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THE DESIGN AND DEVELOPMENT OF A SURVEY INSTRUMENT TO MEASURE FACTORS THAT INFLUENCE CHOICE GOALS OF FORENSIC SCIENCE MAJORS

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A THESIS APPROVED FOR THE
DEPARTMENT OF INSTRUCTIONAL LEADERSHIP AND ACADEMIC CURRICULUM

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Dedication

I dedicate this thesis to my two endless support systems—Roberta Steinmetz and Michael "Tony" Vladovich. Mom, thank you for supporting my academic goals from the day I threw my first tantrum at age two, not for candy or a toy, but to go to school. Your support, encouragement, and guidance since that day have created a life-long learner that is constantly in the pursuit of knowledge. I hope to instill the same love of learning in my children one day that you instilled in me. Tony, thank you for your day in and day out support throughout this process. You have believed in me when I did not believe in myself and encouraged me to keep going when I was ready to give up. I could not have done this without either of you, and I will always be grateful for your love and support.

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Abstract

Colleges and universities are encouraged to strengthen forensic science programs to combat that shortage of highly educated and trained forensic scientists entering the field. To meet these demands and expectations, post-secondary institutions would benefit by knowing which students are selecting this career path and why. The purpose of this study was to design a reliable and valid survey instrument that measures factors which may influence students' decisions to major in forensic science.

The survey instrument contained four sections and was administered to 106 college students enrolled in an introductory forensic science course. In section one, students were found to have high self-efficacy in tasks and skills associated with the field. In section two, students possessed high outcome expectations for their futures if pursuing a degree in forensics. In section three, students had average realistic, investigative, and enterprising interests, above average artistic and conventional interests, and below average social interests. In section four, students identified a variety of contextual supports and barriers that affected their decisions to major in forensic science. The sections measuring self-efficacy, outcome expectations, and interests were found to be reliable and valid with minor or no modifications, while the section measuring contextual supports and barriers was not. A new section measuring contextual supports and barriers was designed and provided. Conducting additional pilot studies to confirm the reliability and validity within all sections is recommended.

Keywords: *forensic science, Social Cognitive Career Theory, survey development*

Chapter 1: Introduction

Forensic science, or the application of science to crime and law, has developed with human discovery and understanding of the sciences over time (Tilstone, Savage, & Clark, 2006). While the use of forensic science has been documented since the 5th century and possibly before this time, forensic science, as we know it today, began to flourish in the 18th and 19th centuries (Fraser & Williams, 2009). Autopsies and Bertillon measurements, which are anatomical measurements believed to be unique to an individual, paved the way for fingerprinting, toxicology, microscopic comparisons, and most recently, DNA analysis (Houck & Siegel, 2010). Forensic science has evolved into a broad and interdisciplinary field that now includes laboratory scientists, expert practitioners, and law enforcement agents working together to provide the collection, analysis, and interpretation of evidence related to a particular crime (Ramsland, 2014).

In the past 20 years, forensic science has become a central and often necessary component in solving crimes and prosecuting offenders (Julian et al., 2011). Because of the increasing importance of forensic science in the criminal justice system, the greatest challenges currently facing the field are a shortage in workforce, education, and training for new forensic scientists (National Institute of Justice, 2006). In 2009, the National Research Council (NRC) released *Strengthening Forensic Science in the United States: A Path Forward*, a national report analyzing the current field of forensic science and the steps necessary for positive growth in the field. From this report, the National Institute of Forensic Science (NIFS) was formed. The NIFS was established to bring a governing body to the growing field of forensic science and provide national standards

and best practices that previously did not exist. The NRC also agreed that many experts in the field of forensics lacked sufficient education and training. Under the guidance and accreditation standards set forth by the new NIFS, colleges and universities across the country were encouraged to strengthen undergraduate and graduate programs by providing "rigorous interdisciplinary education and training… based on established scientific knowledge, principles, and practices" (National Research Council, 2009, p. 27).

The issue of a shortage in well-educated forensic scientists may be related to an overall shortage in students choosing to major in science, technology, engineering, or mathematics (STEM) across the United States. The National Center for Education Statistics found that only about 28 percent of students declared a major in STEM when entering college (Chen, 2013). Of those 28 percent of students, almost half—48 percent—either changed their major or dropped out of college. Due to the increased need for well-educated and well-prepared individuals in the STEM workforce, and to maintain the status as an international leader in STEM advancements, it has become a national priority over the last decade to increase the number of qualified graduates in STEM (National Science Board, 2007).

The President's Council of Advisors on Science and Technology (2010) sought ways to encourage students to pursue STEM careers through preparation and inspiration. Their recommendations included developing rigorous national standards in mathematics and science, hiring highly qualified science teachers, increasing the availability of technology in the classroom, and providing novel experiences both in and outside of the classroom. Studies have found a high correlation between educational

opportunities and the decision to select a STEM major in college (Astin & Astin, 1992; Maltese, Melki, & Wiebke, 2014; Maltese & Tai, 2011). Most commonly, students who take additional or advanced mathematics and science courses in high school are more likely to major in STEM (Bottia, Stearns, Mickelson, Moller, & Parker, 2015; Maple & Stage, 1991; Wang, 2013). According to the cited literature, fostering interest in the STEM fields from a young age, encouraging students to participate in scientific and inquiry-based extracurricular activities, and promoting enrollment in additional STEM courses in high school may potentially have a positive effect on a student's choice to major in STEM in college.

Despite efforts made to provide STEM opportunities for students at the primary, secondary, and post-secondary levels, other individual and contextual factors out of the control of schools or government programs play a role in a student's decision to major in STEM. Studies have found varying factors that influence the decision to major in the STEM field, including race, gender, socioeconomic status, motivation, personal relationships, and self-efficacy (Engberg & Wolniak, 2013; Heilbronner, 2011; Lichtenberger & George-Jackson, 2013; Mau, 2003; Microsoft Corporation, 2011; Miller & Kimmel, 2012; VanMeter-Adams, Frankenfeld, Bases, Espina, & Liotta, 2014; Wang, 2013). Additional studies have focused on how to attract more minority students and females into the STEM field that continues to be dominated by affluent, white males (Maple & Stage, 1991; Mau & Bikos, 2000; Schneider, Judy, & Mazuca, 2012). It is necessary to determine these non-academic factors, as well as academic factors, that affect students' college major decisions, so that efforts can be made to break down these barriers and increase enrollment in STEM fields.

While the U.S. Department of Homeland Security includes forensic science in the list of approved STEM degrees, others argue that its "interdisciplinary nature… has traditionally made it difficult to categorize" (Horton et al., 2013, p. 181). Career paths in forensic science can vary from the traditional laboratory setting of toxicology or DNA analysis to fieldwork, such as crime scene processing, which lacks the need for an education in the natural sciences. Because of the diversity within the field of forensics, the question arises whether the same factors affecting traditional STEM students in selecting a college major also apply to forensic science students. Differences in the roles these factors play on students' decisions could greatly affect how the issue of generating well-educated forensic scientists should be addressed.

The media has also played a major role in presenting forensic science as a unique career path in the STEM field (Jones & Bangert, 2006). Today, one can hardly turn on the television without scanning past crime shows like *CSI*, *NCIS*, or *Criminal Minds*. These shows glamorize the field of forensics by presenting the vast array of investigative techniques used to catch the criminal. Mainstream television has exposed the science behind a career that was once believed to be a job only for police officers and detectives. The increased interest in forensic science has led to more colleges across the country offering programs in an effort to produce highly educated and trained forensic scientists (Parker, 2007; Saidi, 2013).

While this glamorization by the media brings the benefit of heightened interest in forensic science, it also the increases misconceptions of the field (Baskin & Sommers, 2010; Deutsch & Cavender, 2008; Mopas, 2007; Perkins, 2004; Schweitzer & Saks, 2007). Most of the general population realizes that crimes cannot be solved in

an hour, but many do not consider the days, weeks, months, or years that can go into solving a case. These shows expose the public to a variety of forensic science techniques, but the actual science necessary behind the processing of evidence is often downplayed (Roane & Morrison, 2005). The one "scientist" on the show that instantly runs DNA, scans fingerprints, extracts evidence from digital devices, and pulls up a list of suspects is quite different from the real team of forensic scientists specializing in different areas of the field to provide a thorough analysis of each piece of evidence. The national interest in crime and forensic science is undeniable; for those pursuing a career in forensic science, there is question as to how much influence the media is having on major selection in college (Weaver, Salamonson, Koch, & Porter, 2012).

Problem Statement

Crime has been documented since the beginning of civilization and continues to be committed universally within societies (Bell, 2008; Levinson, 2002; Pyrek 2007). It often takes the efforts of well-educated and highly trained individuals working together in the field of forensic science to solve these crimes. As technology in the field continues to advance and spread throughout the country, more forensic scientists are needed to meet the growing demand for these individuals in laboratories and law enforcement agencies.

The Department of Labor projects a 27% increase in the number of forensic science laboratory technicians over the next ten years, compared to the national average of 7% across jobs as a whole (Bureau of Labor Statistics, 2016). In contrast, fieldwork positions like crime scene and death investigators, often conducted by police and detectives, are only expected to rise 4%. It is important to note, however, that there are

currently approximately 800,000 police jobs and only 14,000 forensic laboratory jobs in the United States. New forensic science programs are starting up across the country, at a rate of approximately 22 each year, to meet the current demand by students (Jackson, 2009). However, this rapid increase in growth is causing concern for a potentially negative shift in the demand for forensic scientists in the future. More knowledge about the students pursuing careers in forensic science and the factors that may influence their career choice goals may provide university programs with information to improve recruitment and retention efforts.

Background and Need

Five major career development theories have been adopted in the United States to help guide and counsel students in career determination (Leung, 2008). Of those five, Social Cognitive Career Theory (SCCT) focuses more on academic interest and choice (Lent, Brown, & Hackett, 1994). Lent and Brown (2006) further developed the core constructs of their theory that affect career-related choice behavior to include self-efficacy, outcome expectations, goals, interests, and contextual supports and barriers.

The various influences on students' selection to major in STEM, in general, have been investigated using SCCT and other career choice theories, but little research has focused on why students major in forensic science, in particular. Skills for Justice in the United Kingdom conducted a thorough study of the forensic science programs and their ability to produce highly educated forensic scientists in the country, including a brief survey on what factors and sources of information led students to pursue forensic science at a specific university (Hannis & Welsh, 2009). The findings from this study suggested the primary reasons students chose to major in forensic science were a

general interest in science, the ability to specialize in forensic science within the sciences, and the desire to become a forensic scientist upon graduation. Surprising, only a third of students cited media influence as their main motivation.

Horton et al. (2013) investigated Australian students' attitudes toward forensic science after being enrolled in a university program for this degree field, but the survey did not inquire into *why* students chose to major in forensic science initially. The only similar research conducted in the United States examined why individuals pursue and persist in careers in forensic science (Dawley, Houck, & Gupta, 2014). While providing a useful look into the demographics and the attraction to forensic science of current laboratory practitioners in the field, this study along with the others addressing forensic science and motivation, do not provide a clear picture of the demographics and attraction to forensic science of students choosing to pursue forensic science as a major.

The NRC and NIFS have recognized the need of forensic scientists in the United States and set forth standards to improve undergraduate and graduate programs, but universities still lack necessary research and data as to what kinds of students are currently attracted to forensic science and why they are attracted to this discipline. Once this information is available, universities and the industry can begin to make changes that specifically address the needs of the students pursuing the field.

Purpose of the Study

The purpose of this study was to design a reliable and valid survey instrument that measures factors which may influence students' decisions to major in forensic science.

Significance of the Study

Although forensics science is rising quickly in popularity, little research exists on forensic science as a major in higher education. Before programs can begin to be adapted to fit the needs of students and the field of forensic science, it is important to first have a reliable and valid survey tool to measure what kind of students choose to major in forensic science and what factors influence their choice. While the survey instrument may have no direct short- or long-term benefits to participants, it will provide benefits to the forensic science programs in which they are enrolled. Once a reliable and valid survey tool is available, studies can be conducted at colleges and universities across the country to guide the development of current and future programs in forensic science.

Definitions

Contextual Barriers: environmental obstacles that people believe will challenge their goals (Lent & Brown, 2006)

Contextual Supports: environmental, facilitative influences that people believe will assist their goals (Lent & Brown, 2006)

Goal: intention to participate in a specific activity or to produce a specific outcome (Bandura, 1986)

Interests: people's typical likes, dislikes, and indifferences toward different material or activities (Lent & Brown, 2006)

Non-STEM: acronym used for any field that does not fall under science, technology, engineering, or mathematics as defined by the National Science Foundation (Chen, 2013)

Outcome Expectations: beliefs about the consequences or benefits of performing specific behaviors (Lent & Brown, 2006)

Self-Efficacy: people's beliefs of their abilities to understand material or produce an action required to succeed (Bandura, 1986)

STEM: acronym used for any field in science, technology, engineering and mathematics as defined by the National Science Foundation (Chen, 2013)

Chapter 2: Review of Literature

Introduction

A projected increase in job availability and a current shortage of well-educated and well-trained employees in the field of forensic science presents national concern for the future of forensic investigation. The NRC (2009) believed the resolution to this shortage begins with quality educational programs at the post-secondary level. However, unlike other STEM fields, there is currently a large gap in the literature concerning the demographics of students attracted to the field of forensic science and the factors that influence their choices to major in forensic science in college. To better meet the demands and expectations of the field, post-secondary institutions would benefit by knowing what students are selecting these career paths and why. Once this foundational knowledge is obtained, programs can begin to modify their efforts in recruitment, academics, and retention in forensic science.

The literature review will address three areas related to the demographic characteristics and variables that play an important role in students' choices to major in STEM and non-STEM related forensic science disciplines. The first section will address the limited research related to significant variables that lead to interest in forensic science, with subsections reviewing the primary studies in this area. The second section will focus on the Social Cognitive Career Theory (SCCT), one of the predominant career theories used to measure constructs that affect academic interest and choice. The third section will present the model studies and research used to design a new survey instrument.

Limited Research in Forensic Science Education and Motivation

There exists a staggering gap in the literature on forensic science education at the collegiate level across the globe. While many institutions have researched how to integrate forensic science into a unit of study or lesson, little information is available concerning forensic science as its own area of study or degree program. To begin to fill this research gap, Hannis & Welsh (2009) along with Skills for Justice sought to collect information about forensic science programs across the United Kingdom (UK) and to investigate whether forensic science coursework at universities in the UK were actually producing more educated and qualified individuals for the workforce. This comprehensive study collected data from students, universities, and employers to determine the current status of forensic science education and make recommendations for improvement based on input and data from all three groups. To collect data, Hannis and Welsh utilized one-on-one semi-structured interviews with employers and certain professors and online surveys with students and other forensic science faculty.

To begin the study, researchers interviewed universities and employers to determine how each group felt about graduates in the forensic science. Universities felt they made a strong effort to prepare graduates for employment. While the job market continues to employ new graduates to fill openings, they find a large disparity in the quality of applicants and that many graduates lack basic job and laboratory skills. This deficiency in skills was found to be a widespread issue for all STEM graduates, and not just those in forensic science. The study also found that while students rated almost all forensic science coursework as very good or good and most departments met yearly to review course content, employers continued to feel that the forensic science programs

lacked hard science, appropriate techniques, and critical thinking. The government appears to be making an effort to address these issues with the implementation of various committees and a national STEM agenda. In forensic science, specifically, a regulator has been appointed to set educational, practitioner, and laboratory standards for both universities and employers (*Hansard*, 12 July 2007 col WS102).

While this information makes the field of forensic science in the UK seem bleak, researchers found that enrollment in forensic science programs across the UK grew 166% from 2002 to 2007. This is a dramatic increase, especially when compared to the 2% growth in overall STEM subjects during the same time. Also found to be unique to forensic science is the number of females pursuing this degree field. Researchers noted that enrollment overall in STEM fields in the UK was even between males and females; however, forensic science degree programs were found to have a ratio of 63% females to 37% males. The field also saw a 7% increase in non-white student enrollment, but like other STEM fields, forensic science currently continues to be dominated primarily by white students, with their enrollment making up almost 80% of students in these programs.

As part of the study, Hannis and Welsh sought to include a student perspective when investigating the current state of forensic science in the UK. In the online survey, forensic science students were asked to select which resources were used when choosing a college major. The majority of students used the Internet, although course related literature, educators, college tours, taster days, and family or friends were also commonly used to make a decision. Similarly, forensic science programs were found to invest their recruitment efforts primarily in open days, departmental websites, college

visits, course literature, and taster days. Students were also asked to select what factors influenced them to choose a degree in forensic science. General interest in studying science was the primary reason (71%), followed by the opportunity to specialize in forensic science (66%), and the prospect of becoming a forensic scientist upon graduation (65%). In contrast to other literature in the field, only one-third of students cited media coverage of forensic science as a reason why they selected this particular field. Only 19% utilized research into the career and degree requirements as an influence in selecting forensic science as a major. However, almost half of the respondents hoped to pursue a career in forensic science upon graduation. In addition to why students selected their major, they were asked to select factors that influenced their decision to apply to a specific university. Results showed that students primarily selected a university based on location, but that entry grade requirements, reputation of the major or department, facilities, reputation of the university overall, and course offerings were other major factors.

This multifaceted study is the first of its kind of the field of forensic science. It provided a very thorough look at forensic science programs in the UK from various perspectives by highlighting the disconnect between universities and employers and also briefly addressing student interest. However, this study is limited to the UK and cannot be generalized to the forensic science field as a whole. Additionally, student motivation was not truly addressed in this study, as reasoning for choosing forensic science as a major was reduced to one question on a survey.

Horton et al. (2013) sought to assess students' attitudes toward forensic science. The researchers consisted of forensic science educators at Australian universities who

served as an expert panel in the development of an instrument based on the affective domain of Bloom's Taxonomy of Learning (Krathwohl, 2002). To develop the draft instrument, the expert panel first established main themes and then continued through a series of refinement and modification phases using the Delphi method to create their final instrument. The main themes of the final survey instrument included television as a motivator, personal interest, perspective of forensic science as a science, and perspective of forensic science as a profession. Each theme was measured using multiple items with responses given using a 7-point Likert scale.

The final survey in the Horton et al. (2013) study focused more heavily on student perceptions about forensic science when starting a program and less on what motivated them to begin the program initially. The only motivator presented in the survey was television. And while television shows like *CSI*, *NCIS*, and *Criminal Minds* have been shown to play a major role in student motivation to pursue forensic science as a college major or career, they are not the only motivators (Hannis & Welsh, 2009; Jones & Bangert, 2006; Weaver, Salamonson, Koch, & Porter, 2012).

The Horton et al. (2013) study led to the creation and validation of the first instrument to measure forensic science students' attitudes toward the field, but no information has been published on whether the instrument has been used successfully. Another limitation results from the expert panel consisting solely of Australian forensic science educators. This survey would need additional review and validation before being used in other countries.

