision-making process, its link to occupational knowledge had not yet been directly examined in terms of individuals' knowledge about their chosen careers. This deficit in the literature is in large part due to the inherent difficulty in measuring levels of occupational knowledge individuals have regarding their chosen careers. Therefore purpose of the present study was three-fold. First, it sought to address a hole in the occupational knowledge literature regarding its objective measurement and its relation to career certainty in college students. Second, since it was the first study to objectively measure occupational knowledge of college students' chosen careers, it sought to explore the relations between that knowledge and four additional vocational constructs: 1) *interest congruence*, defined as the degree to which a person's interests match those of a given work environment (Spokane & Cruza-Guet, 2005); 2) *career decision-making self-efficacy*, defined as one's belief

that he or she is able to successfully engage in and complete tasks necessary to career decision-making (Betz, 2000); 3) *career exploration activities* participants reported, a behavioral indicator of participants' engagement in career exploration; and 4) *perceived occupational knowledge*, a subjective self-assessment of occupational knowledge which has been frequently used in studies as a measure of "occupational knowledge." Third, the present study sought to examine these four variables alongside occupational knowledge in terms of their roles in predicting career certainty. Overall, the present study sought to gain a better understanding of the factors involved in making career decisions in college students, with particular focus on objective occupational knowledge. A path model predicting career certainty was used to test specific mediation hypotheses involving occupational knowledge and the four other variables-of-interest.

### **Overview of Findings**

Consistent with previous research, career decision-making self-efficacy had moderate positive correlations with career certainty (Creed & Patton, 2003; Creed et al., 2005; Restubog et al., 2010; Taylor & Popma, 1990; Tracey, 2008) and reported number of career exploration behaviors. Career certainty additionally significantly correlated to reported number of career exploration behaviors and perceived occupational knowledge (Westbrook, 1985), but did not significantly correlate with interest congruence (Slaney & Slaney, 1986). Correlational findings in the present study were similar to some previous occupational knowledge research. Objective occupational knowledge correlated significantly, though modestly, with interest congruence (Westbrook & Parry-Hill, 1973), providing some indication the Work Activity Importance Profile was a valid measure of occupational knowledge. Objective occupational knowledge did not significantly correlate with career certainty (Westbrook et al., 1996; Westbrook & Sloan, 2006), perceived occupational knowledge (Grotevant & Durrett, 1980), reported number of

career exploration activities, or career decision-making self-efficacy. These results suggest occupational knowledge, as measured by the Work Activity Importance Profile, does not relate to college students' certainty about the careers they are pursuing, their self-estimates of knowledge about those careers, the amount of career exploration they have engaged in, or their beliefs about their abilities to make career decisions.

### **Hypotheses**

Hypothesis 1 predicted objective occupational knowledge would partially mediate the relation between career decision-making self-efficacy and career certainty. Path analysis results indicated this hypothesis was not supported by the data. Instead, a significant relation existed between career decision-making self-efficacy and career certainty after all other variables have been accounted for in the model; objective occupational knowledge does not significantly relate to either variable.

Hypothesis 2 predicted career exploration activities would partially mediate the relation between career decision-making self-efficacy and objective occupational knowledge. Path analysis results indicated this hypothesis was not supported by the data. Objective occupational knowledge did not significantly relate to either variable; though career decision-making self-efficacy did have a significant direct effect on career exploration activities.

Hypothesis 3 predicted interest congruence would partially mediate the relation between objective occupational knowledge and career certainty. Path analysis results indicated this partial mediation hypothesis was not supported by the data. Results suggested objective occupational knowledge and interest congruence were significantly related; though neither had a significant relation with career certainty.

Finally, Hypothesis 4 predicted objective occupational knowledge would partially mediate the relation between career decision-making self-efficacy and perceived occupational knowledge. Path analysis results indicated this hypothesis was also not supported by the data. A significant direct effect of career decision-making self-efficacy on perceived occupational knowledge was found; though the indirect effect of career decision-making self-efficacy on perceived occupational knowledge through objective occupational knowledge was not significant.

### **Relation of Occupational Knowledge to Career Certainty**

One flaw in the existing occupational knowledge literature is the difficulty in accurately and adequately measuring occupational knowledge specific to careers individuals are actively pursuing. Work Activity Importance Profiles (WAIP) based on O\*NET data were introduced as a possible solution to the pervasive measurement problem that has thus far impeded vocational psychologists' abilities to understand how knowledge plays a role in career decision-making. While it remains uncertain whether the present study's methodology validly measures true occupational knowledge, a few specific pieces of evidence support its use in assessing this construct. First, while its analysis required more preparation than most assessment methods, the WAIP allowed for investigation of participants' knowledge specific to the careers they were actively pursuing at the time rather than their knowledge of the "working world" (e.g., Creed et al., 2007), general clusters of careers (e.g., Job Knowledge Survey; Loesch, 1977), stereotypical careers (e.g., Career Maturity Inventory; Crites, 1978), or their self-estimated knowledge (e.g., Career Development Inventory; Super et al., 1981). Second, the WAIP focused on 41 work activities that were applicable to some degree across all careers. Participants were forced to consider the daily experience of the careers they were pursuing rather than superficial,

stereotypical information they had gained. Third, convergent validity was achieved through its relation to interest congruence. Career decision-making models (e.g., Hirschi & Lage, 2007) and vocational interest theory (e.g., Holland, 1997) both suggest increased knowledge of the career one is pursuing would lead one to determine whether it is a good fit. Fit, in this case, is determined by the congruence between one's vocational interests and the interests fulfilled by the career he or she is pursuing. The present study found that objective occupational knowledge, measured by the WAIP, correlated .20 with interest congruence, measured by Holland's (1997) theory of vocational interests and O\*NET data. This finding indicated that degree of occupational knowledge was modestly related to the degree to which participants were pursuing careers congruent with their vocational interests. Both of these constructs have been weakly to moderately related to job satisfaction in past research (e.g., Thomas & Bruning, 1984; Tranberg et al., 1993). Finally, the lack of a meaningful relation of objective occupational knowledge to perceived occupational knowledge is striking, especially because perceived occupational knowledge had a moderate correlation to career decision-making self-efficacy. This finding provides discriminant validity for the WAIP: participants' commitment to career decisions appears to be influenced in part by perceptions of their decision-making abilities and knowledge rather than being rooted in actual knowledge. This finding is consistent with the idea that efficacy beliefs can influence behavior (Bandura, 1977).

If one considers the WAIP to be an adequate measure of objective occupational knowledge, the full model predicting career certainty can be discussed. The present study found career certainty to significantly relate to career decision-making self-efficacy, reported career exploration activities, and perceived occupational knowledge. Upon examining the direct and indirect effects of the recursive path model predicting career certainty, the significant direct

effects of career decision-making self-efficacy and perceived occupational knowledge remain, though muted. Significant indirect effects were found as well; specifically, career decision-making self-efficacy through perceived occupational knowledge, career decision-making self-efficacy through both career exploration activities and perceived occupational knowledge, and career exploration activities through perceived occupational knowledge. The full model had a medium effect on career certainty (Cohen, 1992), explaining 27.4% of the variance. Notably, neither objective occupational knowledge nor interest congruence significantly contributed to the prediction of career certainty, directly or indirectly. Interestingly, the zero-order relation between career exploration activities and career certainty was almost fully mediated by perceived occupational knowledge; though career exploration activities did have a small significant indirect effect through perceived occupational knowledge. This result suggests actual participation in career exploration activities partially accounts for levels of perceived occupational knowledge, which in turn drives beliefs about career certainty. Results also suggest career decision-making self-efficacy plays a large role in driving the model.

These results make conceptual sense if career certainty is looked at through the lens of career decision-making self-efficacy theory (Taylor & Betz, 1983). Higher career decision-making self-efficacy may lead individuals to approach new or threatening situations with the belief they will be able to cope successfully, while lower career decision-making self-efficacy may result in avoidant behavior leading to preference for the familiar and safe instead of the new and uncertain (Bandura, 1997; Betz, 2004; Betz & Hackett, 1981; Lent et al., 1994; Taylor & Betz, 1983). Career exploration and making career decisions are certainly new and uncertain situations, of which college students are the determinant of success. That level of responsibility

may be perceived as exciting or terrifying depending on the levels of career decision-making self-efficacy students have achieved thus far in their lives.