Theoretical Framework

There are multiple theoretical frameworks that attempt to explain different facets of motivation and career development (Leung, 2008). For this study, the Social Cognitive Career Theory (SCCT) was found to align most closely when attempting to design a reliable and valid instrument that identifies the demographic characteristics of STEM and non-STEM forensic science students and compares the variables that play an important role in students' decisions to major in STEM and non-STEM related forensic science disciplines. Lent, Brown, & Hackett (1994) developed the SCCT model to focus on the "issues of career entry and to the life periods (late adolescence and early adulthood) that are associated with preparation for, and implementation of, career choice" (p. 80-81). They found their theory to be applicable to both career and academic behavior, because "interests and skills developed during the school years ideally become translated into career selections—although social and economic factors frequently intervene" (p. 81).

Social Cognitive Career Theory was derived from Social Cognitive Theory (Bandura, 1986) and an integration of key similarities in the array of career theories. Researchers developed the three models of interest development, career choice, and performance to explain their theory of career development. Specifically relevant to this study is the career choice model, which explains the multiple variables that can affect a student's choice to major in a certain area of study. In this model, self-efficacy, outcome expectations, interests, and contextual supports and barriers all play a role in the development of choice goals, which then lead to the choice action of declaring a major (see Figure 1).

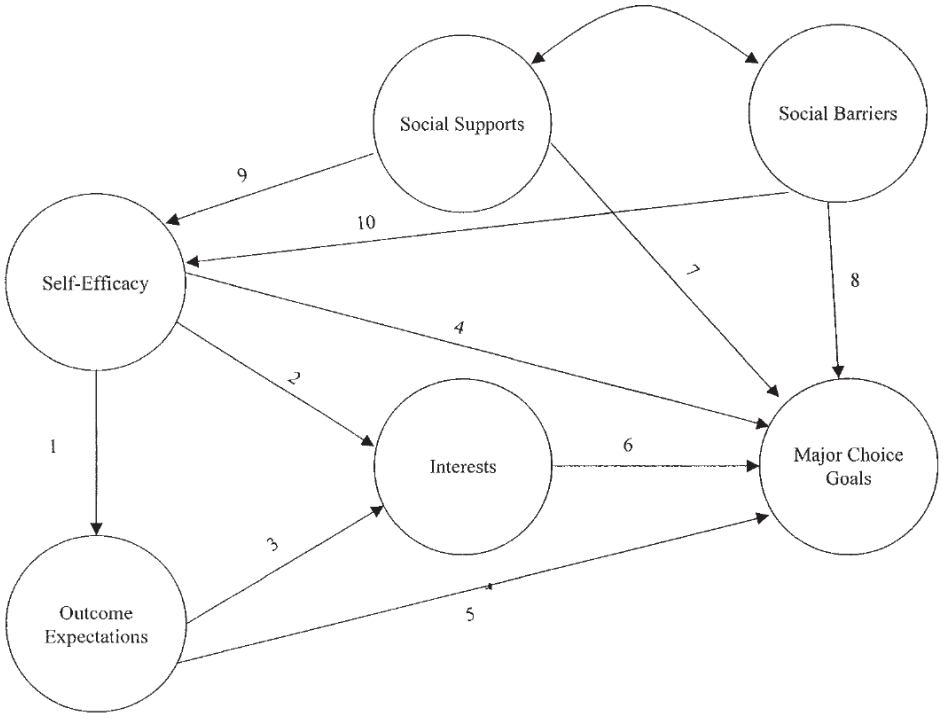

Figure 1. Path model depicting predictors of academic interest and choice goals according to social cognitive career theory. Reprinted from "Social Cognitive Predictors of Academic Interests and Goals in Engineering: Utility for Women and Students at Historically Black Universities," by R. W. Lent et al., 2005, *Journal of Counseling Psychology, 52*(1), p. 86. Copyright 2005 by the American Psychological Association.

Bandura (1986) defined *self-efficacy* as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance" (p. 391). Self-efficacy serves to determine a person's beliefs in their own abilities as well as their ability to perform when faced with challenges. It has been found that self-efficacy is relative to an area or subject, wherein self-efficacy may be high in one performance domain but low in another (Lent, Brown, & Hackett, 1994).

Outcome expectations are the "beliefs about the consequences or outcomes of performing particular behaviors" (Lent & Brown, 2006, p. 17). Outcome expectations often align with personal values, such as social, material, and self-evaluative outcomes (Bandura, 1986). According to SCCT, self-efficacy and outcome expectations work in conjunction to develop career interest. High self-efficacy and positive outcome expectations lead to interest in an area or subject.

Interests refer to "people's patterns of likes, dislikes, and indifferences regarding different activities" (Lent & Brown, 2006, p. 17). Individuals tend to develop interest in activities in which they are successful and receive positive results (Bandura, 1986). Holland (1959) designed a theory of vocational choice, which suggested that careers fall into six occupational environments. According to his theory, individuals possess a ranked "intrapersonal hierarchy" of these six occupational environments based on "preferred methods of dealing with daily problems… values and 'interests', preferences for playing various roles and avoiding others, interpersonal skills, and other personal factors" (p. 36). The independent findings from Holland, Bandura, and Lent and Brown confirm that individuals will begin to develop choice goals based on personal interests.

A *goal* is "the intention to engage in a particular activity or to produce a particular outcome" (Bandura, 1986, p. 17). Goals can include intentions, plans, or aspirations for the future. Developing goals increases the likelihood of engaging in choice actions, like declaring a major (Lent, Brown, & Hackett 1994). While self-efficacy and outcome expectations can lead to interests, and interests can lead to goals, and goals can lead to actions, each of these variables can act directly on action behavior.

Individual factors can strongly impact action behavior, but contextual factors play a role as well. *Contextual supports* are environmental, facilitative influences that people believe will assist their goals (Lent & Brown, 2006). Conversely, *contextual barriers* are environmental obstacles that people believe will challenge their goals (Lent & Brown, 2006). Contextual supports and barriers can be both real and perceived, with higher action behavior resulting from stronger supports and weaker barriers within an individual's environment (Lent, Brown, & Hackett, 1994).

The SCCT researchers developed several predictions and hypotheses related to their proposed theory. To test their predictions and hypotheses, a meta-analytic review of related research was conducted (Lent, Brown, & Hackett, 1994). Correlations among self-efficacy, outcome expectations, interests, choice goals, abilities, and performance were measured. All correlations were based on at least three studies and sample sizes within studies ranged from 339 to 1829. Results strongly supported the propositions and hypotheses related to the career choice model. Little research existed on contextual supports and barriers to validate this aspect of the theory, but multiple studies have since supported the roles of these contextual factors on choice action (Lent, Brown, & Hackett, 2000; Lent et al., 2001; Lent et al., 2003).

SCCT is a comprehensive career theory that integrates multiple individual and contextual factors that work together to develop interest, goals, and performance. This theoretical framework provided the foundation for the instrumentation development design of this study. The SCCT constructs of self-efficacy, outcome expectations, interests, and contextual supports and barriers were measured within the survey to

determine the effect these variables had on a student's choice to pursue a STEM or non-STEM forensic science degree.

Model Studies and Research

Because of significant gaps in the literature on forensic science education and limited published studies measuring the variables that influence students to pursue forensic science, a need exists for the development of a survey instrument that measures self-efficacy, outcome expectations, interests, and contextual supports and barriers on students' decisions to major in forensic science. To design the survey instrument for this study, three prior studies were used as models.

Self-efficacy and contextual supports and barriers.

Utilizing SCCT as a theoretical framework, Porter (2011) sought to determine the significant variables that lead students to major in engineering versus another area of physical science. A non-experimental, cross-sectional online survey made up of 64 items was given to 1076 freshman—911 majoring in engineering and 165 majoring in other areas of physical science. Survey items measured self-efficacy, outcome expectations, interests, and social supports and barriers to determine the influence of these variables on major choice. The survey yielded a response rate of 38%, with responses received from a total of 413 students. Descriptive statistics, as well as *t*-tests, Wilcoxon tests, and binomial logistical regression were used to analyze the data and compare results from the two populations of students.

Multiple variables were found to play a role in influencing students to major in engineering and physical science; however, three significant variables were found between the two degree options. Fathers or male guardians had more influence than

other family members, peers, mentors, or role models on students choosing to pursue an engineering degree. Self-efficacy and/or interest in mathematics and physics also played a stronger role for students choosing to major in engineering than they did for students majoring in another area of physical science. Furthermore, participation in engineering classes in high school through a program called *Project Lead the Way* played a significant role in students selecting engineering as a college major instead of another physical science major.

The study conducted by Porter provided important information for the university concerning what kind of students major in engineering and what motivates them to choose this path. Because this study was limited to one institution and lacked clear reliability and validity measurements, additional research at other institutions across the country or globe needs to be done to support and generalize these findings. The majority of students surveyed for the study were in-state, Caucasian males, so additional studies may also provide a more diverse population and therefore more diverse influences.

The structure of self-efficacy and contextual supports and barriers items used in Porter's survey were utilized but modified for the new survey instrument designed for this study. The items used to measure outcome expectations and interests could not be appropriately modified to apply to a survey measuring the variables that play an important role in students' decisions to major in forensic science disciplines. Therefore, additional research in the areas of outcome expectations and interests had to be consulted and reviewed to generate items to measure these constructs of SCCT.

Outcome expectations.

Similar to universities investing efforts into recruitment and retention, the job market must also know how to attract and keep highly educated and qualified individuals in the field of forensic science. And like forensic science education programs, it has been found that research involving forensic scientists themselves, and not what they do, is severely lacking (Dawley & Munyon, 2012).

Dawley, Houck, & Gupta (2014) conducted a survey with current forensic science practitioners to determine the attraction to the field and the desire to persist in this career choice. The survey created for this study was comprised of three sections: demographic information, reasons for attraction to the field, and reasons for retention in the field. To measure attraction to the field, participants were offered 12 possible reasons for the question "Why would someone pursue a career in the forensic sciences?" and asked to rank each reason using a 5-point Likert scale (p. 71). The scale ranged from Not Important (1) to Very Important (5). Participants were asked to follow the same procedures to measure retention in the field, using the question "Why do you stay in the forensic sciences?" (p. 72). The survey was e-mailed to 461 practicing forensic scientists across the United States, to which 65 individuals responded.

The survey results provided researchers with a screen shot of who is currently working in the field of forensic science, why they might have chosen this career, and what drives them to continue in this area. Almost all participants in the study identified as white, and slightly more than half of the individuals were female. The age ranges were variable, but over 40% of the individuals surveyed had worked in the field for over 20 years. The top five reasons for attraction to the field were overall enjoyment, self-

satisfaction, opportunity to make a difference, job stability, and conducting problem solving tasks. The top five reasons for staying in the field were interest, self-satisfaction, opportunity to make a difference, overall enjoyment, and job stability. Currently, most STEM fields are dominated by white males (Cassell & Slaughter, 2006). While the lack of racial diversity seems to include the field of forensic science, the female dominance in this field is something unique from other STEM careers (Houck, 2009). The most notable finding from the Dawley, Houck, and Gupta (2014) study was that the same aspects that attract individuals to the field are those that make them stay. Because the aspects that attract and retain individuals in the field of forensic science appear to be consistent over time, forensic science degree programs at the university level could benefit by considering these draws when determining recruitment and retention strategies.

While this study only surveyed a small number of the thousands of forensic scientists in the United States and did not include forensic scientists abroad, it provided a foundational study in another area of forensic science lacking research—practitioner motivation. Since these motivational aspects both attract and retain individuals in the field of forensic science, the findings from Dawley, Houck, and Gupta's research were utilized in this study to design items on the new survey instrument that measure outcome expectations of students majoring in forensic science.

Interests.

Countless career interest surveys can be found online or in career counseling offices to assist students and adults in finding the best major or career based on their interest (Rounds, Smith, Hubert, Lewis, & Rivkin, 1999). The U.S. Department of

Labor Employment & Training Administration funded the development of the O*NET Interest Profiler to provide additional "career guidance and research" in the area of occupational interest and information.

Researchers conducting this study chose to model the O*NET Interest Profiler on Holland's Vocational Choice Theory and RIASEC model (Holland, 1959, 1997). RIASEC stands for the six occupational environments or areas of interests described in the Vocational Choice Theory—Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C) (Rounds, Smith, Hubert, Lewis, & Rivkin, 1999). The O*NET Interest Profiler, a modified and expanded version of Holland's original survey, is made up of 60 items about job-related activities. Individuals are asked to rank their interest in the job-related activity on a 5-point Likert scale ranging from Strongly Dislike (1) to Strongly Like (5). Based on an individual's responses to the interest survey, scores are a reporting of the RIASEC letters in order from highest interest to lowest interest.

Following the creation of the O*NET Interest Profiler, Occupational Interest Profiles (OIPs) with numerical RIASEC scores were created for 12,748 careers by the Department of Labor Statistics (Rounds, Smith, Hubert, Lewis, & Rivkin, 1999). The popular and preferred incumbent method of generating occupational RIASEC scores based on a representative sample of workers in the field was not selected by the Department of Labor Statistics due to cost and time to generate these codes for all recorded occupations across the United States. Instead, empirical and judgment analyses were conducted by their researchers to develop the OIPs, and reliability, validity and economy of the two analyses were then compared. Empirical analysis

utilized occupational analysis data to generate RIASEC scores for each occupation. This was followed by judgment analysis, where trained judges were asked to assign RIASEC ordering to each occupation. Empirical analysis was the most successful method in assigning the primary area within the RIASEC code to a specific occupation, but judgment analysis provided the most accurate and thorough classification. The generated RIASEC scores were compared to previously established Holland codes, which supported the validity of this new method for creating OIPs or RIASEC scores for specific occupational units.

While the RIASEC scores for OIPs were numerical, they are easily converted to three letter codes or categories that can be compared to the first three letters of an individual's RIASEC code on the O*NET Interest Profiler. After completing the survey, individuals are given a list of careers that match their interests based on the first three letters of their personal RIASEC code. Occupations with a RIASEC code that matches the order of an individual's first three letters in their personal RIASEC code suggest the strongest occupational match based on interests, but all careers with the same first three letters (although possibly in different orders) are provided for consideration.

The U.S. Department of Labor Employment and Training Administration has developed RIASEC codes for the majority of forensic science careers, accessible through the O*NET Interest Profiler website. Because forensic science is such an interdisciplinary field, not every single forensic science career option has been given a RIASEC code. However, all but one forensic science profession (forensic psychiatrists) fall under the IRE (Investigative-Realistic-Enterprising), IRC (Investigative-Realistic-

Conventional) or ERI (Enterprising- Realistic-Investigative) codes, suggesting that most forensic careers will also fall into one of these three categories. Because of the reliability and validity of this instrument to determine career interest, the items on the O*NET Interest Profiler were utilized to measure interests on the new survey instrument designed for this study.

Chapter Summary

The number of students choosing to major in forensic science in college is growing rapidly, but little research has been conducted to determine what types of students are drawn to this field and what influences their decision. Hannis & Welsh (2009), working with Skills for Justice, began to fill the gap in the literature of forensic science education by providing a screen shot of forensic science programs across the United Kingdom. While the study was thorough and provided a wealth of information not previously investigated, it focused primarily on the relationships and conflicts between collegiate programs and the workforce. Some information was provided on student demographics, but only two survey items were dedicated to factors influencing one's choice to major in forensic science.

In contrast, Horton et al. (2013) investigated Australian students' attitudes toward forensic science. This study is one of few in forensic science education that moves the focus from the program and coursework to the student. However, this study focused on how students felt about forensic science once in the program and not on what motivated them initially to select this subject as a college major. While both of the previous studies recognize the importance of the student in forensic science education, their results do not focus on the action behavior to major in forensic science

and the influences on that academic choice. The results of these studies are also limited to their respective countries and cannot be generalized to students in the United States without further research.

Of the five major career theories, SCCT was selected as a theoretical framework for designing a survey instrument (a) to identify the demographic characteristics of STEM and non-STEM forensic science students and (b) to compare the variables that influence students' decisions to major in STEM and non-STEM related forensic science disciplines. SCCT, rooted in Social Cognitive Theory (Bandura, 1986) with integrations from other career development theories like Holland's Vocational Choice Theory (1959), utilizes the relationships between self-efficacy, outcome expectations, interests, and contextual supports and barriers to explain goals and action behavior. This theory can be applied to both careers and academics, making it ideal for investigating variables affecting college major choices.

A study conducted by Porter (2011) utilized SCCT to determine significant variables that affect the choice to major in engineering versus another area of physical science. The research and survey designed by Porter served as a model for designing items on self-efficacy and contextual supports and barriers for the new survey instrument used in this study.

The researcher did not find any studies that have been published on the types of students that major in forensic science in the United States or the influences that drive them to pursue a major in this field. Dawley, Houck, & Gupta (2014) conducted a survey in the United States on attraction to the field of forensics and the desire to persist in this career choice, but the study was conducted with professional forensic scientists,

not forensic science students. However, this study provided data could be applied to the creation of items on outcome expectations for the new survey instrument used in this study.

The U.S. Department of Labor Employment and Training Administration funded the design of a survey instrument to link job-related interests to careers based on Holland's Vocational Choice Theory and RIASEC model (Rounds, Smith, Hubert, Lewis, & Rivkin, 1999). Thousands of careers in the U.S. have been given a RIASEC code. Individuals can take the O*NET Interest Profiler survey to determine their personal RIASEC code and find careers related to their interests or compare their RIASEC code to the RIASEC code associated with a career of interest. While not all forensic science careers currently have a RIASEC code due to the interdisciplinary nature of the field, most forensic science careers possess similar RIASEC codes. The O*NET Interest Profiler and occupational RIASEC codes were used to measure interests within the new survey instrument designed for this study.

Forensic science is growing in popularity as both a college major and a career. The NRC (2009) believed that after conducting research on the field of forensic science in the United States, the answer to improving forensics in the country and recruiting highly educated and qualified individuals begins at the collegiate level. While research has begun to address forensic science education at the program and coursework levels, scant research exists on forensic science students themselves. To produce the level of forensic scientist expected by the workforce, it is necessary to first look at what kind of students are currently being attracted to the field and what factors are influencing this attraction. The design of a new survey instrument to investigate the factors that

influence students to major in forensic science serves as a foundation for future studies in the field of forensic science education and pioneers this area of research in the United States.

Chapter 3: Methods

Introduction

Forensic science has become a key component in the criminal justice system in the United States and other countries across the globe. And while forensic science plays an important role in solving crimes, the NRC (2009) found that many forensic scientists entering the field lack the necessary education and training to be successful. This shortage in qualified scientists is an issue facing all STEM fields (Chen, 2013; National Science Board, 2007). To begin to address this problem, it is important to know what factors are influencing current students to pursue these career fields and choosing these areas as college majors. Many studies have been conducted to research the various factors that affect students' decisions to major in different STEM fields, but limited studies have focused specifically on the field of forensic science.