What is concerning based on results from the present study is the lack of influence objective occupational knowledge has on career certainty. It appears that, in general, college students are making career decisions in part based on career decision-making self-efficacy and perceived occupational knowledge; relying on *beliefs* of success and achievement and eschewing any need for objective proof. Likely, this behavior will not have catastrophic consequences for most students once they finish their education and begin working; though for some overconfident individuals, entering the working world may be more difficult than anticipated. Their lack of previous knowledge may become apparent and they may or may not feel satisfied with the choices they made. This latter scenario is supported by current rates of job dissatisfaction in the general working population, which was estimated at a striking 52.8% in 2011 (Ray & Rizzacasa, 2012). Of course, this rate included individuals working in all job levels, not just college graduates. However, even if the dissatisfaction rate were to drop to 20% for college graduates alone, it may signal that university programs and professionals are overlooking the need to guide students toward informed, thoughtful career decisions.

An additional group of students also deserves some attention in light of these findings: students who appear to be taking a cautious approach to career decision-making. While these students may be taking a more thoughtful, guarded approach to career decisions than their overconfident counterparts, they likely experience some of their own unique struggles. Specifically, these cautious students may be dealing with greater current distress resulting from worries or fears about their futures, and low confidence or self-esteem. The overconfident students may be at greater risk of setting themselves up for *future* distress in the form of job

dissatisfaction, career changes, or potentially depressive symptoms due to the lack of personal fulfillment provided by their jobs. In contrast, the cautious students may be experiencing similar levels of distress *currently*; adding to their difficulty making a career decision. Both of these groups should be the focus of attention from university professionals and academic major program personnel in order to preemptively remedy potential effects of poor career decision-making.

### **Conclusions & Implications**

In an attempt to improve assessment of objective occupational knowledge in college students, the present study utilized the Work Activities Importance Profile in tandem with five variables to predict career certainty. Importantly, objective occupational knowledge of participants' chosen careers significantly related to interest congruence; however, neither variable significantly contributed to variance in career certainty. Results indicated career decision-making self-efficacy largely drives participation in career exploration activities and perceived occupational knowledge, and all three variables contribute to the prediction of career certainty through direct or indirect effects. This study was the first to objectively assess college students' knowledge of the careers they were actively pursuing, and the first to examine that construct along with career decision-making self-efficacy, participation in career exploration activities, perceived occupational knowledge, interest congruence, and career certainty in a large college student sample ( $N = 316$ ).

If the results of this study are truly reflective of career decision processes being utilized by college students, the implications would be widespread and compel universities to respond accordingly. Results suggest college students are determining their career certainty in part based on perceptions of career decision-making ability and perceived knowledge of chosen careers

instead of on objective evidence. These students should be encouraged to seek out real-world experiences of the careers they are pursuing as a way of confirming decisions or doubts.

University officials should also be encouraging students to assess and understand their reasons for choosing and persisting in academic major programs, and providing resources to help guide them through this process in a thoughtful and comprehensive way. Career counseling and exploration services should be emphasized as important aids in making good career decisions (i.e., based on accurate and comprehensive knowledge, and interest congruence), and utilized more often than not by students *before* they are allowed to commit to a degree program. These practices would likely result in greater proportions of students graduating with majors they can be confident will lead them to satisfying careers. The alternative, it seems, is that students may be navigating through external pressures in the form of expectations from parents and society, financial debt, and timeliness in degree completion, that are making them persist in somewhat incongruent major programs or experience distress related to paralyzing indecision. Neither of these scenarios is ideal; further research should be conducted to understand the process and experience of college students in order to best prepare them for lives in the working world.

### **Limitations**

The limitations in the present study are largely related to the assessment of objective occupational knowledge. This was the first time O\*NET's work activity profiles were used in research for the purpose of measuring participants' levels of knowledge about careers they were actively pursuing. While evidence for the validity of this measure was presented earlier in this section, it remains a new method of measurement and, thus, its validity and reliability remain speculative. Furthermore, participants' free responses indicating which career each one was actively pursuing had to be qualitatively matched to O\*NET's career titles. While some career

title matches were obvious (e.g., “accountant”), others were subject to judgment by the author and her major professor (e.g., “FBI” became “Criminal Investigators and Special Agents”). The O\*NET also did not have data for every career indicated by participants (e.g., military officer). Future research utilizing this assessment method may consider providing O\*NET career titles for participants to choose from rather than allowing free-responses. Additionally, the Career Certainty Scale was adapted by the author from a previous scale (Osipow et al., 1976), and the Perceived Occupational Knowledge Scale and the Career Exploration Checklist were created by the author for use in the present study. Notably, however, reliability in the form of coefficient alpha was acceptable for all these scales.

An additional important limitation is related to the present study’s sample. Participants were recruited from a large Midwestern university, which resulted in a sample of mostly European American students; only 19.6% of the sample identified belonging to an ethnic group other than the majority. This limitation requires that the present study’s results be interpreted with caution, as they may not be applicable to more ethnically-diverse samples.

### **Future Directions**

Given the present study was the first of its kind in many respects, future researchers can build off of its findings in various ways. Initially, further research should be done using the Work Activity Importance Profiles in order to determine its reliability and validity. In contrast, other forms of objective occupational knowledge could be examined that may provide more proximal assessments of college student knowledge (e.g., testing knowledge of one’s academic major, comparing personal work values to those fulfilled by careers-of-interest), thus providing a more accurate picture of their occupational knowledge. Career certainty is certainly a piece of the

career decision-making process that could use additional research. Variables in the present study only explained 27.4% of the variance in career certainty, leaving the majority unexplained.

Types of careers being pursued by college students could provide additional information regarding the process of career decision-making. Prestige, aspiration levels, job availability, social exposure, and prospective financial rewards, among others, could be influencing students to pursue careers rather than job details, activities, and interest congruence. Overall, it appears that the career decision process in college students is complex and in need of further research. Vocational researchers, with the help of universities, should be focusing on guiding college students toward thoughtful career decisions in hopes of ultimately maximizing future job satisfaction.

Future research should also examine the present study's findings in relation to more diverse groups of students in terms of ethnicity and year in school. Examining students longitudinally or an equal amount of students in their freshman through senior years would be important in order to determine the nature of career certainty and interest congruence over time. In addition, longitudinal research could shed light on the utility of career certainty in predicting major at graduation or behavior after graduation, and whether students gravitate toward more congruent careers over the course of their educations.

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## APPENDIX A

### Demographics Questionnaire

Age: \_\_\_\_\_

Gender:      Male  
                Female  
                Other

Ethnicity:     Asian American/Pacific Islander  
                  Arab American  
                  Caucasian/White  
                  Native American  
                  Black/African American  
                  Latino/a American  
                  Biracial \_\_\_\_\_  
                  International Student  
                  Other: \_\_\_\_\_

Year in school:     First  
                       Second  
                       Third  
                       Fourth  
                       Fifth  
                       Sixth  
                       Graduate Student

Have you declared your major? YES / NO

If YES, what is it? \_\_\_\_\_  
 If NO, what major are you considering? \_\_\_\_\_

What career are you currently considering pursuing? \_\_\_\_\_

What is the education level required for that career?

High school degree  
 Bachelor's degree  
 Master's degree  
 Doctoral degree (e.g., PhD, MD, JD)

## APPENDIX B

Work Activity Importance Profile: O\*NET Detailed Work Activities  
 (National Center for O\*NET Development, 2003)

Not Important	Somewhat Important	Important	Very Important	Extremely Important
1	2	3	4	5

- 1 **Getting Information:** Observing, receiving, and otherwise obtaining information from all relevant sources.
- 2 **Identifying Objects, Actions, and Events:** Identifying information by categorizing, estimating, recognizing differences or similarities, and detecting changes in circumstances or events.
- 3 **Monitoring Processes, Materials, or Surroundings:** Monitoring and reviewing information from materials, events, or the environment, to detect or assess problems.
- 4 **Inspecting Equipment, Structures, or Materials:** Inspecting equipment, structures, or materials to identify the cause of errors or other problems or defects.
- 5 **Estimating the Quantifiable Characteristics of Products, Events, or Information:** Estimating sizes, distances, and quantities; or determining time, costs, resources, or materials needed to perform activity.
- 6 **Judging the Qualities of Objects, Services, or People:** Assessing the value, importance, or quality of things or people.
- 7 **Evaluating Information to Determine Compliance with Standards:** Using relevant information and individual judgment to determine whether events or processes comply with laws, regulations, or standards
- 8 **Processing Information:** Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data.
- 9 **Analyzing Data or Information:** Identifying the underlying principles, reasons, or facts of information by breaking down information or data into separate parts.
- 10 **Making Decisions and Solving Problems:** Analyzing information and evaluating results to choose the best solution and solve problems.
- 11 **Thinking Creatively:** Developing, designing, or creating new applications, ideas, relationships, systems, or products, including artistic contributions.
- 12 **Updating and Using Relevant Knowledge:** Keeping up-to-date technically and applying new knowledge to your job.