Forensic science is unique from other STEM fields due to its interdisciplinary nature (Ramsland, 2014). While some disciplines in the field of forensics require a strong knowledge of the natural sciences and laboratory skills, other disciplines consist primarily of fieldwork and require little traditional scientific knowledge. Because of the diversity within the realm of forensic science, it is misguided to assume that findings concerning STEM students can be applied to all forensic science students. In addition to the interdisciplinary nature of the field, forensic science also has the issue of receiving strong media attention compared to other career fields (Jones & Bangert, 2006). The many crime shows currently airing on TV are believed to be affecting student interest in the field of forensic science (Weaver, Salamonson, Koch, & Porter,

2012). The unique issues facing the field of forensic science reinforce the need for more and directed research to be conducted in the field of forensic science education.

There are five major theories that address career development, but Social Cognitive Career Theory (SCCT) is the most applicable to academic pursuits in the process of career choice. SCCT (Lent, Brown, & Hackett, 1994), combines Bandura's (1986) Social Cognitive Career Theory with various components of other career theories, including Holland's (1959) Vocational Choice Theory, to create a comprehensive and integrative theory that addresses academic and career choice goals. SCCT suggests that self-efficacy, outcome expectations, interests, and contextual support sand barriers all play a role in an individual's choice goal or selection of a college major.

The purpose of this study was to design a reliable and valid instrument based on SCCT that measures self-efficacy, outcome expectations, and interests of forensic science majors, as well as perceived contextual supports and barriers on students' decisions to major in forensic science. A new survey instrument was designed using prior studies as models (Porter, 2011; Dawley, Houck, & Gupta, 2014; Rounds, Smith, Hubert, Lewis, & Rivkin, 1999). The survey was created online using Qualtrics and consisted of and items measuring individual self-efficacy, outcome expectations, interests, and contextual supports and barriers, as well as demographic information.

Setting

The study was conducted through a forensic science program located at a public, four-year, regional university in the West South Central United States. The forensic science program was selected for its interdisciplinary structure, allowing students to

pursue STEM and non-STEM disciplines within the field. The introductory forensic science course was selected, because it is the first course students must take as part of the forensic science degree program. Motivation and major choice goals have been found to be dynamic attributes, constantly changing as the various factors that influence them change (Lent & Brown, 2006). The purpose of developing the survey instrument was to determine what factors initially influenced a student to major in forensic science, so it was important to survey students at the start of their academic careers in this discipline.

Regardless of the nature of the study or lack of risk involved, ethical considerations must be made when human subjects are used in research. The Institutional Review Boards (IRBs) at both the institution of record for the researcher and the recruitment institution where the study was conducted reviewed and approved this study (see Appendix A). The professor of the introductory forensic science course also reviewed the study and submitted his written approval (see Appendix A).

Sample/Participants

During the class period prior to survey administration, the professor of the course read an oral recruitment script to the class, informing the students about the survey that would be administered during the following class period (see Appendix B). Students were also informed that participation was voluntary and would not affect their grade in the course. All participants were provided with a formal electronic consent form at the start of the survey the following class period that included information on the purpose of the study, the risks and benefits of participation, the voluntary nature of the survey, and privacy policies related to data obtained (see Appendix C). Students

were required to consent to taking the survey before having access to answer items. Students who did not consent were sent directly to the end of the survey. Because additional ethical considerations are required for minors, all participants had to confirm being over the age of 18 years to access the survey items. Students under the age of 18 years were sent directly to the end of the survey.

One hundred and twenty-nine students were enrolled in the introductory forensic science course during the semester the study was conducted, and 119 of those students were in attendance on the day the survey was administered. The survey was made available to all students in attendance that day and yielded a total of 106 students who responded, or an 89% response rate overall. Any survey with one or more invalid answers was not used for analysis, thereby creating a conservative sample size of 79 participants whose surveys were utilized for analysis in this study (see Table 1).

Table 1

Demographics for Sample Participants (N = 79)

Variable	N	%
Age		
18-24 years	74	93.7
25-34 years	5	6.3
Gender		
Male	20	25.0
Female	59	75.0
Ethnicity/Race		
American Indian/Native American	5	6.3
Asian	5	6.3
Black/African American	3	3.8
Hispanic	10	12.7
White/Caucasian—Non-Hispanic	47	59.5
Multiple/Mixed Races	4	5.1
Other	1	1.3
Prefer not to Answer	4	5.1
Student Type		
In-State Undergraduate	70	87.3
Out-of-State Undergraduate	8	10.1
International Undergraduate	1	1.3
Student Classification		
Freshman	34	43.0
Sophomore	21	26.6
Junior	18	22.8
Senior	4	5.1
Post-Baccalaureate	2	2.5
Concurrent Major		
STEM	30	38.0
Non-STEM	49	62.0

Measurement Instrument

A new instrument was designed using the SCCT model to measure the factors that influence a student's choice goal to major in forensic science by evaluating self-efficacy, outcome expectations, interests, and contextual supports and barriers related to forensic science. The survey instrument was divided into the four sections, measuring

each of the SCCT constructs, and each section was modeled from previous studies. The survey instrument contained a total of 141 items measuring these areas and was designed as an online survey using Qualtrics.

Self-efficacy.

The self-efficacy section of the new survey instrument was modeled after a portion of a survey developed by Porter (2011) to measure the variables that influenced students to pursue engineering degrees versus other physical science degrees in college. Porter's survey was designed using the SCCT framework and compared different majors within the same discipline, making it an appropriate model for this study. The section measuring self-efficacy on Porter's survey was made up of seven items. Items were added, removed, and/or modified from the original survey due to the small number of items measuring this construct and the different content areas being measured between the two studies.

The self-efficacy items on the new survey instrument were constructed using Porter's item design to measure self-efficacy. Participants were asked to indicate their level of confidence in their ability to perform items related to majoring in forensics (e.g. "Indicate your level of confidence in your ability to be organized"). Twenty-six items were included in the self-efficacy section for the study (see Table 1). Porter utilized a 5-point Likert scale (1 = Not At All Confident, 2 = Not Confident, 3 = Somewhat Confident, 4 = Confident, and 5 = Very Confident) in his survey design to measure self-efficacy. However, there was question as to how participants might interpret and respond to these options due to strong overlap between choices. Responses for this

survey instrument were instead reported on a 4-point Likert scale (1 = No Confidence, 2 = Slight Confidence, 3 = Moderate Confidence, and 4 = High Confidence) for clarity.

Table 2

Survey Items Measuring Self-Efficacy

Item
Be Organized
Be Detailed
Be Innovative
Be Objective
Be Honest
Be Patient
Follow Rules
Solve Problems
Think Critically
Think Independently
Take Notes
Write Report
Utilize the Scientific Method
Interpret Data
Learn to Use New Tools
Learn New Skills
Present Information to a Group
Work Alone
Work in a Group
Work in a Laboratory Setting
Work in Variable Conditions
Work under Stressful Conditions
Pursue Concurrent Degrees
Obtain Above Average Grades (A's or B's) in Forensic Science Courses
Obtain Above Average Grades (A's or B's) in Math Courses
Obtain Above Average Grades (A's or B's) in Science Courses

Outcome expectations.

The outcome expectations section of the new survey instrument was designed based on results found in a study examining why forensic scientists might pursue and maintain a career in the field (Dawley, Houck, & Gupta, 2014). The study investigated

why individuals entered or stayed in the field, which was exploring the practitioner's outcome expectations or what the individual believed would happen if a career in forensic science was obtained (Lent & Brown, 2006). The reasons found for entering and staying in the field of forensic science were modified to create items related to students' outcome expectations as a result of majoring in forensic science.

The outcome expectations items were constructed based on Lent (2005) describing outcome expectations as "If I try doing this, what will happen" (p. 104). Participants were asked their level of agreement or disagreement with statements about outcome expectations related to majoring in forensic science (e.g. "If I major in forensic science, I will get to use my talents & skills"). Twelve items were included in the outcome expectations section for the study (see Table 2). Reponses were reported on a 5-point Likert scale (1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree Nor Disagree, 4 = Somewhat Agree, and 5 = Strongly Agree).

Table 3

Survey Items Measuring Outcome Expectations

Item
Get to Use My Talents and Skills
Make a Good Salary
Make a Difference
Be Respected
Be Proud of Myself
Be Connected to a Larger Organization
Enjoy My Job
Have an Exciting Job
Have Many Job Opportunities
Have Educational and Professional Growth Opportunities
Have Work-Life Balance
Have Job Stability

Interests.

The interests section of the new survey instrument utilized the O*NET Interest Profiler, a public domain self-assessment career exploration tool sponsored by the U.S. Department of Labor Employment & Training Administration and developed by the National Center for O*NET Development (Rounds, Smith, Hubert, Lewis, & Rivkin, 1999). The O*NET Interest Profiler is a modified and expanded survey from Holland's Vocational Choice Theory (1959) and RIASEC Model (1997). Because Holland's theories and models were utilized to develop the SCCT framework, the O*NET Interest Profiler was appropriate to measure interests in this new survey instrument.

The O*NET Interest Profiler is made up of 60 items that ask participants to decide how they feel about work or job-related activities. Each job related activity is linked to one of Holland's six occupational environments or areas of interests described in the Vocational Choice Theory—Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), or Conventional (C). A personal RIASEC code is assigned that reorganizes the six letters based on a student's collective reported interests, with the first letter representing their strongest area of interest and the last letter representing their weakest area of interest. The U.S. Department of Labor Employment & Training Administration also assigned RIASEC codes to thousands of careers in the United States (Rounds, Armstrong, Liao, Lewis, & Rivkin, 2008). Personal RIASEC codes can be compared to career RIASEC codes to determine if a career matches a student's interests.

All 60 items from the O*NET Interest Profiler were included in the interest section for the study (see Table 3). Responses were reported on a 5-point Likert scale (1 = Strongly Dislike, 2 = Dislike, 3 = Unsure, 4 = Like, and 5 = Strongly Like).

Table 4

Survey Items Measuring Interests

Item
Build Kitchen Cabinets
Lay Brick or Tile
Develop a New Medicine
Study Ways to Reduce Water Pollution
Write Books or Plays
Play a Musical Instrument
Teach an Individual an Exercise Routine
Help People with Personal or Emotional Problems
Buy and Sell Stocks and Bonds
Manage a Retail Store
Develop a Spreadsheet Using Computer Software
Proofread Records or Forms
Repair Household Appliances
Raise Fish in a Fish Hatchery
Conduct Chemical Experiments
Study the Movement of Planets
Compose or Arrange Music
Draw Pictures
Give Career Guidance to People
Perform Rehabilitation Therapy
Operate a Beauty Salon or Barber Shop
Manage a Department Within a Large Company
Install Software Across Computers on a Large Network
Operate a Calculator
Assemble Electronic Parts
Drive a Truck to Deliver Packages to Offices and Homes
Examine Blood Samples Using a Microscope
Investigate the Cause of a Fire
Create Special Effects for Movies
Paint Sets for a Play
Do Volunteer Work at a Non-Profit Organization
Teach Children How to Play Sports
Start Your Own Business
Negotiate Business Contracts

(continued)

Item
Keep Shipping and Receiving Records
Calculate Wages of Employees
Test the Quality of Parts Before Shipment
Repair and Install Locks
Develop a Way to Better Predict the Weather
Work in a Biology Lab
Write Scripts for Movies or Television Shows
Perform Jazz or Tap Dance
Teach Sign Language to People with Hearing Disabilities
Help Conduct a Group Therapy Session
Represent a Client in a Lawsuit
Market a New Line of Clothing
Inventory Supplies Using a Hand-Held Computer
Record Rent Payments
Set Up and Operate Machines to Make Products
Put Out Forest Fires
Invent a Replacement for Sugar
Do Laboratory Tests to Identify Diseases
Sing in a Band
Edit Movies
Take Care of Children at a Daycare Center
Teach a High School Class
Sell Merchandise at a Department Store
Manage a Clothing Store
Keep Inventory Records
Stamp, Sort, and Distribute Mail for an Organization

Contextual supports and barriers.

The contextual supports and barriers section of the new survey instrument were also modeled after portions of the previously mentioned survey developed by Porter (2011) to measure the variables that influenced a student to pursue an engineering degree versus another physical science degree in college. Porter included 41 items in various formats to measure contextual supports and barriers. A student's response to each item determined whether it was a contextual support or contextual barrier. For example, a response of "Yes" to "In high school, did you job shadow a person who works as an engineer, scientist, or mathematician?" would indicate a contextual support,

whereas an answer of "No" would indicate a contextual barrier. Multiple items were added, removed, and/or modified from Porter's original survey due to the different content areas being measured between the two studies and the differences in perceived contextual supports and barriers of these two different groups of students.

The contextual supports and barriers items of the new survey instrument were constructed using Porter's item design to measure contextual supports and barriers. Participants were asked to answer a series of items about themselves and their home, social, and academic environments (e.g. "Rate the level of emotional support you received from the following environments when selecting to major in forensic science" or "Did you participate in any summer camps, clubs, or extracurricular activities related to forensic science in elementary, middle, or high school?"). Demographic information, including age, gender, and race, were considered items for analysis of contextual supports and barriers (Maple & Stage, 1991; Mau & Bikos, 2000; Schneider, Judy, & Mazuca, 2012). Thirty-seven items were included in the contextual supports and barriers section for the study. Responses from four demographic items were also considered, making a total of 41 items utilized to determine contextual supports and barriers (see Table 4). Reponses were reported using various formats, including fill in the blank, multiple choice, and Likert-scales. Each response was reviewed by the researcher and classified as a *contextual support* or as a *contextual barrier*. For analysis, these responses were given a numerical value of 2 and 1, respectively.

Table 5

Survey Items Measuring Contextual Supports and Barriers

Item
What year did you graduate high school or get your GED?
Did you take Forensic Science or a related course in high school?
Indicate all of the liberal arts courses you completed for high school credit.
Indicate all of the math courses you completed for high school credit.
Indicate all of the science courses you completed for high school credit.
Indicate all Advanced Placement (AP) courses you completed for high school credit.
Did you participate in an International Baccalaureate (IB) program in high school?
Please indicate your highest overall score on the ACT.
Please indicate your highest overall score on the SAT.
Did you participate in any summer camps, clubs, or extracurricular activities related to Forensic Science while in elementary, middle, or high school?
Do you qualify for federal financial aid through FAFSA?
Please indicate the level of financial support you receive from your family for your education.
Please indicate the level of financial aid you receive that does not have to be paid back (ex. Grants, scholarships, etc.).
Please indicate the level of financial aid you receive that must be paid back in the future (ex. Loans).
Do you work while going to school?
Is your job related to your career goals?
Rate the level of emotional support you received from the following environments when selecting to major in Forensic Science?
Home Environment
Social Environment
Academic Environment
Rate the level of influence the following people had on your decision to major in Forensic Science?
Father/Male Guardian
Mother/Female Guardian
Sibling(s)
Other Relative(s)
Peers
Personal Mentor(s)
High School STEM Teacher(s)
High School Non-STEM Teacher(s)
College STEM Professor(s)
College Non-STEM Professor(s)
High School Guidance Counselor(s)
College Academic Advisor(s)

(continued)

Item
Do you have any family, friends, or mentors currently or previously pursuing a degree in forensic science or a related field?
Do you have any family, friends, or mentors currently or previously employed in the field of forensic science or a related career?
Prior to taking Intro to Forensic Science, did you speak to, job shadow, or intern with a forensic scientists?
Prior to taking Intro to Forensic Science, did you obtain any information about becoming a forensic scientist?
From where did you obtain your information about becoming a forensic scientist?
From which of the previous sources did you receive the MOST INFORMATION about becoming a forensic scientist?
What is your age?
What is your gender?
Are you of Hispanic, Latino, or Spanish origin?
What is your race?

Materials

Materials for the study to measure reliability and validity of the new survey instrument included the new Qualtrics survey instrument (see Appendix D) and personal electronic devices provided by the participants. The Qualtrics survey was designed to be completed on any appropriate electronic device (e.g. computer, tablet, or smartphone) with internet connection. The university where the study was conducted provides free Wi-Fi connection for all students. Data provided from the survey administration were analyzed using IBM SPSS Statistics software.

Data Collection/Procedures

All students over the age of 18 years and enrolled in the introductory forensic science course at the university were included in the participant pool for the study of the new survey instrument. Permission was obtained by the professor of the course to administer the survey during a single class session (see Appendix A). During the class

period prior to the administration of the survey, students were informed of the opportunity to participate in a study about forensic science education through the use of an oral recruitment script read by their professor (see Appendix B). Students were encouraged to bring their own electronic device of choice (laptop, tablet, or smartphone) in the following class period to participate in the survey. Students who attended the class period in which the survey was conducted were eligible to participate voluntarily. Attendance was recorded to determine the response rate.

The survey was administered during the last 30 minutes of a 50-minute class period. The professor was asked to leave the classroom and the consent agreement was read allowed by the researcher before administering the survey (see Appendix C). The class was provided with a link to the Qualtrics survey and was given the remainder of the class period to complete the survey. Students were given the opportunity to review the informed consent letter again at the start of the survey and were required to consent electronically before participating. Students also had to confirm electronically that they were over the age of 18 years. Participants completed items designed to measure self-efficacy, outcome expectations, interests, and contextual support and barriers, as well as demographic information via the electronic survey. The survey contained no identifying data, assuring anonymity within the study. Survey results were provided within Qualtrics and exported directly to IBM-SPSS Software (SPSS) for analysis. All results and analyses of data were saved in password-protected files on a secure server in a keypad-locked room. Survey data with no identifying information were maintained by the researcher after the completion of the study for comparison with future studies and to track potential changes or trends across years of future data.

Data Analysis

The purpose of this study was to design a reliable and valid survey instrument that measures factors which may influence students' decisions to major in forensic science. Because each section of the survey instrument measured a different construct and utilized a different scale, the survey instrument was divided into its respective constructs for analysis: self-efficacy, outcome expectations, interests, and contextual supports and barriers. The interests section was further divided into its subconstructs or different areas of interest: realistic, investigative, artistic, social, enterprising, and conventional. Because the subconstructs perform together to generate personal interests, analysis was done on each of the subconstructs of interests as well as interests as a single construct.

Numerical values were automatically assigned for items measuring self-efficacy, outcome expectations, and interests when data were exported to SPSS. Contextual supports and barriers were measured using a variety of item designs, including fill in the blank, multiple choice, and Likert scales. To compare data for analysis, each item's responses had to be reviewed and assigned a numerical value. Responses considered by the researcher to be a contextual barrier were given a value of 1 and responses considered by the researcher to be a contextual support were given a value of 2. The determination of contextual support or barrier for each item in this section can be found in Appendix G.

Descriptive statistics.

Descriptive statistics can be used not only to describe demographics of the sample population but also to report on the results of the data obtained from the sample

(Pallant, 2007). The mean, median, mode, standard deviation, and skewness of responses for each item within a construct were calculated. Frequency statistics were also run for every item to determine the frequency and percentage of each response within an item. Data were analyzed for any outliers or extremes that did not fit with the remainder of the data as well as any patterns found within the data.

Reliability

Reliability indicates the accuracy or precision of an instrument (Van Tilburg Norland, 1990). Because motivation and major choice goals have been found to be dynamic attributes, constantly changing as the various factors that influence them change, Lent & Brown (2006) suggested that test-retest reliability may not be an appropriate method to measure reliability for an SCCT survey. Instead, they recommended relying on internal consistency reliability estimates. Internal consistency reliability estimates are used to determine the relationships between items measuring the same construct (DeVellis, 1991).

Reliability for this survey instrument was first analyzed using Cronbach's alpha, a measure of internal consistency. Cronbach's alpha was calculated for the constructs of self-efficacy, outcome expectations, interests, and contextual supports and barriers, as well as the subconstructs within interests. Nunnally (1978) stated that "in the early stages of research… reliabilities of 0.7 or higher will suffice" (p. 244). A Cronbach's alpha value of 0.70 to 0.95 is generally considered an acceptable value (Tavakol & Dennick, 2011). This criterion was utilized to determine the Cronbach's alpha of each construct and subconstruct within the instrument.

Duhachek and Iacobucci (2004) found errors in Cronbach's alpha to always be higher for smaller samples sizes and encouraged mean inter-item correlation also to be calculated. Because of the small sample size for the study, mean inter-item correlation was calculated for each construct along with Cronbach's alpha. Pallant (2007) argued that it is also common to find low Cronbach's alpha values for instruments with 10 items or fewer and suggested reporting mean inter-item correlation for these items. Because each subconstruct within the construct of interests was made up of 10 items, mean inter-item correlation was also calculated for the subconstructs. Clark and Watson (1995) recommended a range of 0.15 to 0.5 for mean inter-item correlation.

Cronbach's alpha if Item Deleted was another statistical analysis used to determine reliability of the constructs within the survey instrument. This form of reliability looks at the change that would occur in Cronbach's alpha if an individual item was deleted. Removal of an item should be considered if it would raise the Cronbach's alpha value (Leong & Austin, 2006). However, other researchers argue that Cronbach's alpha if Item Deleted should only be used if the overall Cronbach's alpha is below 0.7 and/or if deleting an item is logical and theoretically sound (Cho & Kim, 2015; Kopalle & Lehmann, 1997; Pallant, 2007; Raykov, 2008). Items in the survey that would raise the overall Cronbach's alpha within the construct were considered on an individual basis for removal.

To further investigate the reliability of each section of the survey instrument, inter-item correlations for individual items within the construct were measured. While Cronbach's alpha looks at the correlation between all items within the section, the inter-item correlation matrix provided correlations or relationships between pairs of items.

Higher inter-item correlations suggest that items are measuring the same construct (DeVellis, 1991). BrckaLorenz, Chiang, and Nelson Laird (2013) suggested an acceptable range of 0.15 to 0.85 for inter-item correlations. The ideal cutoff, as proposed by Nunnally and Bernstein (1994), is 0.3. Kopalle and Lehmann (1997) argued that an over-exaggeration of Cronbach's alpha can occur if items are deleted strictly for low inter-item correlation. Because of the discrepancies in the literature, items in the survey instrument with low inter-item correlations within the construct were considered on an individual basis for removal.

Validity.

Test validity was defined in the *Standards for Educational and Psychological Testing* (1999) as "the degree to which evidence and theory support the interpretation of test scores entailed by proposed uses of tests" (p. 9). Classical models of validity, as originally published by the American Psychological Association and modified in future years, divided validity into three domains: content validity, criterion validity, and construct validity (APA, AERA, & NCME, 1954).

Content validity illustrates "how well the content of the test samples the class of situations or subject matter about which conclusions are to be drawn" (APA, AERA, & NCME, 1954, p. 13). Most commonly, content validity is determined by the "judgment, logic, and reasoning of the researcher with validation from a panel" of experts (Wynd, Schmidt, & Schaefer, 2003, p. 509). To measure content validity, an expert panel of more than ten forensic science educators and practitioners was established. During the construction of the new survey instrument, each section of the survey was sent to the expert panel for review.

Criterion validity within the classical model of test validity requires existence of a similar or related instrument from which to make comparisons or correlations. The item or assessment must have "empirical association with come criterion or 'gold standard'" (DeVellis, 1991, p. 44). Because the survey instrument for this study is being created due to a lack of a current instrument, criterion validity could not be determined for this survey instrument.

Construct validity is concerned with how well the survey instrument is measuring the relationship of the variables defined by the theoretical construct (DeVellis, 1991). In this case, the researcher attempted to determine the behavior of the scale in relation to the SCCT model. The SCCT model suggests that self-efficacy, outcome expectations, interests, and social supports and barriers all affect a student's choice goal. Results or data from the survey instrument were analyzed to determine the extent to which each of these factors affected students' choice goals to major in forensic science.

Messick (1995) reformed the classical ideas of validity by stating that test validity consists only of construct validity, which is made up of the following six aspects that include content and criterion related validity: content, substantive, consequential, structural, external, and generalizability aspects. Content validity, though now included within construct validity, maintains its definition as evidence that the content of the survey instrument is a thorough representation of the construct or constructs being measured (Messick, 1995). Relating closely to content validity, substantive validity questions the soundness of the theoretical framework on which the survey instrument was designed. Each section of the survey was designed using SCCT

as a model, which is a popular theoretical framework that has been proven through countless rounds of testing to be reliable and valid (Lent & Brown, 2006). Each section of the survey was also sent to the expert panel of forensic science educators and practitioners for review during the instrument development design process. Items were added, removed, or modified based on feedback from the panel. The final survey instrument utilized for the study to measure reliability and validity was evaluated by the expert panel and determined to be a valid instrument. Both content and substantive validity were established prior to the administration of the survey instrument.

Added to Messick's modernized interpretation of validity was consequential validity, which assesses the potential risks or benefits to participants based on the interpretation of results (Messick, 1995). Consequential validity was considered during both instrument development and analysis of data. The anonymity and voluntary nature of the survey instrument eliminated adverse consequences, and there was minimal to no risk in completing the survey. Improvements to the forensic science program and modifications to the current recruitment efforts could be made based on the variables found to significantly affect students' choice goals to major in STEM or non-STEM forensic science disciplines, providing positive consequential validity to the survey instrument.

Structural validity ties closely to the classical definition of construct validity. Structural validity measures the extent to which structure, relationships, and dimensions of the survey instrument itself are consistent with the structure, relationships, and dimensions of the construct or constructs being measured (Messick, 1995). Factor analysis is commonly used in the development and evaluation of survey instruments

(Pallant, 2007). Exploratory factor analysis (EFA) is used primarily at the beginning of the research to explore relationships, whereas confirmatory factor analysis (CFA) is used later to confirm hypotheses and theories. Within EFA, one can run a principal components analysis (PCA) or a principal axis factoring (PAF) analysis. It is recommended that PCA be used for a statistically sound but simpler summary of the data set (Stevens, 1996; Tabachnick & Fidell, 2007).

Because this research was an instrumentation development design study, EFA using PCA was used to determine structural validity instead of PFA or CFA. PCA was initially run on each construct as well as the subconstructs within the interests construct to show structural validity of the instrument. Scree plots were generated for each construct to confirm a single factor being measured within each construct. The component matrix was analyzed to measure how well each item correlated with other items within the construct or subconstruct. Pallant (2007) considers factors loading at 0.3 or higher to be valid within the construct. However, this value is set for sample populations above 150. Lower values may be obtained for samples sizes below 150 participants (Stevens, 1996; Tabachnick & Fidell, 2007) or sample sizes that do not have a 10:1 ratio of participants to items (Nunnally, 1978). The potential error due to sample size was taken into consideration when analyzing data, since the sample population size (N = 79) did not meet either standard.

External validity and generalizability are similar to the criterion-related validity of the classical validity model. External validity evaluates the extent to which the test contains convergent, discriminant, and predictive qualities (Messick, 1995). Generalizability is the degree to which the results of the survey instrument can be

generalized across different groups or settings. Due to the lack of a current instrument, the early research stage of this study, and the small sample size, external validity and generalizability were not measured at this time.

Summary

The new survey instrument was designed to measure which variables from the SCCT model influence a student's choice goal to pursue a forensic science degree. The variables measured within the survey included self-efficacy, outcome expectations, interests, and contextual supports and barriers. All of the variables have been found to affect the major choice goal to different degrees (Lent, Brown, & Hackett, 1994), but limited studies have previously measured the effect of these variables on a forensic science student's major choice goal. Before utilizing the survey to measure these variables, the survey first had to be shown to be reliable and valid, which was the purpose of the current study.

A study was conducted with an introductory forensic science course at a regional university. Students completed the online survey via Qualtrics during a single class period. Data were transferred from Qualtrics to IBM SPSS for analysis. Initial data analysis included descriptive and frequency statistics to report on demographics of the sample population and look for patterns or outliers in the data. Data were then divided into the constructs of self-efficacy, outcome expectations, interests, and contextual supports and barriers. The interests section was then further divided into its subconstructs or areas of interest. The mean, median, mode, standard deviation, and skewness was calculated for each item within these four constructs.

Reliability of the results from the new survey instrument was first measured by analyzing Cronbach's alpha and mean inter-item correlations for each construct as well as each subconstruct within interests. Cronbach's alpha if Item Deleted and inter-item correlations were then reviewed for each item with the construct to determine if any items should be removed to improve reliability.

Messick (1995) reformed the classical ideas of validity by stating that all test validity is construct validity, which is made up of six components: content, substantive, consequential, structural, external, and generalizability. Content and substantive validity were assessed by the researcher and a panel of experts in the field of forensic science education. Consequential validity was considered during the development and administration of the survey, as well as during the analysis of results. The results did not provide any harm to participants, but could provide potential benefits if modifications were made to forensic science programs based on information provided by students about their motivations. Structural validity was measured by running a principal component analysis (PCA), which is part of experimental factor analysis (EFA). Results were analyzed to determine how strongly each item related to the overall construct or subconstruct being measured and if any items should be removed to improve validity. External validity and generalizability were not measured this early in the research due to the limitations in comparable survey instruments and the small sample size used for the study. Results for descriptive statistics, frequencies, reliability measurements, and validity measurements will be discussed in the following chapter.

Chapter 4: Results

Introduction

The demand for well-trained and well-educated forensic scientists is growing in countries across the globe (Hannis & Welsh, 2009; NRC, 2009; Samarji, 2012). In the next ten years, the U.S. Department of Labor expects to see the number of forensic science laboratory technician positions increase by 27% (Bureau of Labor Statistics). To meet the current and anticipated demand, new forensic science programs are starting at colleges and universities throughout the United States (Jackson, 2009). However, little is known about the forensic science student and what drives them to pursue this major.

This lack of research could be due to the sudden increase in institutions offering bachelor's programs in forensic science or the assumption that all forensic science disciplines fall into the category of STEM. However, forensic science is an interdisciplinary field that includes both laboratory technicians and crime scene investigators doing fieldwork with little scientific background (Ramsland, 2014). The purpose of this study was to design a reliable and valid survey instrument that measures factors which may influence students' decisions to major in forensic science.

The new survey instrument designed for this study, which is based on Lent, Brown, and Hackett's Social Cognitive Career Theory (1994), examined the influence of self-efficacy, outcome expectations, and interests of forensic science majors, as well as the perceived contextual supports and barriers on the students' choice goal to major in forensic science. The self-efficacy and contextual supports and barriers sections of the survey utilized modified items from a survey created by Porter (2011) to examine

variables that influenced students' decisions to major in engineering versus other physical sciences. The outcome expectations section of the survey was developed based on data collected by Dawley, Houck, and Gupta (2014) to investigate why individuals might pursue and maintain a career in forensic science. The interest section of the survey utilized the O*NET® Interest Profiler (Rounds, Armstron, Liao, Lewis, & Rivkin, 2008) which is an expanded version of Holland's RIASEC model within his theory of vocational personalities (Holland, 1997).

The new survey instrument was administered as a study to a sample population of college students enrolled in the introductory forensic science course required for all forensic science majors at an institution in the West South Central United States. Students voluntarily participated in the online Qualtrics survey during a single class session. The study generated 79 valid surveys for reliability and validity analysis.

Data were then divided into the four constructs being measured in the survey: self-efficacy, outcome expectations, interests, and contextual supports and barriers. The interests section was further divided into its subconstructs or areas of interests: realistic, investigative, artistic, social, enterprising, and conventional. Descriptive statistics collected for each construct included the mean, median, mode, standard deviation, and skewness for every item within the construct. Frequency statistics were then run for each item to determine the frequency and percentage of each response option for an item. Descriptive statistics and frequencies were also used to look for any outliers or abnormalities in the scores before running reliability and validity measurements.

Reliability was measured using multiple methods. First, Cronbach's alpha was collected for each construct, as well as the subconstructs for interests and contextual

supports and barriers. Because Cronbach's alpha can be skewed due to small sample sizes and constructs with a small number of items, mean inter-item correlations were also calculated for each construct and subconstruct (Duhachek and Iacobucci, 2004; Pallant, 2007). Cronbach's alpha if Item Deleted and inter-item correlations were also measured to assist in the determination of whether to include or remove an item in question.

Messick (1995) provided a modern interpretation of test validity, which integrates six aspects within construct validity: content, substantive, consequential, structural, external, and generalizability. Content and substantive validity were established through the sound theoretical framework of the SCCT model used to develop the survey and the feedback from the expert panel of forensic science educators and practitioners. Consequential validity was considered during development and administration of the survey, as well as throughout the interpretation of results. The lack of identifying information in the survey or negative consequences from interpretations of survey results provides consequential validity. Structural validity was measured for each construct and subconstruct using exploratory factor analysis (EFA), and more specifically, principal component analysis (PCA). Component matrices, which provided a numerical value that illustrated the correlations between the item and the other items within the construct being measured, were analyzed to determine if any items should be removed. These values can be affected by small sample size, so this was considered when making final decisions about including or excluding items from the survey.

Self-Efficacy

Self-efficacy is defined as people's beliefs of their abilities to understand material or produce an action required to succeed (Bandura, 1986). Twenty-six items were included within the self-efficacy section of the survey instrument and were designed to measure a student's self-efficacy in the field of forensic science.

Descriptive statistics.

Each self-efficacy item utilized a 4-point Likert scale (1 = No Confidence, 2 = Slight Confidence, 3 = Moderate Confidence, and 4 = High Confidence). The mean, median, mode, standard deviation, and skewness for each self- efficacy item are provided in Table 5.

Table 6

Descriptive Statistics for Survey Items Measuring Self-Efficacy

Item	*M*	Median	Mode	*SD*	Skewness
Be Organized	3.42	3.00	4.00	0.63	-0.93
Be Detailed	3.39	3.00	4.00	0.63	-0.53
Be Innovative	3.19	3.00	3.00	0.68	-0.51
Be Objective	3.39	3.00	4.00	0.63	-0.53
Be Honest	3.89	4.00	4.00	0.76	-2.48
Be Patient	3.22	3.00	3.00	0.43	-0.57
Follow Rules	3.85	4.00	4.00	0.37	-2.93
Solve Problems	3.47	3.00	3.00	0.50	0.13
Think Critically	3.44	3.00	3.00	0.57	-0.41
Think Independently	3.67	4.00	4.00	0.50	-1.06
Take Notes	3.68	4.00	4.00	0.52	-1.36
Write Reports	3.29	3.00	3.00	0.70	-0.47
Utilize the Scientific Method	3.33	3.00	4.00	0.71	-0.58
Interpret Data	3.32	3.00	4.00	0.69	-0.51
Learn to Use New Tools	3.70	4.00	4.00	0.52	-1.43
Learn New Skills	3.73	4.00	4.00	0.47	-1.45
Present Information to a Group	3.78	3.00	3.00	0.83	-0.76
Work Alone	3.68	4.00	4.00	0.67	-2.14
Work in a Group	3.42	4.00	4.00	0.69	-0.77
Work in a Laboratory Setting	3.46	4.00	4.00	0.76	-1.17
Work in Variable Conditions	3.41	4.00	4.00	0.67	-0.69
Work under Stressful Conditions	3.33	3.00	4.00	0.71	-0.80
Pursue Concurrent Degrees	3.52	4.00	4.00	0.62	-0.91
Obtain Above Average Grades in Forensic Science Courses	3.67	4.00	4.00	0.57	-1.56
Obtain Above Average Grades in Math Courses	2.86	3.00	2.00	0.93	-0.21
Obtain Above Average Grades in Science Courses	3.25	3.00	4.00	0.79	-0.81

The mean, median, and mode for each item all suggested that students majoring in forensic science have moderate to high self-efficacy in the area of forensic science. The only item with a mean below 3.0 (Moderate Confidence) and a mode of 2.0 (Slight Confidence) was Obtain Above Average Grades in Math Courses. This item also had the highest standard deviation, however, it was still below 1.0. The most common

median value was 3.0 (Moderate Confidence), but the most common mode value was 4.0 (High Confidence). All answers displayed negative skewness values, except for Solve Problems. Negative skewness indicates answers were clustered at the high end (Pallant, 2007), suggesting higher self-efficacy. Follow Rules, Be Honest, and Work Alone displayed the three highest negative skewness values, respectively.

Frequencies.

The frequency of each response choice, as well as the percent of each response, for every self-efficacy item are both presented in Appendix E. Results from the frequency statistics confirmed the above average self-efficacy in forensic science of students who selected this major. Seventeen items had zero responses recorded for No Confidence. High Confidence was the most frequent response for 19 of the 26 items and tied with Moderate Confidence for the most frequent response for three items. The only four items that had Moderate Confidence as the most frequent response were Be Innovative, Be Patient, Solve Problems, and Obtain Above Average Grades in Math Courses. No items had No Confidence or Slight Confidence as the most frequent response.

Reliability.

Reliability was first measured by calculating Cronbach's alpha for the self-efficacy construct. The Cronbach's alpha for the construct was found to be 0.820. This shows a high level of internal consistency within the items included in this section. Another value used to establish reliability was Cronbach's alpha if Item Deleted. If removing an item raises the Cronbach's alpha value, the item should be considered for removal. Cronbach's alpha if Item Deleted for each self-efficacy item is listed in Table

7. Five of the 26 items within the self-efficacy construct would raise the Cronbach's Alpha value if deleted. These included Be Organized, Be Patient, Follow Rules, Work Alone, and Work in a Group. These items were flagged for potential removal from the survey instrument, pending analysis of other reliability and validity values.