- 13 **Developing Objectives and Strategies:** Establishing long-range objectives and specifying the strategies and actions to achieve them.
- 14 **Scheduling Work and Activities:** Scheduling events, programs, and activities, as well as the work of others.
- 15 **Organizing, Planning, and Prioritizing Work:** Developing specific goals and plans to prioritize, organize, and accomplish your work.
- 16 **Performing General Physical Activities:** Performing physical activities that require considerable use of your arms and legs and moving your whole body, such as climbing, lifting, balancing, walking and handling of materials.
- 17 **Handling and Moving Objects:** Using hands and arms in handling, installing, positioning, moving materials, and manipulating things.
- 18 **Controlling Machines and Processes:** Using either control mechanisms or direct physical activity to operate machines or processes (not including computers or vehicles).
- 19 **Working with Computers:** Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.
- 20 **Operating Vehicles, Mechanized Devices, or Equipment:** Running, maneuvering, navigating, or driving vehicles or mechanized equipment, such as forklifts, passenger vehicles, aircraft, or water craft
- 21 **Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment:**  
Providing documentation, detailed instructions, drawings, or specifications to tell others about how devices, parts, e or structures are to be fabricated, constructed, assembled, modified, maintained, or used.
- 22 **Repairing and Maintaining Mechanical Equipment:** Servicing, repairing, adjusting, and testing machines, devices, moving parts, and equipment that operate primarily on the basis of mechanical (not electronic) principles.
- 23 **Repairing and Maintaining Electronic Equipment:** Servicing, repairing, calibrating, regulating, fine-tuning, or testing machines, devices, and equipment that operate primarily on the basis of elect electronic (not mechanical) principles.
- 24 **Documenting/Recording Information:** Entering, transcribing, recording, storing, or maintaining information in written or electronic/magnetic form.
- 25 **Interpreting the Meaning of Information for Others:** Translating or explaining what information means and how it can be used.

- 26 Communicating with Supervisors, Peers, or Subordinates:** Providing information to supervisors, coworkers, and subordinates by telephone, in written form, e-mail, or in person.
- 27 Communicating with People Outside the Organization:** Communicating with people outside the organization, representing the organization to customers, the public, government, and other external source information can be exchanged in person, in writing, or by telephone or e-mail.
- 28 Establishing and Maintaining Interpersonal Relationships:** Developing constructive and cooperative working relationships with others, and maintaining them over time.
- 29 Assisting and Caring for Others:** Providing personal assistance, medical attention, emotional support, or other personal care to others such as coworkers, customers, or patients.
- 30 Selling or Influencing Others:** Convincing others to buy merchandise/goods or to otherwise change their minds or actions.
- 31 Resolving Conflicts and Negotiating with Others:** Handling complaints, settling disputes, and resolving grievances and conflicts, or otherwise negotiating with others.
- 32 Performing for or Working Directly with the Public:** Performing for people or dealing directly with the public. This includes serving customers in restaurants and stores, and receiving clients or guests.
- 33 Coordinating the Work and Activities of Others:** Getting members of a group to work together to accomplish tasks.
- 34 Developing and Building Teams:** Encouraging and building mutual trust, respect, and cooperation among team members.
- 35 Training and Teaching Others:** Identifying the educational needs of others, developing formal educational or training programs or classes, and teaching or instructing others.
- 36 Guiding, Directing, and Motivating Subordinates:** Providing guidance and direction to subordinates, including setting performance standards and monitoring performance.
- 37 Coaching and Developing Others:** Identifying the developmental needs of others and coaching, mentoring, or otherwise helping others to improve their knowledge or skills.
- 38 Providing Consultation and Advice to Others:** Providing guidance and expert advice to management or other groups on technical, systems-, or process-related topics.
- 39 Performing Administrative Activities:** Performing day-to-day administrative tasks such as maintaining information files and processing paperwork.