Table 7

Cronbach's alpha if Item Deleted for Survey Items Measuring Self-Efficacy (α = 0.820)

Item	α if item deleted
Be Organized	0.821
Be Detailed	0.815
Be Innovative	0.808
Be Objective	0.814
Be Honest	0.817
Be Patient	0.823
Follow Rules	0.826
Solve Problems	0.818
Think Critically	0.807
Think Independently	0.810
Take Notes	0.817
Write Reports	0.809
Utilize the Scientific Method	0.808
Interpret Data	0.804
Learn to Use New Tools	0.809
Learn New Skills	0.812
Present Information to a Group	0.820
Work Alone	0.822
Work in a Group	0.825
Work in a Laboratory Setting	0.805
Work in Variable Conditions	0.804
Work under Stressful Conditions	0.809
Pursue Concurrent Degrees	0.811
Obtain Above Average Grade in Forensic Science Courses	0.819
Obtain Above Average Grade in Math Courses	0.822
Obtain Above Average Grade in Science Courses	0.813

An additional measurement collected to determine the reliability of the results of this survey instrument was the mean inter-item correlation value. The mean inter-item

correlation value was found to be 0.153, which is just within the recommended range of 0.15 to 0.50 (Clark & Watson, 1995). Individual inter-item correlations were also examined (see Appendix F). Of all the inter-item correlations for self-efficacy, 14% were found to be negative. Some were outside of the 0.15 to 0.85 range, but 47% were within the range. Only 16% were above the ideal value of 0.3. Be Organized, Be Patient, Follow Rules, Work Alone, and Work in a Group all had several negative or low correlations with multiple other items and were considered for removal depending on their values within other reliability and validity measurements.

Validity.

Validity for the self-efficacy construct was measured using exploratory factor analysis (EFA), and specifically principal component analysis (PCA). A scree plot was first obtained to verify that a single component was being measured within the construct (see Figure 2). This is confirmed by the sharp drop between the first and second point on the graph.

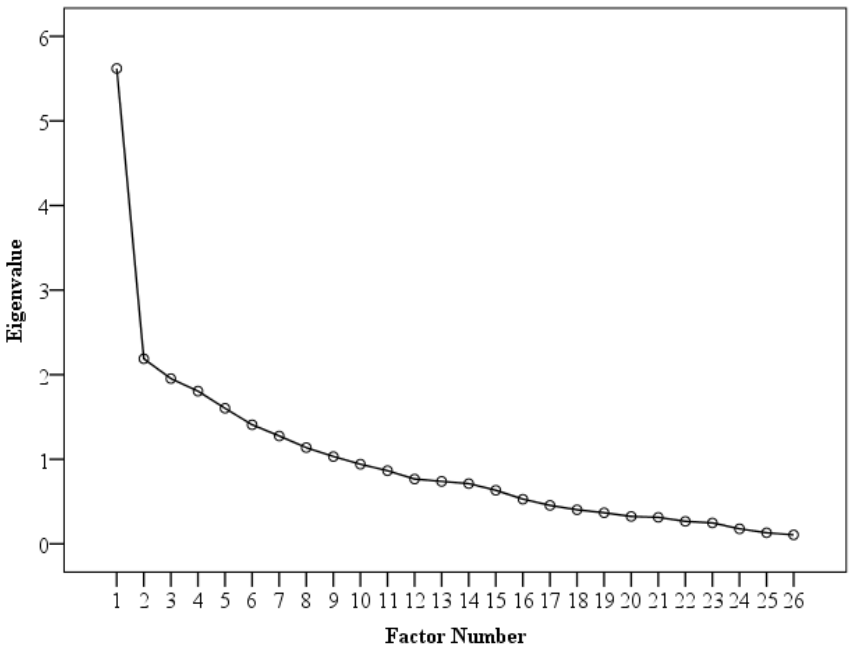

Figure 2. Scree plot of items measuring self-efficacy illustrating a single component being measured within this section of the survey instrument.

The PCA for the single component being measured within the self-efficacy section can be seen in Table 8. Twenty of the 26 items loaded above 0.3, making these items valid within the construct. The six items that loaded below 0.3 were Be Organized, Be Patient, Follow Rules, Work Alone, Work in a Group, and Obtain Above Average Grades in Forensic Science Courses. Lower values than 0.3 can be expected when the sample size is less than 150 or if there is not a 10:1 ration of participants to items (Nunnally, 1978; Stevens, 1996; Tabachnick & Fidell, 2007). This was taken into consideration when making a final determination as to whether or not an item should be deleted from the survey instrument.

Table 8

Component Matrix for Survey Items Measuring Self-Efficacy

Item	Component 1
Be Organized	0.211
Be Detailed	0.343
Be Innovative	0.571
Be Objective	0.426
Be Honest	0.330
Be Patient	0.182
Follow Rules	-0.080
Solve Problems	0.301
Think Critically	0.638
Think Independently	0.609
Take Notes	0.318
Write Reports	0.550
Utilize the Scientific Method	0.598
Interpret Data	0.654
Learn to Use New Tools	0.661
Learn New Skills	0.556
Present Information to a Group	0.315
Work Alone	0.202
Work in a Group	0.109
Work in a Laboratory Setting	0.640
Work in Variable Conditions	0.662
Work under Stressful Conditions	0.557
Pursue Concurrent Degrees	0.555
Obtain Above Average Grades in Forensic Science Courses	0.272
Obtain Above Average Grades in Math Courses	0.304
Obtain Above Average Grades in Science Courses	0.461

Outcome Expectations

Outcome expectations are defined as beliefs about the consequences or benefits of performing specific behaviors (Lent & Brown, 2006). Twelve items were included within the outcome expectations section of the survey instrument and were designed to measure a student's outcome expectations if they major in forensic science.

Descriptive statistics.

Each outcome expectations item utilized a 5-point Likert scale (1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Neither Agree Nor Disagree, 4 = Somewhat Agree, and 5 = Strongly Agree). The mean, median, mode, standard deviation, and skewness for each outcome expectations item are outlined in Table 9.

Table 9

Descriptive Statistics for Survey Items Measuring Outcome Expectations

Item	*M*	Median	Mode	*SD*	Skewness
Get to Use My Talents & Skills	4.57	5.00	5.00	0.57	-0.92
Make a Good Salary	4.14	4.00	4.00	0.76	-0.60
Make a Difference	4.72	5.00	5.00	0.50	-1.61
Be Respected	4.57	5.00	5.00	0.61	-1.13
Be Proud of Myself	4.94	5.00	5.00	0.25	-3.66
Be Connected to a Larger Organization	4.72	5.00	5.00	0.58	-1.97
Enjoy My Job	4.87	5.00	5.00	0.37	-3.03
Have an Exciting Job	4.75	5.00	5.00	0.52	-1.97
Have Many Job Opportunities	4.27	4.00	5.00	0.80	-0.99
Have Educational & Professional Growth Opportunities	4.62	5.00	5.00	0.56	-1.16
Have Work-Life Balance	4.13	4.00	4.00	0.85	-0.76
Have Job Stability	4.54	5.00	5.00	0.66	-1.42

The mean, median, mode, and standard deviation for each item all suggested that students majoring in forensic have high outcome expectations for their futures based on their choices to major in forensic science. No items had a median or mode of 1.0 (Strongly Disagree) but the majority had median and mode values of 5.0 (Strongly Agree). All answers displayed negative skewness values, indicating answers were clustered at the high or positive outlook end (Pallant, 2007). Be Proud of Myself and Enjoy My Job had the highest mean values and negative skewness values, respectively.

Frequencies.

The frequency of each response choice, as well as the percent of each response, for every outcome expectations item are presented in Appendix E. Results from the frequency statistics confirmed the high outcome expectations for students who choose to major in forensic science. All 12 items had zero responses recorded for Strongly Disagree. Strongly Agree was the most frequent response for 10 of the 12 items. The only two items that had Somewhat Agree as the most frequent response were Have Work-Life Balance and Make a Good Salary. No items had Strongly Disagree, Somewhat Disagree, or Neither Agree Nor Disagree as the most frequent response.

Reliability.

Reliability was first measured by calculating Cronbach's alpha for the outcome expectations construct. The Cronbach's alpha for the construct was found to be 0.800. This shows a high level of internal consistency within the items included in this section. Another value used to establish reliability was Cronbach's alpha if Item Deleted. If removing an item raises the Cronbach's Alpha value, then the item should be considered for removal. Cronbach's alpha if Item Deleted for each outcome expectations item is listed in Table 10. Removing any item from the outcome expectations section of the survey instrument would lower or maintain the original Cronbach's Alpha value, and therefore weaken the reliability.

Table 10

Cronbach's Alpha if Item Deleted for Survey Items Measuring Outcome Expectations (α = 0.800)

Item	α if item deleted
Get to Use My Talents & Skills	0.785
Make a Good Salary	0.770
Make a Difference	0.787
Be Respected	0.791
Be Proud of Myself	0.800
Be Connected to a Larger Organization	0.791
Enjoy My Job	0.791
Have an Exciting Job	0.781
Have Many Job Opportunities	0.779
Have Educational & Professional Growth Opportunities	0.781
Have Work-Life Balance	0.790
Have Job Stability	0.773

An additional measurement collected to determine the reliability of the results of this survey instrument was the mean inter-item correlation value. The mean inter-item correlation value was found to be 0.257, which is within the recommended range of 0.15 to 0.50 (Clark & Watson, 1995). Individual inter-item correlations were also examined (see Appendix F). All inter-item correlations were found to be positive. Some were outside of the 0.15 to 0.85 range, but 78% were within the range, and 39% were above the ideal value of 0.3.

Validity.

Validity for the outcome expectations construct was measured using exploratory factor analysis (EFA), and specifically principal component analysis (PCA). A scree plot was first obtained to verify that a single component was being measured within the

construct (see Figure 3). This is confirmed by the sharp drop between the first and second point on the graph.

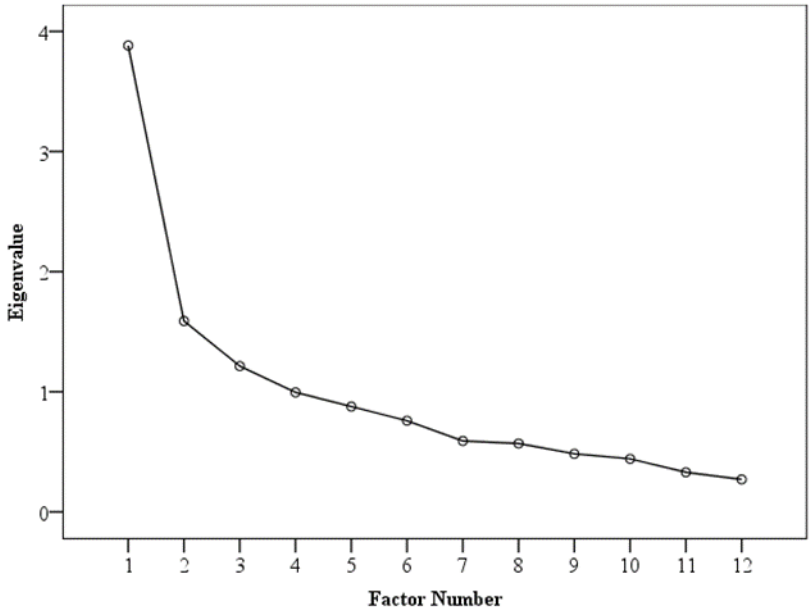

Figure 3. Scree plot of items measuring self-efficacy illustrating a single component being measured within this section of the survey instrument.

The PCA for the single component being measured within the outcome expectations section can be seen in Table 11. All values loaded above 0.3, making each item valid within the construct.

Table 11

Component Matrix for Survey Items Measuring Outcome Expectations

Item	Component 1
Get to Use My Talents & Skills	0.575
Make a Good Salary	0.677
Make a Difference	0.541
Be Respected	0.486
Be Proud of Myself	0.359
Be Connected to a Larger Organization	0.509
Enjoy My Job	0.558
Have an Exciting Job	0.630
Have Many Job Opportunities	0.624
Have Educational & Professional Growth Opportunities	0.594
Have Work-Life Balance	0.543
Have Job Stability	0.657

Interests

Interests are defined as people's typical likes, dislikes, and indifferences toward different material or activities (Lent & Brown, 2006). Sixty items were included within the interests section of the survey instrument and were divided into six subconstructs of 10 items each: realistic interests, investigative interests, artistic interests, social interests, enterprising interests, and conventional interests.

Descriptive statistics.

Items were divided into the six subconstructs. Each interest item utilized a 5-point Likert scale (1 = Strongly Dislike, 2 = Somewhat Dislike, 3 = Unsure, 4 = Somewhat Like, and 5 = Strongly Like). The mean, median, mode, standard deviation, and skewness for each interest item can be found in Tables 12-17.

Table 12

Descriptive Statistics for Survey Items Measuring Realistic Interests

Item	*M*	Median	Mode	*SD*	Skewness
Build Kitchen Cabinets	2.76	3.00	2.00	1.24	0.10
Lay Brick or Tile	2.43	2.00	2.00	1.16	0.45
Repair Household Appliances	3.94	4.00	4.00	1.02	-1.22
Raise Fish in a Fish Hatchery	3.52	4.00	4.00	1.18	-0.63
Assemble Electronic Parts	3.58	4.00	4.00	1.26	-0.51
Drive a Truck or Deliver Packages to Offices and Homes	3.39	4.00	4.00	1.37	-0.41
Test the Quality of Parts Before Shipment	3.53	4.00	4.00	1.24	-0.45
Repair and Install Locks	3.25	3.00	4.00	1.23	-0.21
Set Up and Operate Machines to Make Products	2.49	3.00	3.00	1.12	-0.01
Put Out Forest Fires	2.54	2.00	2.00	1.22	-0.20

The mean, median, mode, and standard deviation for each item all suggested that students majoring in forensic have average to just slightly higher than average realistic interests. No items had a median or mode of 1.0 (Strongly Dislike) or 5.0 (Strongly Like). The item with the highest average interest score was Repair Household Appliances (3.94), and the item with the lowest average interest score was Lay Brick or Tile (2.43). Seven of the 10 items showed minimal negative skewness, while two showed minimal positive skewness. Repair Household Appliances had the highest negative skewness value (-1.22), suggesting general interest in this item was on the higher end.

Table 13

Descriptive Statistics for Survey Items Measuring Investigative Interests

Item	*M*	Median	Mode	*SD*	Skewness
Develop a New Medicine	2.88	3.00	2.00	1.26	0.49
Study Ways to Reduce Water Pollution	2.53	2.00	2.00	1.21	0.31
Conduct Chemical Experiments	3.39	4.00	4.00	1.33	-0.36
Study the Movement of Planets	3.95	4.00	5.00	1.26	-1.01
Examine Blood Samples Using a Microscope	3.33	4.00	2.00	1.33	-0.16
Investigate the Cause of a Fire	2.67	2.00	2.00	1.35	0.40
Develop a Way to Better Predict the Weather	2.97	3.00	1.00	1.48	-0.00
Work in a Biology Lab	2.87	3.00	2.00	1.16	-0.10
Invent a Replacement for Sugar	3.13	3.00	2.00	1.42	-0.01
Do Laboratory Tests to Identify Diseases	3.58	4.00	4.00	1.28	-0.57

The mean, median, mode, and standard deviation for each item suggested that students majoring in forensic have average to slightly below average investigative interests. No items had a median of 1.0 (Strongly Dislike), but Develop a Way to Better Predict the Weather had a mode of 1.0. No items had a median of 5.0 (Strongly Like), but Study the Movement of Planets had a mode of 5.0. The most common mode value for these 10 items was 2.0 (Dislike). The item with the highest average interest score was Study the Movement of Planets (3.95), and the item with the lowest average interest score was Study Ways to Reduce Water Pollution (2.53). Seven of the 10 items showed minimal negative skewness, while two showed minimal positive skewness. Study the Movement of Planets had the highest negative skewness value (-1.01), suggesting general interest in this item was on the higher end.

Table 14

Descriptive Statistics for Survey Items Measuring Artistic Interests

Item	*M*	Median	Mode	*SD*	Skewness
Write Books or Plays	3.13	3.00	4.00	1.18	-0.11
Play a Musical Instrument	1.93	2.00	2.00	0.95	0.86
Compose or Arrange Music	2.97	3.00	2.00	1.21	0.01
Draw Pictures	3.76	4.00	4.00	1.12	-0.79
Create Special Effects for Movies	3.09	3.00	4.00	1.43	-0.13
Paint Sets for a Play	3.31	4.00	4.00	1.27	-0.39
Write Scripts for Movies or Television Shows	2.92	3.00	2.00	1.06	0.09
Perform Jazz or Tap Dance	3.19	3.00	4.00	1.09	-0.14
Sing in a Band	4.25	4.00	5.00	0.87	-1.60
Edit Movies	4.34	4.00	4.00	0.81	-2.03

The mean, median, mode, and standard deviation for each item suggested that students majoring in forensic have above average artistic interests. No items had a median or mode of 1.0 (Strongly Dislike). No item had a median value of 5.0 (Strongly Like), but Sing in a Band had a mode value of 5.0. The most common mode value for these 10 items was 4.0 (Like). The item with the highest mean score was Edit Movies (4.34), and the item with the lowest mean score was Play a Musical Instrument (1.93). Five of the 10 items showed minimal negative skewness, while three showed minimal positive skewness. Edit Movies and Sing in a Band had the two highest negative skewness values, suggesting general interest in these items was on the higher end.

Table 15

Descriptive Statistics for Survey Items Measuring Social Interests

Item	*M*	Median	Mode	*SD*	Skewness
Teach an Individual an Exercise Routine	2.79	3.00	2.00	1.07	0.03
Help People with Personal and Emotional Problems	2.28	2.00	2.00	0.97	0.61
Give Career Guidance to People	3.04	3.00	4.00	1.26	-0.03
Perform Rehabilitation Therapy	4.00	4.00	4.00	1.01	-1.14
Do Volunteer Work at a Non-Profit Organization	2.35	2.00	3.00	1.04	0.22
Teach Children How to Play Sports	2.72	3.00	2.00	1.14	0.20
Teach Sign Language to People With Hearing Disabilities	2.68	2.00	2.00	1.18	0.41
Help Conduct a Group Therapy Session	3.33	4.00	4.00	1.08	-0.51
Take Care of Children at a Daycare Center	2.59	2.00	2.00	1.09	0.33
Teach a High School Class	2.46	2.00	2.00	0.92	0.29

The mean, median, mode, and standard deviation for each item suggested that students majoring in forensic have below average social interests. No items had a median or mode of 1.0 (Strongly Dislike) or 5.0 (Strongly Like). The most common mode value for these 10 items was 2.0 (Dislike). The item with the highest average interest score was Perform Rehabilitation Therapy (4.00), and the item with the lowest average interest score was Help People with Personal and Emotional Problems (2.28). Two of the 10 items showed minimal negative skewness, while seven showed minimal positive skewness. Perform Rehabilitation Therapy had a high negative skewness value (-1.01), suggesting general interest in this item was on the higher end. The majority of items showed positive skewness values, suggesting general social interests were on the lower end.