40 **Staffing Organizational Units:** Recruiting, interviewing, selecting, hiring, and promoting employees in an organization.

41 **Monitoring and Controlling Resources:** Monitoring and controlling resources and overseeing the spending of money.

What career did you have in mind while you were rating the importance of those activities?

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## APPENDIX C

### Occupation Work Activity Importance Profile Example: The top six work activities for accounting

90 ━━━━━━ **Interacting With Computers** — Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.



89 ━━━━━━ **Processing Information** — Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data.



86 ━━━━━━ **Getting Information** — Observing, receiving, and otherwise obtaining information from all relevant sources.



83 ━━━━━━ **Evaluating Information to Determine Compliance with Standards** — Using relevant information and individual judgment to determine whether events or processes comply with laws, regulations, or standards.



75 ━━━━━━ **Organizing, Planning, and Prioritizing Work** — Developing specific goals and plans to prioritize, organize, and accomplish your work.



74 ━━━━━━ **Analyzing Data or Information** — Identifying the underlying principles, reasons, or facts of information by breaking down information or data into separate parts.



## APPENDIX D

Perceived Occupational Knowledge Scale  
(Pesch, 2014a)

Please respond to the following statements about the career you listed earlier in the survey.

Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6

1. I have a good understanding of the daily activities that will be involved in this job.
2. I do not know what I will be doing on a daily basis in this job.
3. I know the types of work activities I will be required to do in this job.

## APPENDIX E

**Career Certainty Scale**  
 (Adapted from Osipow, Carney, & Barak, 1976)

Please respond to the following statements about the career you listed earlier in the survey.

Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6

1. I am certain that this is the career I want when I finish my education.
2. I definitely want to pursue this career.
3. I have decided this is the career I am most interested in pursuing.

## APPENDIX F

### Career Decision Self-Efficacy Scale (Taylor & Betz, 1983)

**INSTRUCTIONS:** For each statement below, please read carefully and indicate how much confidence you have that you could accomplish each of these tasks by marking your answer according to the following 5-point continuum. Mark your answer by filling in the correct circle on the answer sheet.

NO CONFIDENCE AT ALL	VERY LITTLE CONFIDENCE	MODERATE CONFIDENCE	MUCH CONFIDENCE	COMPLETE CONFIDENCE
1	2	3	4	5

#### HOW MUCH CONFIDENCE DO YOU HAVE THAT YOU COULD:

1. List several majors that you are interested in.
2. Use the internet to find information about occupations that interest you.
3. Select one major from a list of potential majors you are considering.
4. Make a plan of your goals for the next five years.
5. Determine the steps to take if you are having academic trouble with an aspect of your chosen major.
6. Accurately assess your abilities.
7. Find information about companies who employ people with college majors in English.
8. Select one occupation from a list of potential occupations you are considering.
9. Determine the steps you need to take to successfully complete your chosen major.
10. Persistently work at your major or career goal even when you get frustrated.
11. List several occupations that you are interested in.
12. Find information about educational programs in engineering.
13. Choose a career that will fit your preferred lifestyle.
14. Prepare a good resume.
15. Change majors if you did not like your first choice.
16. Determine what your ideal job would be.
17. Talk to a faculty member in a department you are considering for a major.
18. Make a career decision and then not worry about whether it was right or wrong.
19. Get letters of recommendation from your professors.
20. Change occupations if you are not satisfied with the one you enter.
21. Decide what you value most in an occupation.
22. Ask a faculty member about graduate schools and job opportunities in your major.
23. Choose a major or career that your parents do not approve of.
24. Get involved in a work experience relevant to your future goals.
25. Resist attempts of parents or friends to push you into a career or major you believe is beyond your abilities.
26. Figure out whether you have the ability to successfully take math courses.
27. Describe the job duties of the career/occupation you would like to pursue.