Table 16

Descriptive Statistics for Survey Items Measuring Enterprising Interests

Item	*M*	Median	Mode	*SD*	Skewness
Teach an Individual an Exercise Routine	2.43	2.00	2.00	1.00	0.08
Help People with Personal and Emotional Problems	3.20	4.00	4.00	1.27	-0.43
Give Career Guidance to People	3.44	4.00	4.00	1.23	-0.53
Perform Rehabilitation Therapy	4.19	5.00	5.00	1.09	-1.43
Do Volunteer Work at a Non-Profit Organization	2.42	2.00	2.00	1.32	0.70
Teach Children How to Play Sports	3.34	4.00	4.00	1.15	-0.40
Teach Sign Language to People With Hearing Disabilities	3.61	4.00	4.00	1.01	-0.30
Help Conduct a Group Therapy Session	2.87	3.00	2.00	1.04	-0.02
Take Care of Children at a Daycare Center	2.63	2.00	2.00	1.09	0.17
Teach a High School Class	2.53	2.00	2.00	0.98	0.24

The mean, median, mode, and standard deviation for each item suggested that students majoring in forensic have average enterprising interests. No items had a median or mode of 1.0 (Strongly Dislike). Manage a Department Within a Large Company had both a median and mode of 5.0 (Strongly Like). The other items were split, with about half having medians and modes suggesting dislike and the other half having medians and modes suggesting like or interest. The item with the highest average interest score was Manage a Department Within a Large Company (4.19), and the item with the lowest average interest score was Start Your Own Business (2.42). Five of the 10 items showed minimal negative skewness, while four showed minimal positive skewness. Manage a Department Within a Large Company had a high negative skewness value (-1.43), suggesting general interest in this item was on the higher end.

Table 17

Descriptive Statistics for Survey Items Measuring Conventional Interests

Item	*M*	Median	Mode	*SD*	Skewness
Develop a Spreadsheet Using Computer Software	3.58	4.00	4.00	1.02	-0.79
Proofread Records or Forms	3.24	3.00	4.00	1.11	-0.21
Install Software Across Computers on a Large Network	3.57	4.00	4.00	1.05	-0.43
Operate a Calculator	3.44	4.00	4.00	1.13	-0.24
Keep Shipping and Receiving Records	4.30	4.00	4.00	0.72	-0.95
Calculate the Wages of Employees	3.72	4.00	4.00	1.28	-0.81
Inventory Supplies Using a Hand-Held Computer	3.37	4.00	4.00	1.27	-0.35
Record Rent Payments	3.06	3.00	4.00	1.30	-0.08
Keep Inventory Records	2.58	3.00	2.00	1.05	0.09
Stamp, Sort, and Distribute Mail for an Organization	2.47	2.00	2.00	1.12	0.13

The mean, median, mode and standard deviation for each item suggested that students majoring in forensic have above average conventional interests. No items had a median or mode of 1.0 (Strongly Dislike) or 5.0 (Strongly Like). The most common median and mode value for these 10 items was 4.0 (Like). The item with the highest average interest score was Keep Shipping and Receiving Records (4.30), and the item with the lowest average interest score was Stamp, Sort, and Distribute Mail for an Organization (2.47). Eight of the 10 items showed some negative skewness, while only two showed minimal positive skewness. This suggests general interest in these items was on the higher end.

Frequencies.

The frequency of each response choice, as well as the percent of each response, for every interest item are presented in Appendix E. Frequency results were divided by subconstruct. Results from the frequency statistics of realistic interests were variable, but leaned slightly toward the positive interest spectrum. Strongly Like was never the most frequent response, but Like was the most frequent response for six of 10 items. Strongly Dislike was never the most frequent response, but Dislike was the most frequent response for three of the items. Approximately half of participants selected Dislike or Strongly Dislike for four items: Build Kitchen Cabinets, Lay Brick or Tile, Set Up and Operate Machines to Make Products, and Put Out Forest Fires. More than half of participants selected Like or Strongly Like for five items: Repair Household Appliances, Raise Fish in a Fish Hatchery, Assemble Electronic Parts, Drive a Truck or Delivery Packages to Homes, and Test the Quality of Parts Before Shipment.

Results from the frequency statistics of investigative interests were also variable. Strongly Like was only the most frequent response for one item, but Like was the most frequent response for four items. Strongly Dislike was also only the most frequent response once, but Dislike was the most frequent response for six of 10 items. Approximately half of participants responded with Like or Strongly Like for four items: Conduct Chemical Experiments, Study the Movement of Planets, Examine Blood Samples Using a Microscope, and Do Laboratory Tests to Identify Diseases. Whereas, half of the sample population selected Dislike or Strongly Dislike only for Investigate Cause of a Fire. Responses were frequently evenly distributed between the answer choices rather than skewed to one extreme or the other.

Results from the frequency statistics of artistic interests suggested a higher interest in this area than others. Strongly Like was the most frequent response for two items, and Like was the most frequent response for seven of 10 items. Strongly Dislike was never the most frequent response, and Dislike was the most frequent response for only three of the items. Responses tended to hover in the middle, but those leaning toward one end or the other were more strongly skewed toward the respective pole than items in the other sections. More than half of participants selected Like or Strongly Like for Draw Pictures and Paint Sets for a Play, and approximately 90% selected Like or Strongly Like for Sing in a Band and Edit Movies. More than 75% of students selected Dislike or Strongly Dislike for Play a Musical Instrument.

Results from the frequency statistics of social interests suggested a lower interest in this area than others. Strongly Like was never the most frequent response, and Like was the most frequent response for only three items. Strongly Dislike was never the most frequent response, but Dislike was the most frequent response for six of 10 items. Responses tended be Dislike, Unsure, or Like, with fewer students responding with the extremes. More than half of participants selected Like or Strongly Like for the items Perform Rehabilitation Therapy and Help Conduct a Group Therapy Session. More than half of students selected Dislike or Strongly Dislike for the following items: Help People with Personal and Emotional Problems, Do Volunteer Work at a Non-Profit Organization, Teach Sign Language to People with Hearing Disabilities, Take Care of Children at a Daycare, and Teach a High School Class.

Results from the frequency statistics of enterprising interests were variable. Strongly Like was the most frequent response for one item, and Like was the most

frequent response for four items. Strongly Dislike was never the most frequent response, but Dislike was the most frequent response for five of 10 items. Approximately half of participants selected Like or Strongly Like for four items: Manage a Retail Store, Operate a Beauty Salon or Barber Shop, Negotiate Business Contracts, and Represent a Client in a Lawsuit. More than 80% chose Like or Strongly Like for Mange a Department Within a Large Company. Conversely, more than half of participants selected Dislike or Strongly Dislike for four items: Buy and Sell Stocks and Bonds, Start Your Own Business, Sell Merchandise at a Department Store, and Manage a Clothing Store.

Results from the frequency statistics of conventional interests suggested a more positive interest in this area. Strongly Like was never the most frequent response, but Like was the most frequent response for eight of 10 items. Strongly Dislike was never the most frequent response, and Dislike was only the most frequent response for two of 10 items. More than half of participants selected Like or Strongly Like for six items: Develop a Spreadsheet Using Computer Software, Install Software Across Computers on a Large Network, Operate a Calculator, Calculate the Wages of Employees, Inventory Supplies Using a Hand-Held Computer, and Keep Shipping and Receiving Records (92%). Conversely, more than half of participants only selected Dislike or Strongly Dislike for Stamp, Sort, and Distribute Mail for an Organization.

Reliability.

Reliability was first measured by calculating Cronbach's alpha for the entire construct and each subconstruct. The overall Cronbach's alpha for the interests construct was found to be 0.924. This shows a very high level of internal consistency

within the items included in this section. Cronbach's alpha for the subconstructs of realistic, investigative, artistic, social, enterprising, and conventional were found to be 0.680, 0.788, 0.689, 0.741, 0.674, and 0.710, respectively. Lower Cronbach's alpha values for the subconstructs were expected due to each section having only 10 items (Pallant, 2007). However, all values are still close to the recommended 0.7 established by Nunnally (1978) and half exceed this standard value.

Another value used to establish reliability was Cronbach's alpha if Item Deleted. If removing an item raises the Cronbach's alpha value, the item should be considered for removal. Cronbach's alpha if Item Removed for each item is listed by subconstruct in Tables 18-23. Removing any item from the realistic interests, social interests, and conventional interests subconstructs would lower the Cronbach's Alpha value, and therefore weaken the reliability. One of 10 items within the investigative interests subconstruct would raise the Cronbach's Alpha value if deleted. Two of 10 items within the artistic interests subconstruct would raise the Cronbach's alpha value if deleted. One of 10 items within the enterprising interests subconstruct would raise the Cronbach's alpha value if deleted. These four items include Develop a New Medicine, Create Special Effects for Movies, Perform Jazz or Tap Dance, and Manage a Department Within a Large Company. These items were flagged for potential removal from the survey instrument, pending analysis of other reliability and validity values.

Table 18

Cronbach's Alpha if Item Deleted for Realistic Interests (α =0.680)

Item	α if item deleted
Build Kitchen Cabinets	0.663
Lay Brick or Tile	0.653
Repair Household Appliances	0.671
Raise Fish in a Fish Hatchery	0.657
Assemble Electronic Parts	0.650
Drive a Truck or Deliver Packages to Offices and Homes	0.632
Test the Quality of Parts Before Shipment	0.661
Repair and Install Locks	0.666
Set Up and Operate Machines to Make Products	0.656
Put of Forest Fires	0.650

Table 19

Cronbach's Alpha if Item Deleted for Investigative Interests (α =0.788)

Item	α if item deleted
Develop a New Medicine	0.817
Study Ways to Reduce Water Pollution	0.782
Conduct Chemical Experiments	0.740
Study the Movement of Planets	0.759
Examine Blood Samples Using a Microscope	0.756
Investigate the Cause of a Fire	0.752
Develop a Way to Better Predict the Weather	0.780
Work in a Biology Lab	0.786
Invent a Replacement for Sugar	0.737
Do Laboratory Tests to Identify Diseases	0.774

Table 20

Cronbach's Alpha if Item Deleted for Artistic Interests (α =0.689)

Item	α if item deleted
Write Books or Plays	0.655
Play a Musical Instrument	0.663
Compose or Arrange Music	0.632
Draw Pictures	0.633
Create Special Effects for Movies	0.706
Paint Sets for a Play	0.657
Write Scripts for Movies or Television Shows	0.678
Perform Jazz or Tap Dance	0.695
Sing in a Band	0.664
Edit Movies	0.667

Table 21

Cronbach's Alpha if Item Deleted for Social Interests (α =0.741)

Item	α if item deleted
Teach an Individual an Exercise Routine	0.714
Help People with Personal and Emotional Problems	0.714
Give Career Guidance to People	0.728
Perform Rehabilitation Therapy	0.736
Do Volunteer Work at a Non-Profit Organization	0.733
Teach Children How to Play Sports	0.727
Teach Sign Language to People With Hearing Disabilities	0.722
Help Conduct a Group Therapy Session	0.716
Take Care of Children at a Daycare Center	0.699
Teach a High School Class	0.715

Table 22

Cronbach's Alpha if Item Deleted for Enterprising Interests (α =0.674)

Item	α if item deleted
Buy and Sell Stocks and Bonds	0.628
Manage a Retail Store	0.653
Operate a Beauty Salon or Barber Shop	0.661
Manage a Department within a Large Company	0.684
Start Your Own Business	0.639
Negotiate Business Contracts	0.639
Represent a Client in a Lawsuit	0.639
Market a New Line of Clothing	0.628
Sell Merchandise at a Department Store	0.662
Manage a Clothing Store	0.664

Table 23

Cronbach's Alpha if Item Deleted for Conventional Interests (α =0.710)

Item	α if item deleted
Develop a Spreadsheet Using Computer Software	0.690
Proofread Records or Forms	0.683
Install Software Across Computers on a Large Network	0.694
Operate a Calculator	0.668
Keep Shipping and Receiving Records	0.694
Calculate the Wages of Employees	0.708
Inventory Supplies Using a Hand-Held Computer	0.705
Record Rent Payments	0.669
Keep Inventory Records	0.674
Stamp, Sort, and Distribute Mail for an Organization	0.694

An additional measurement collected to determine the reliability of the results of this survey instrument was the mean inter-item correlation value. The overall mean inter-item correlation value for the interests construct was found to be 0.171, which is within the recommended range of 0.15 to 0.50 (Clark & Watson, 1995). The mean inter-item correlations for the subconstructs of realistic, investigative, artistic, social, enterprising, and conventional were found to be 0.173, 0.266, 0.189, 0.225, 0.174, and

0.203, respectively. Individual inter-item correlations were also examined for each subconstruct (see Appendix F). While 12% of inter-item correlation values were negative and 26% were considered below range, Kopalle and Lehmann (1997) argued that an over-exaggeration of Cronbach's alpha can occur if items are deleted strictly for low inter-item correlation. Develop a New Medicine, Create Special Effects for Movies, Perform Jazz or Tap Dance, Manage a Department Within a Large Company, Sell Merchandise at a Department Store, and Manage a Clothing Store all had several negative or low correlations with multiple other items and were considered for removal depending on their values within other reliability and validity measurements.

Validity.

Validity for the interests construct was measured using exploratory factor analysis (EFA), and specifically principal component analysis (PCA). A scree plot was first obtained to verify that six components were being measured within the construct (see Figure 4). This is confirmed by the points becoming close together and beginning to level off after the sixth point.

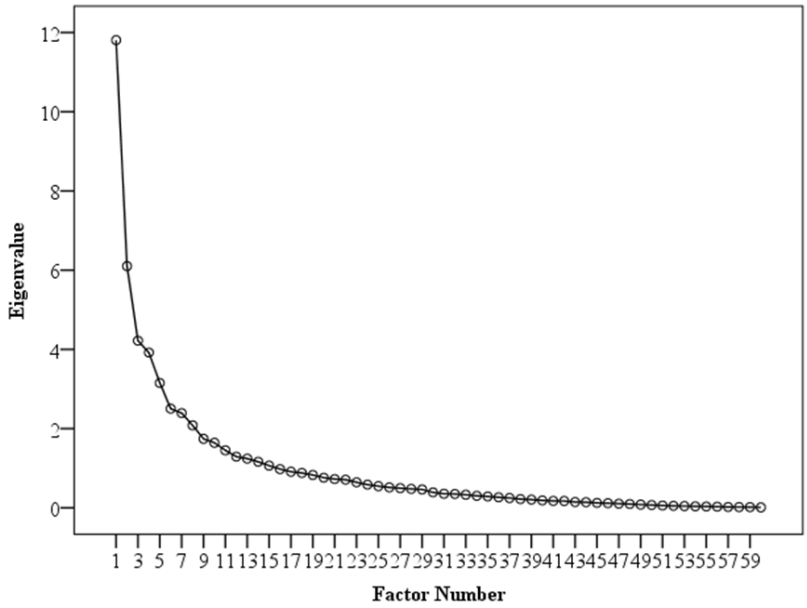

Figure 4. Scree plot of items measuring interests illustrating six subcomponents being measured within this section of the survey instrument.

The PCA for the six subcomponents being measured within the interests section can be seen in Tables 24-29. Fifty six of the 60 items loaded above 0.3, making these items valid within the construct. The four items that loaded below 0.3 were Develop a New Medicine, Create Special Effects for Movies, Perform Jazz or Tap Dance, and Manage a Department within a Large Company. Lower values than 0.3 can be expected when the sample size is less than 150 or if there is not a 10:1 ration of participants to items (Nunnally, 1978; Stevens, 1996; Tabachnick & Fidell, 2007). This was taken into consideration when making a final determination as to whether or not an item should be deleted from the survey instrument.

Table 24

Component Matrix for Survey Items Measuring Realistic Interests

Item	Component 1
Build Kitchen Cabinets	0.470
Lay Brick or Tile	0.528
Repair Household Appliances	0.368
Raise Fish in a Fish Hatchery	0.494
Assemble Electronic Parts	0.564
Drive a Truck or Deliver Packages to Offices and Homes	0.641
Test the Quality of Parts Before Shipment	0.446
Repair and Install Locks	0.421
Set Up and Operate Machines to Make Products	0.530
Put Out Forest Fires	0.572

Table 25

Component Matrix for Survey Items Measuring Investigative Interests

Item	Component 1
Develop a New Medicine	0.019
Study Ways to Reduce Water Pollution	0.398
Conduct Chemical Experiments	0.850
Study the Movement of Planets	0.707
Examine Blood Samples Using a Microscope	0.741
Investigate the Cause of a Fire	0.698
Develop a Way to Better Predict the Weather	0.504
Work in a Biology Lab	0.404
Invent a Replacement for Sugar	0.826
Do Laboratory Tests to Identify Diseases	0.526

Table 26

Component Matrix for Survey Items Measuring Artistic Interests

Item	Component 1
Write Books or Plays	0.587
Play a Musical Instrument	0.424
Compose or Arrange Music	0.700
Draw Pictures	0.796
Create Special Effects for Movies	0.233
Paint Sets for a Play	0.478
Write Scripts for Movies or Television Shows	0.339
Perform Jazz or Tap Dance	0.248
Sing in a Band	0.656
Edit Movies	0.594

Table 27

Component Matrix for Survey Items Measuring Social Interests

Item	Component 1
Teach an Individual an Exercise Routine	0.623
Help People with Personal and Emotional Problems	0.590
Give Career Guidance to People	0.482
Perform Rehabilitation Therapy	0.386
Do Volunteer Work at a Non-Profit Organization	0.443
Teach Children How to Play Sports	0.510
Teach Sign Language to People With Hearing Disabilities	0.536
Help Conduct a Group Therapy Session	0.604
Take Care of Children at a Daycare Center	0.701
Teach a High School Class	0.605

Table 28

Component Matrix for Survey Items Measuring Enterprising Interests

Item	Component 1
Buy and Sell Stocks and Bonds	0.630
Manage a Retail Store	0.473
Operate a Beauty Salon or Barber Shop	0.394
Manage a Department within a Large Company	0.186
Start Your Own Business	0.541
Negotiate Business Contracts	0.598
Represent a Client in a Lawsuit	0.587
Market a New Line of Clothing	0.631
Sell Merchandise at a Department Store	0.491
Manage a Clothing Store	0.475

Table 29

Component Matrix for Survey Items Measuring Conventional Interests

Item	Component 1
Develop a Spreadsheet Using Computer Software	0.508
Proofread Records or Forms	0.594
Install Software Across Computers on a Large Network	0.462
Operate a Calculator	0.595
Keep Shipping and Receiving Records	0.513
Calculate the Wages of Employees	0.404
Inventory Supplies Using a Hand-Held Computer	0.410
Record Rent Payments	0.630
Keep Inventory Records	0.640
Stamp, Sort, and Distribute Mail for an Organization	0.538

Contextual Supports and Barriers

Contextual supports are environmental, facilitative influences that people believe will assist their goals (Lent & Brown, 2006). Contextual barriers are environmental obstacles that people believe will challenge their goals (Lent & Brown, 2006). The same factor, like financial aid, can be a support for one individual and a barrier for another. Thirty-seven items were included within the contextual supports

and barriers section of the survey instrument. Age, Gender, Race, and Ethnicity from the demographics section were also considered within the contextual supports and barriers to create a total of 41 items. Some items were combined to determine a single support or barrier. One item asked about the student's highest ACT score while the following item asked about the student's highest SAT score. Since almost all students took one or the other, these were combined into a single support or a single barrier. Having to work was considered a barrier unless students answered in the following item that their job was related to forensic science. Results from race and ethnicity were combined into one answer that resulted in a support or a barrier. International Baccalaureate (IB) Courses in High School was not included in the analysis, because no students in the sample population participated in IB coursework. This generated 37 items designed to measure whether a variety of common factors affecting choice goals of students were supports or barriers for students who have chosen to major in forensic science.

Descriptive Statistics.

Contextual supports and barriers were measured using a variety of item designs, including fill in the blank, multiple choice and Likert scales. The researcher determined which responses were considered supports and which answers were considered barriers for each item (see Appendix G). Responses considered to be contextual barriers were given a numerical value of 1 and responses considered to be contextual supports were given a value of 2. The mean, median, mode, standard deviation, and skewness for each contextual supports and barriers item are outlined in Table 30.

Table 30

Descriptive Statistics for Survey Items Measuring Contextual Supports and Barriers

Item	*M*	Median	Mode	*SD*	Skewness
High School Graduation Year	1.95	2.00	2.00	0.22	-4.18
Forensic Science Course in High School	1.23	1.00	1.00	0.42	1.32
Liberal Arts Courses in High School	1.61	2.00	2.00	0.49	-0.45
Math Courses in High School	1.75	2.00	2.00	0.44	-1.16
Science Courses in High School	1.54	2.00	2.00	0.50	-0.18
AP Courses in High School	1.90	2.00	2.00	0.30	-2.70
ACT or SAT Score	1.85	2.00	2.00	0.36	-1.98
Forensic Science Extracurricular Activities	1.10	1.00	1.00	0.30	2.70
Financial Aid Status	1.86	2.00	2.00	0.35	-2.12
Financial Aid from Family	1.76	2.00	2.00	0.43	-1.24
Financial Aid, Debt-Free	1.73	2.00	2.00	0.44	-1.08
Financial Aid, Debt	1.44	1.00	1.00	0.50	0.23
Work Status	1.22	1.00	1.00	0.41	1.41
Home Environment	1.86	2.00	2.00	0.35	-2.13
Social Environment	1.78	2.00	2.00	0.41	-1.41
Academic Environment	1.91	2.00	2.00	0.29	-2.95
Paternal Figure's Influence on Decision	1.30	1.00	1.00	0.46	0.87
Maternal Figure's Influence on Decision	1.37	1.00	1.00	0.49	0.56
Siblings' Influence on Decision	1.22	1.00	1.00	0.41	1.41
Relatives' Influence on Decision	1.22	1.00	1.00	0.41	1.41
Peers' Influence on Decision	1.19	1.00	1.00	0.39	1.61
Mentor's Influence on Decision	1.19	1.00	1.00	0.39	1.61
High School STEM Teachers' Influence on Decision	1.10	1.00	1.10	0.30	2.70
High School Non-STEM Teachers' Influence on Decision	1.10	1.00	1.00	0.30	2.70
College STEM Teachers' Influence on Decision	1.22	1.00	1.00	0.41	1.41

(continued)

Item	*M*	Median	Mode	*SD*	Skewness
College Non-STEM Teachers' Influence on Decision	1.14	1.00	1.00	0.35	2.13
High School Counselor's Influence on Decision	1.10	1.00	1.00	0.30	2.70
College Advisor's Influence on Decision	1.25	1.00	1.00	0.44	1.16
Family or Friends Majoring in Forensic Science	1.25	1.00	1.00	0.44	1.16
Family or Friends Working in Forensic Science Field	1.19	1.00	1.00	0.39	1.61
Job Shadowed with Forensic Scientist	1.16	1.00	1.00	0.37	1.85
Obtained Information about Forensic Science Before Making Decision	1.80	2.00	2.00	0.40	-1.51
Source of Most Information Obtained about Forensic Science	1.68	2.00	2.00	0.47	-0.81
Age	1.94	2.00	2.00	0.25	-3.66
Gender	1.25	1.00	1.00	0.44	1.16
Race/Ethnicity	1.59	2.00	2.00	0.49	-0.39

The mean, median, and mode for each item all suggested that students had multiple contextual supports and barriers that affected their choice to major in forensic science. The standard deviation for each item was low due to the binary nature of the items. Based on the mean and standard deviations, students were mostly divided on the following factors being a contextual support or a contextual barrier: Liberal Arts Courses in High School, Science Courses in High School, Financial Aid Debt, Maternal Figure's Influence on Decision to Major in Forensic Science, Source of Most Information Obtained about Forensic Science, and Race/Ethnicity. All items measuring the influence individuals had on a student's decision to major in forensic science displayed positive skewness, suggesting that these answers were considered contextual barriers or clustered at the low end (Pallant, 2007). Several other items displayed negative skewness values, like High School Graduation Year, AP Courses in High

School, Age, and Support from Academic Environment. This suggested that these answers were considered contextual supports or clustered at the high end.

Frequencies.

The frequency of each response choice as a support or barrier, as well as the percent of each response as a support or barrier, for every contextual supports and barriers item are both presented in Appendix E. Results from the frequency statistics illustrated a divide in contextual supports and barriers within a student's environment. The following items were determined to be considered contextual supports for more than half of the participants in the survey: Graduation Year, Liberal Arts Courses in High School, Math Courses in High School, Science Courses in High School, AP Courses in High School, ACT/SAT Scores, Financial Aid Status, Financial Support from Family, Debt-Free Financial Aid, Home Environment, Social Environment, Academic Environment, Information Obtained Before Majoring in Forensic Science, Source of Information Before Majoring in Forensic Science, Age, and Race. The following items (or lack of) were determined to be considered contextual barriers for more than half of the participants in the survey: Forensic Science Course in High School, Forensic Science Extracurricular Activities, Financial Aid Debt, Work Status, Family or Friend Majoring or Majored in Forensic Science, Family or Friend Working or Worked in Forensic Science field, Job Shadowed a Forensic Scientist, and Gender. While home, social, and academic environments were considered to be contextual supports, the majority of students stated that all individuals listed on the survey had little to no influence on their decision to major in Forensic Science. The highest support was High School Graduation Year, with 95% of students having this as a contextual

support. The highest barrier was Forensic Science Extracurricular Activities in High School, with 90% of the sample population having not participated in such an opportunity. Similarly, 77% of students did not take or did not have the opportunity to take a course in Forensic Science during high school.

Reliability.

Reliability was first measured by calculating Cronbach's alpha for the contextual supports and barriers construct. The Cronbach's alpha for the construct was found to be 0.740. This shows an acceptable level of internal consistency within the items included in this section. Another value used to establish reliability was Cronbach's alpha if Item Deleted. If removing an item raises the Cronbach's alpha value, then the item should be considered for removal. Cronbach's alpha if Item Deleted for each contextual supports and barriers item is listed in Table 31. Four of the 36 items analyzed within the contextual supports and barriers construct would raise the Cronbach's alpha value if deleted. These included Liberal Arts Courses in High School, Math Courses in High School, Science Courses in High School, and Race/Ethnicity. These items were flagged for potential removal from the survey instrument, pending analysis of other reliability and validity values.

Table 31

Cronbach's alpha if Item Deleted for Survey Items Measuring Contextual Supports and Barriers (α = 0.744)

Item	α if item deleted
High School Graduation Year	0.742
Forensic Science Course in High School	0.733
Liberal Arts Courses in High School	0.746
Math Courses in High School	0.746
Science Courses in High School	0.747
AP Courses in High School	0.742
ACT or SAT Score	0.741
Forensic Science Extracurricular Activities	0.735
Financial Aid Status	0.742
Financial Aid from Family	0.733
Financial Aid, Debt-Free	0.735
Financial Aid, Debt	0.735
Work Status	0.740
Home Environment	0.732
Social Environment	0.744
Academic Environment	0.743
Paternal Figure's Influence on Decision	0.717
Maternal Figure's Influence on Decision	0.721
Siblings' Influence on Decision	0.724
Relatives' Influence on Decision	0.728
Peers' Influence on Decision	0.721
Mentor's Influence on Decision	0.721
High School STEM Teachers' Influence on Decision	0.723
High School Non-STEM Teachers' Influence on Decision	0.727
College STEM Teachers' Influence on Decision	0.722
College Non-STEM Teachers' Influence on Decision	0.725
High School Counselor's Influence on Decision	0.728
College Advisor's Influence on Decision	0.725
Family or Friends Majoring in Forensic Science	0.740
Family or Friends Working in Forensic Science Field	0.742
Job Shadowed with Forensic Scientist	0.731
Obtained Information about Forensic Science Before Making Decision	0.736
Source of Most Information Obtained about Forensic Science	0.733
Age	0.743
Gender	0.737
Race/Ethnicity	0.746

An additional measurement collected to determine the reliability of the results of this survey instrument was the mean inter-item correlation value. The mean inter-item correlation value was found to be 0.075, which is outside the recommended range of 0.15 to 0.50 (Clark & Watson, 1995). Individual inter-item correlations were also examined (see Appendix F). Of all the inter-item correlations for contextual supports and barriers, 30% were found to be negative. Only 7% were above the ideal value of 0.3. However, the Likert scale items about the influences of individuals on a student's decision to major in forensic science had 94% within range and 48% above 0.3. The correlation value below the acceptable range and several negative or low inter-item correlation values did not suggest this that this section of the survey instrument was reliable for measuring contextual supports and barriers for students majoring in forensic science.

Validity.

Validity for the contextual supports and barriers construct was measured using exploratory factor analysis (EFA), and specifically principal component analysis (PCA). A scree plot was first obtained to verify the number of components being measured within the construct (see Figure 5). Based on the two dips in the screen plot before beginning to level off, it can be assumed that there is more than one component being measured within the contextual supports and barriers section of the survey instrument. This would suggest that there may be subconstructs within this construct. It begins to level off after the third point, so the researcher decided to measure validity using three unknown subconstructs.

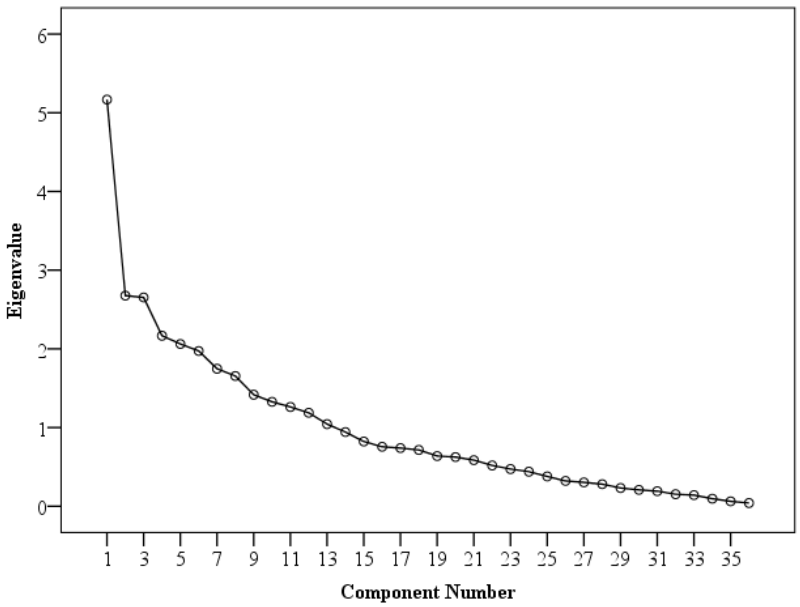

Figure 5. Scree plot of items measuring contextual supports and barriers illustrating three potential subcomponents being measured within this section of the survey instrument.

The PCA for the three potential unknown subcomponents being measured within the contextual supports and barriers section can be seen in Table 32. The 12 Likert scale items measuring the influences of different individuals on a student's choice to major in forensic science all loaded above 0.3 within Component 1. The following six items loaded above 0.3 within Component 2: High School Graduation Year, Forensic Science Course in High School, ACT/SAT Score, Financial Aid from Family, Job Shadowed with a Forensic Scientist, and Age. The following three items loaded above 0.3 within Component 3: Science Courses in High School, Work Status, and Source of Most Information Obtained about Forensic Science. The remaining 15 items either did not load above 0.3 in any component or loaded above 0.3 in multiple components. Lower values than 0.3 can be expected when the sample size is less than 150 or if there is not a 10:1 ration of participants to items (Nunnally, 1978; Stevens,

1996; Tabachnick & Fidell, 2007). This was taken into consideration when making a final determination as to whether or not an item should be deleted from the survey instrument or if this section of the survey instrument was valid.

Table 32

Component Matrix for Survey Items Measuring Contextual Supports and Barriers

Item	Component 1	Component 2	Component 3
High School Graduation Year	-0.045	0.629	-0.614
Forensic Science Course in High School	0.196	0.392	0.233
Liberal Arts Courses in High School	0.183	-0.158	0.256
Math Courses in High School	-0.118	0.339	0.343
Science Courses in High School	0.050	-0.002	0.382
AP Courses in High School	0.007	0.088	0.251
ACT or SAT Score	-0.016	0.321	0.097
Forensic Science Extracurricular Activities	0.102	0.518	0.343
Financial Aid Status	-0.012	0.137	0.272
Financial Aid from Family	0.133	0.486	0.103
Financial Aid, Debt-Free	0.230	0.164	0.037
Financial Aid, Debt	0.298	0.042	0.125
Work Status	0.259	-0.248	0.393
Home Environment	0.247	0.164	0.023
Social Environment	0.044	-0.078	-0.101
Academic Environment	0.108	-0.163	-0.264
Paternal Figure's Influence on Decision	0.668	-0.130	0.054
Maternal Figure's Influence on Decision	0.593	-0.067	-0.015
Siblings' Influence on Decision	0.540	-0.054	-0.174
Relatives' Influence on Decision	0.518	0.009	-0.288
Peers' Influence on Decision	0.647	-0.051	-0.075
Mentor's Influence on Decision	0.713	-0.161	-0.212
High School STEM Teachers' Influence on Decision	0.653	0.179	-0.045
High School Non-STEM Teachers' Influence on Decision	0.542	0.161	0.090
College STEM Teachers' Influence on Decision	0.656	-0.054	-0.050
College Non-STEM Teachers' Influence on Decision	0.705	-0.306	0.099
High School Counselor's Influence on Decision	0.503	0.160	-0.038

(continued)

Item	Component 1	Component 2	Component 3
College Advisor's Influence on Decision	0.609	-0.040	-0.092
Family or Friends Majoring in Forensic Science	0.160	0.246	-0.056
Family or Friends Working in Forensic Science Field	0.132	0.215	-0.147
Job Shadowed with Forensic Scientist	0.233	0.453	0.138
Obtained Information about Forensic Science Before Making Decision	0.027	0.380	0.613
Source of Most Information Obtained about Forensic Science	0.215	0.245	0.521
Age	-0.044	0.630	-0.671
Gender	0.250	-0.046	0.026
Race/Ethnicity	-0.009	0.232	-0.155

Summary

Data collected from the study were divided into the different sections or constructs measured in the survey: self-efficacy, outcome expectations, interests, and contextual supports and barriers. The interests section was further subdivided into the six subconstructs or areas of interest: realistic, investigative, artistic, social, enterprising and conventional.

Descriptive and frequency statistics showed that student have high self-efficacy within the tasks and skills associated with the field of forensic science and necessary to pursue this degree option. These statistics also showed that student have high outcome expectations for their futures and career goals if they pursue a degree in forensic science. Students had average realistic, investigative and enterprising interests. Students had above average artistic and conventional interests and below average social interests. A variety of contextual supports and barriers affected students' choice goals to major in forensic science.

Reliability and validity tests were run for all constructs and subconstructs within the survey instrument. With no or minor modifications, the areas of self-efficacy, outcome expectations, and interests were found to be reliable and valid measurements of students majoring in forensic science. Based on the same reliability and validity tests, the area of contextual supports and barriers was found not to be a reliable or valid measurement of students majoring in forensic science. Discussion, conclusions, and recommendations based on these results are discussed in the next chapter.

Chapter 5: Discussion

Introduction

With an increasing importance placed on the field of forensic science in the criminal justice system, the greatest challenges currently facing the field are a shortage in workforce, education, and training for new forensic scientists (National Institute of Justice, 2006). The National Research Council (2009) also agreed that many experts in the field of forensics lack sufficient education and training. Colleges and universities across the country have now been encouraged to strengthen undergraduate and graduate programs in forensic science.

More knowledge about the students pursuing careers in forensic science and their motivations to do so would provide university programs with information to improve recruitment and retention efforts. A common theoretical model for investigating career and major choice is the Social Cognitive Career Theory (SCCT; Lent, Brown, Hackett, 1994), which looks at the effects self-efficacy, outcome expectations, interests, and contextual supports and barrier have on major choice goal. The various influences on students' choice to major in STEM, in general, have been investigated using SCCT and other career choice theories, but little research has focused on why students major in forensic science, in particular. Some entities consider forensic science a STEM field, while others find it to be more interdisciplinary in nature (Horton et al., 2013). Because of the diversity within the field of forensics, the question arose as to whether the same factors affecting traditional STEM students in selecting a college major also applied to forensic science students. Differences in the roles these factors

play on students' choice goals could greatly affect how the issue of generating well-educated forensic scientists should be addressed.

The purpose of this study was to design a reliable and valid instrument based on Social Cognitive Career Theory (SCCT) that measures self-efficacy, outcome expectations, and interests of forensic science majors, as well as perceived contextual supports and barriers on students' decisions to major in forensic science. The new survey instrument designed for this study examined the effects of self-efficacy, outcome expectations, goals, interests, and contextual supports and barriers on student choice to major in forensic science. Before programs could begin to be adapted to fit the needs of students and the field of forensic science, it was important to first have a reliable and valid survey tool to measure what kind of students chose to major in forensic science and what factors influenced their choice.

Discussion

Self-efficacy.

Self-efficacy is defined as people's beliefs in their abilities to understand material or produce an action required to succeed (Bandura, 1986). Using descriptive and frequency statistics, it was found that students who decided to major in forensic science have high self-efficacy across a wide array of tasks and skills necessary to be successful in the field of forensic science. Reliability and validity measurements were obtained to determine whether any items from this section of the survey should be removed or modified. Because the sample size is small for the study, each item that produced results that brought reliability or validity into question was assessed on an individual basis (Nunnally, 1978; Stevens, 1996; Tabachnick & Fidell, 2007). The

values obtained were analyzed in relation to the actual item and its intended purpose in the survey. The researcher chose to remove the following items from the self-efficacy section of the survey based on individual analysis of each item in relation to the reliability and validity values obtained: Be Organized, Be Patient, Follow Rules, Work Alone, and Work in a Group. This reduced the self-efficacy section of the survey instrument from 26 to 21 items. The deletion of these items raised the Cronbach's Alpha value from 0.820 to 0.840. The mean inter-item correlation value was raised from 0.153 to 0.208. Both of these values, along with the remaining values in the component matrix, suggested this modified section of the survey instrument would provide reliable and valid results when measuring self-efficacy of students who made the choice to declare a major in forensic science. A fully modified survey instrument with the recommended changes to the self-efficacy section can be found in Appendix H.