28. Choose a career in which most workers are the opposite sex.
29. Find and use the Placement Office on campus.
30. Move to another city to get the kind of job you really would like.
31. Determine the academic subject you have the most ability in.
32. Find out the employment trends for an occupation in the next decade.
33. Choose a major or career that will fit your interests.
34. Decide whether or not you will need to attend graduate or professional school to achieve your career goals.
35. Apply again to graduate school after being rejected the first time.
36. Determine whether you would rather work primarily with people or with information.
37. Find out about the average yearly earnings of people in an occupation.
38. Choose a major or career that will suit your abilities.
39. Plan course work outside of your major that will help you in your future career.
40. Identify some reasonable major or career alternatives if you are unable to get your first choice.
41. Figure out what you are and are not ready to sacrifice to achieve your career goals.
42. Talk with a person already employed in the field you are interested in.
43. Choose the best major for you even if it took longer to finish your college degree.
44. Identify employers, firms, institutions relevant to your career possibilities.
45. Go back to school to get a graduate degree after being out of school 5-10 years.
46. Define the type of lifestyle you would like to live.
47. Find information about graduate or professional schools.
48. Choose the major you want even though the job market is declining with opportunities in this field.
49. Successfully manage the job interview process.
50. Come up with a strategy to deal with flunking out of college.

## APPENDIX G

### Career Exploration Checklist (Pesch, 2014b)

Please indicate whether or not you have used the following methods to gain information about the career you chose for this survey.

Never	Once	More than once
0	1	2

1. Searched the internet to learn about this career
2. Read about the career somewhere other than the internet
3. Talked with a family member who is employed in this career
4. Talked with a friend who is pursuing this career
5. Talked with a professor or graduate student about this career
6. Talked with an academic advisor about this career
7. Talked with someone who is employed in the career about the career
8. Did an informational interview with someone about this career
9. Job shadowed someone who is employed in the career
10. Did an internship or job related to the career
11. Did an externship with someone related to this career
12. Did volunteering related to the career
13. Attended a career or job fair
14. Attended a presentation about this career or this career field
15. Attended a meeting sponsored by a student organization related to this career
16. Took a career course related to this career
17. Talked to a career counselor about options

## APPENDIX H

### O\*NET Interest Profiler – Short Form (Rounds, Su, Lewis, & Rivkin, 2010)

Below are 60 questions about work activities that some people do on their jobs. Please read each question carefully and decide how you would feel about doing each type of work:

Strongly dislike				Strongly Like
	0	1	2	3
				4

#### **Realistic Items**

- 1. Build kitchen cabinets
- 18. Lay brick or tile
- 19. Repair household appliances
- 20. Raise fish in a fish hatchery
- 21. Assemble electronic parts
- 22. Drive a truck to deliver packages to offices and homes
- 23. Test the quality of parts before shipment
- 24. Repair and install locks
- 25. Set up and operate machines to make products
- 26. Put out forest fires

#### **Investigative Items**

- 1. Develop a new medicine
- 2. Study ways to reduce water pollution
- 3. Conduct chemical experiments
- 4. Study the movement of planets
- 5. Examine blood samples using a microscope
- 6. Investigate the cause of a fire
- 7. Develop a way to better predict the weather
- 8. Work in a biology lab
- 9. Invent a replacement for sugar
- 10. Do laboratory tests to identify diseases

#### **Artistic Items**

- 1. Write books or plays
- 2. Play a musical instrument
- 3. Compose or arrange music
- 4. Draw pictures
- 5. Create special effects for movies
- 6. Paint sets for plays
- 7. Write scripts for movies or television shows
- 8. Perform jazz or tap dance
- 9. Sing in a band

10. Edit movies

**Social Items**

1. Teach an individual an exercise routine
2. Help people with personal or emotional problems
3. Give career guidance to people
4. Perform rehabilitation therapy
5. Do volunteer work at a non-profit organization
6. Teach children how to play sports
7. Teach sign language to people with hearing disabilities
8. Help conduct a group therapy session
9. Take care of children at a day-care center
10. Teach a high-school class

**Enterprising Items**

1. Buy and sell stocks and bonds
2. Manage a retail store
3. Operate a beauty salon or barber shop
4. Manage a department within a large company
5. Start your own business
6. Negotiate business contracts
7. Represent a client in a lawsuit
8. Market a new line of clothing
9. Sell merchandise at a department store
10. Manage a clothing store

**Conventional Items**

1. Develop a spreadsheet using computer software
2. Proofread records or forms
3. Load computer software into a large computer network
4. Operate a calculator
5. Keep shipping and receiving records
6. Calculate the wages of employees
7. Inventory supplies using a hand-held computer
8. Record rent payments
9. Keep inventory records
10. Stamp, sort, and distribute mail for an organization