Outcome expectations.

Outcome expectations are defined as beliefs about the consequences or benefits of performing specific behaviors (Lent & Brown, 2006). Using descriptive and frequency statistics, it was found that students believe the choice to major in forensic science will provide positive outcomes for a variety of future career and life scenarios. Reliability and validity measurements were obtained to determine whether any items should be removed or modified. No items were brought into question, and the researcher made the decision to keep all 12 items in the outcome expectations section of the survey instrument. The Cronbach's alpha value of 0.800, mean inter-item correlation value of 0.257, and component matrix values were all maintained and suggested that this section of the survey instrument would provide reliable and valid

results when measuring outcome expectations of students who made the choice to declare a major in forensic science. A fully modified survey instrument with the no changes to the outcome expectations section can be found in Appendix H.

Interests.

Interests are defined as people's typical likes, dislikes, and indifferences toward different material or activities (Lent & Brown, 2006). Using descriptive and frequency statistics, it was found that students who decided to major in forensic science have a variety of interests. As a whole, artistic interests were the most favored, while social interests were weakest. Conventional interests were also favorable. Realistic, investigative, and enterprising interests were variable, with an average level of interest for each.

Reliability and validity measurements were obtained to determine whether any items should be removed or modified. Because the sample size was small for the study, each item that produced results that brought reliability or validity into question was assessed on an individual basis. The values obtained were analyzed in relation to the actual item and its intended purpose within the survey. Because each subconstruct was made up of 10 items, no item could be removed without creating an imbalance of items measuring each subconstruct. Instead, the researcher recommends that the following items be replaced by new items to provide stronger validity and reliability of the results being measured by the subconstructs: Develop a New Medicine within investigative (I) interests, Paint Sets for a Play and Perform Jazz or Tap Dance within artistic (A) interests, and Manage a Department Within a Large Company within enterprising (E) interests. The researcher also recommends that the following items within the

enterprising (E) interests subconstruct be reviewed and potentially modified due to strong similarities in verbiage: Manage a Retail Store, Market a New Line of Clothing, Sell Merchandise at a Department Store, and Manage a Clothing Store.

The deletion or replacement of the four items in the interest section lowered the Cronbach's Alpha value from 0.924 to 0.922, but the mean inter-item correlation value was raised from 0.171 to 0.176. Both of these values, along with the remaining values in the inter-item correlation matrices and component matrices, suggested this modified section of the survey instrument would provide reliable and valid results when measuring interests of students who choose to declare a major in forensic science. A fully modified survey instrument with the recommended changes to the interests section can be found in Appendix H.

Contextual supports and barriers.

Contextual supports are environmental, facilitative influences that people believe will assist their goals (Lent & Brown, 2006). Contextual barriers are environmental obstacles that people believe will challenge their goals (Lent & Brown, 2006). Using descriptive and frequency statistics, it was found that students had varying contextual supports and barriers within their environments that affected their choice goal to major in forensic science. Reliability and validity measurements were obtained to determine whether any items should be removed or modified. Because the sample size was small for the study, each item that produced results that brought reliability or validity into question was assessed on an individual basis. The values obtained were analyzed in relation to the actual item and its intended purpose within the survey. Reliability and validity values were inconsistent and primarily low throughout

this section of the survey instrument. Based on these results, the researcher made the decision that this section of the survey instrument did not possess reliability or validity for measuring the contextual supports and barriers that affected a student's choice goal to major in forensic science. A fully modified survey instrument with a newly designed contextual supports and barriers section can be found in Appendix H.

Limitations

When developing a new survey instrument, surveys are recommended to "confirm that the scale uses clear and appropriate language, has no obvious errors or omissions, and has at least adequate psychometric properties before it is used" (Johanson & Brooks, 2010, p. 394). The purpose of this study was to design a reliable and valid instrument based on Social Cognitive Career Theory (SCCT) that measures self-efficacy, outcome expectations, and interests of forensic science majors, as well as perceived contextual supports and barriers on students' decisions to major in forensic science. The survey was administered to a sample population to assure that suitable language was used, that no major errors existed, and that each section produced reliable and valid results before using data to make any changes to the forensic science program.

Lower reliability and validity values may be obtained for studies with sample sizes below 150 participants (Stevens, 1996; Tabachnick & Fidell, 2007) or sample sizes that do not have a 10:1 ratio of participants to items (Nunnally, 1978). Responses to the online survey in this study were received from 106 students, but only the results from 79 survey responses were used for analysis. Reliability and validity values were still found to be acceptable for the sections measuring self-efficacy, outcome expectations, and interests but not for the section measuring contextual supports and

barriers. A modified survey instrument was created with the minor changes in the self-efficacy and interests section as well as a new section measuring contextual supports and barriers (Appendix H). Additional reliability and validity studies should be done with the modified survey instrument before using the results to make any changes to the current forensic science program or providing the survey instrument to other forensic science programs across the country.

Limitations also existed within the survey implementation. The need for personal electronic devices to respond to the online survey prevented some students from participating. While the students were asked in advance to bring a personal electronic device with access to Wi-Fi on the day of survey administration, some students did not have or forgot to bring these devices. It would be beneficial to have a computer lab near the survey administration site that students could use if they did not bring a personal electronic device but wished to participate in the survey. Another option would have been to leave the survey open for multiple days, but this was suggested against since students would have time to answer the survey more than once or to share the URL with students who are not in the class or majoring in forensic science.

Analysis of data was limited by the survey design, producing challenges for the researcher in interpreting data. Survey items that allowed fill-in-the-blank or multiple responses produced many invalid or conflicting responses. A conservative approach to the analysis of data was taken, causing the number of survey data analyzed to be decreased by the removal of any individual's survey data with one or more invalid responses. To increase the sample size in future studies, the researcher recommends

removing or invalidating individual responses rather than a student's entire survey data for one invalid answer. The researcher also recommends replacing fill-in-the-blank items with multiple choice items instead. For example, instead of asking students to fill in their other major or other intended major, students should be given the option to choose STEM major or non-STEM major. A list of STEM and non-STEM majors at the university were already provided in the survey instrument.

One issue with modifying the survey instrument arose in the items within the subconstructs of the interests section. Because each subconstruct was made up of 10 items, no item could be removed without creating an imbalance of items measuring each subconstruct. The researcher recommends that the following items be replaced rather than deleted for this section. Develop a New Medicine within investigative (I) interests could be associated with having to go to medical school for students unfamiliar with this field. The researcher recommends replacing this item with Develop and Test a New Vaccine to see if more reliable and valid results would be produced. Paint Sets for a Play within artistic (A) interests limited students' interest in painting and tied it to the artistic field of theatre that one might not share the same interest in. Instead, the researcher recommends utilizing Paint a Mural in place of the previous option. Perform Jazz or Tap Dance within artistic (A) interests was also very specific and limited students' interests to certain styles of dance that can require extensive training. Instead, the researcher recommends replacing this item with Perform a Dance Routine. Manage a Department Within a Large Company within enterprising (E) interests produced abnormally positive results when compared to other enterprising interest items as well as items across the entire interests section. The researcher recommends rewording this

item by removing the word large to have Manage a Department Within a Company. The word large could have led participants to associate the word large with successful or rich, which would explain the spike in positive answers.

The researcher also recommends that the following items within the enterprising (E) interests subconstruct be reviewed and potentially modified due to strong similarities in verbiage: Manage a Retail Store, Market a New Line of Clothing, Sell Merchandise at a Department Store, and Manage a Clothing Store. Manage a Retail Store and Manage a Clothing Store could be asking the exact same question if the participant assumed the retail store sold clothing. Selling Merchandise at a Department Store might also be assumed to be related to a clothing store. If a participant did not have any interest in clothing, they may have answered negatively to all of these items. This could also explain the much higher response to the previous question about managing a department within a company. Manage a Retail Store and Sell Merchandise at a Department Store were decided to be acceptable items that would not pose a problem if the other two items were modified. The researcher suggests changing Market a New Line of Clothing to Market a New Product in an effort to assure that the item was measuring enterprising interests and not interests in clothing. Because an item already existed about managing a retail store, it is suggested that Manage a Clothing Store be changed to Manage a Small Business.

As mentioned previously, the sections measuring self-efficacy, outcome expectations, and interests were found to produce results that were both reliable and valid for measuring these factors within students who recently majored in forensic science with few to no modifications. The researcher found the section measuring

contextual supports and barriers to produce results that were neither reliable nor valid. While the Cronbach's alpha value of 0.744 is considered acceptable, the average inter-item correlation value of 0.075 was outside the acceptable range. The majority of individual inter-item correlation values were found to be negative or outside the acceptable range as well. The principal component analysis (PCA) to measure validity produced a scree plot that suggest multiple components were being measured within this section. This was not alarming, since contextual supports and barriers can be found in multiple environmental factors. However, the produced component matrix had almost half the values not loading onto any of the experimental components or loading high on more than one component.

Because low reliability and validity values can be obtained when sample sizes are low, the researcher chose to compare the reliability and validity values as well as the descriptive and frequency statistics obtained for each item to the actual wording of the item on the survey instrument. Measurement anchors and scales were erratic within the contextual supports and barriers construct and required the researcher to analyze each individual's response to each question within the section and reclassify it as a contextual support or barrier. This could have been one of the causes of the low reliability and validity values obtained for this section of the survey.

The researcher determined that the most significant issue with this section was the actual item anchors. Lent & Brown (2006) defined both contextual supports and barriers as factors that the individual *believes* to be assisting or challenging their goals. The items on this section of the survey, structured from a similar survey conducted by

Porter (2011), did not ask participants if they believed these factors to be supports or barriers but instead left it up to the researcher to make this determination for them.

Another issue found with the anchors was the section that asked students to rate the level of influence the following individuals had on their choice to major in forensic science. This series of items provided the most reliable and valid results numerically for the contextual supports and barrier section. Unfortunately, these items turned out to not be valid at all do to the interpretation of the anchor. For each of the 12 individuals listed on the survey, more than 60% of students said that the individual had no or slight influence on their decision to major in forensic science. These individuals were therefore all calculated as barriers to the student's choice goal of majoring in forensic science. However, these responses may be explained by the rise in individualism that has led young adults to be more independent and rely less on others in making life decisions (Twenge, 2006). Students are discouraged to let other people make big decisions for them, like having a parent or sibling tell them what to major in or where to go to school. Many individuals see not letting others influence their decisions as a positive trait or confirmation that this was their decision and no one else's. But just because an individual did not directly influence the student's choice goal to major in forensic science does not mean that the individual was a barrier to the decision or not supportive of it. This notion is reinforced by the fact that 86% of students said their home environment was supportive of their choice goal to major in forensic science, 79% said their social environment was supportive of their choice goal to major in forensic science, and 91% said their academic environment was supportive of their

choice goal to major in forensic science. While numerically reliable and valid, these items were not accurately measuring contextual supports and barriers.

Due to the poor reliability and validity of the data obtained as well as the many flaws in the survey items themselves within this section, the researcher recommends redesigning this section of the survey and administering additional pilot studies with the new design (see Appendix H). The modified section measuring contextual supports and barriers provided by the researcher no longer has fill-in-the-blank items or multiple response items, which would correct the previously mentioned issue of multiple invalid responses from these types of items.

Recommendations for Future Research

While the study of this new survey instrument did provide reliable and valid results for three of the four main factors influencing major selection for students pursuing a degree in forensic science, it was limited to the analysis of results from 79 students at a single institution and provided only a small sample of the students pursuing this major across the country. It is recommended that additional pilot studies be done using the modified survey instrument that has the necessary items removed or modified from the self-efficacy and interests sections, as well as the full removal and replacement of the contextual supports and barriers section with the new items provided by the researcher (see Appendix H). Once the survey instrument has been confirmed to produce reliable and valid data for all four constructs, additional studies can be done. It is recommend that a researcher at the current recruitment institution administer a reliable and valid survey each semester to students enrolled in the introduction to forensic science course. Determining patterns from semester to semester in student

enrollment and their motivations would provide the program with useful information for recruitment and retention efforts. It may also lead to modifications within the program to better meet the needs of students.

Because forensic science is an interdisciplinary field, it is also necessary to explore the differences in variables that have the most influence on the choice to major in this area between those students pursuing STEM disciplines within forensic science and those pursuing non-STEM related disciplines. Because of the high demand in the workforce for laboratory forensic scientists with a STEM background, it is important (a) to determine what motivates students to pursue this field and (b) if it is similar to the motivations for other STEM majors. However, it is also important to discover and compare the drive behind students pursuing non-STEM related careers in forensic science when the future demand for these positions in the job market is bleaker and the starting pay significantly less.

It is recommended that future studies be done to determine if the survey instrument can be utilized by forensic science programs across the country or even globally. Because of cultural differences, it cannot be assumed that results will be reliable and valid for different regions within the United States or for different countries without further testing. The survey items asking students their concurrent major and whether they are confident in their ability to pursue concurrent degrees would need to be removed for schools that have stand-alone forensic science degree programs.

Another study that could arise from the development of the survey instrument is further research into the interests of forensic science students. Students' individual RIASEC scores could be calculated using the results of the interests section of the

survey instrument. These RIASEC scores could then be compared to RIASEC scores generated by the Bureau of Labor Statistics for forensic science careers. It would be interesting to see if the RIASEC scores of students choosing to major in forensic science align with the RIASEC scores associated with careers in the field of forensics. If they do not align, the other sections of the survey instrument may be helpful in determining what made a student decide to major in forensic science if this field does not align with his or her personal interests.

Conclusion

The Social Cognitive Career Theory (SCCT) suggests that a student's choice goal is a result of self-efficacy, outcome expectations, interests, and contextual supports and barriers. All of these factors are believed to work together and upon each other to lead to a choice goal, which for this study was the choice to major in forensic science (Lent, Brown, & Hackett, 1994). The purpose of this study was to design a reliable and valid instrument based on Social Cognitive Career Theory (SCCT) that measures self-efficacy, outcome expectations, and interests of forensic science majors, as well as perceived contextual supports and barriers on students' decisions to major in forensic science.

The level of self-efficacy and outcome expectations for the sample population of students enrolled in an introductory forensic science course were both incredibly high. Students were highly confident in their abilities to perform various tasks related to the field of forensic science. A high level of self-efficacy positively impacts a student's choice goal, so these results suggest that self-efficacy played an important role in their decision. The only concern is that students' confidence levels in being successful in the

classes necessary to actually learn and perfect the skills to be a forensic scientist were not nearly as high. This suggests that students self-efficacy may be slightly inflated and not necessarily match their current abilities. In alignment with self-efficacy levels of future job skills, outcome expectations were equally high. Students believe that majoring in forensic science will provide them with a career that is both meaningful and exciting. However, students were also more realistic with their outcome expectations, with answers being slightly less high concerning salary and work-life balance. Based on their responses, students recognize that forensic scientists do not choose their careers for money or free time, but to serve their communities by assisting in solving crimes.

High self-efficacy and outcome expectations align with the theoretical framework that these factors affect a student's choice goal to major in forensic science. Because interests also play a role, it would be expected that students would have interests related to forensic science. Forensic science is an investigative field that relies heavily on science and detail to help solve crimes, and therefore, the RIASEC score for most forensic science careers begin with the letter I. Unlike the extremely high results for self-efficacy and outcome expectations, however, students' investigative (I) interests were average or even slightly below average. The investigative (I) interest questions focused heavily on the sciences though, which may not have interested students who plan to pursue non-STEM related positions in fieldwork. As mentioned previously, comparing results between STEM and non-STEM forensic science students would be beneficial for instances like this one. Students' highest levels of interests were in artistic (A) and conventional (C) interests. While the most common forensic science careers do not have an A in their 3-letter RIASEC scores, C is a common letter

associated with forensic science careers due to the attention to detail and repetitive nature of conventional interests. Another unexpected result was the low level of social (S) interests within the sample population. The lowest scoring item in that section was helping people with personal and emotional problems. While this might be expected since forensic science is often associated with the deceased or laboratory work, both which can require minimal social interaction, more than half of the participants are non-STEM forensic science majors and 22% declared their concurrent degree as psychology. These conflicting results within interests and major choice may suggest that students declare a major before having a thorough understanding of the field or that students' ideas of forensic science have been skewed by outside sources like the media.

It was difficult to determine the effects of contextual supports and barriers on students' choice goals to major in forensic science, due to the results not being reliable and valid. However, this error provided very beneficial information about the importance of survey design, pilot studies, and analysis. The survey instrument was designed based on previous studies and surveys that were said to be reliable and valid, but that does not mean that these models are reliable and valid for this field or sample population. Without a pilot study, the lack of reliability or validity within the contextual supports and barriers section would have gone unnoticed. The researcher also discovered the importance of not relying solely on numerical data for reliability and validity. The section of the survey that asked students to rate the level of influence various individuals had on the student's decision to major in forensic science was considered numerically reliable and valid. However, upon reading the responses, it was apparent that the items were not actually measuring what they were intended to

measure. Despite having been reviewed by an expert panel for content validity, the survey items were interpreted differently by the participants than the designers. It is critical for researchers to go back and review the items and the responses regardless of the results from reliability and validity studies. Based on a comparison of the results with the survey items themselves, it was possible to design a new section measuring contextual supports and barriers that should provide more reliable and valid data for future studies.

What was one of the highest scoring items, and possibly one of the most important responses on the survey, was that students believe that if they major in forensic science then they will be proud of themselves. That level of intrinsic motivation appears to be a major driving factor for students pursuing this major. If colleges and universities are being faced with students that believe in themselves and have high expectations for their futures in forensic science, then meeting the demand of producing highly educated and qualified forensic scientists is now on the academic programs to develop rigorous, interdisciplinary training that challenges these students to meet their goals.

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Appendix A: Approval Letters for Study

The UNIVERSITY of OKLAHOMA

Institutional Review Board for the Protection of Human Subjects

Approval of Initial Submission – Exempt from IRB Review – AP01

Date: November 01, 2016 **IRB#:** 7426

Principal Investigator: Stacey E Steinmetz **Approval Date:** 11/01/2016

Exempt Category: 2

Study Title: EXAMINATION OF THE VARIABLES THAT INFLUENCE A STUDENT'S CHOICE TO MAJOR IN FORENSIC SCIENCE: INSTRUMENT DEVELOPMENT, RELIABILITY, AND VALIDITY

On behalf of the Institutional Review Board (IRB), I have reviewed the above-referenced research study and determined that it meets the criteria for exemption from IRB review. To view the documents approved for this submission, open this study from the *My Studies* option, go to *Submission History*, go to *Completed Submissions* tab and then click the *Details* icon.

As principal investigator of this research study, you are responsible to:

- Conduct the research study in a manner consistent with the requirements of the IRB and federal regulations 45 CFR 46.
- Request approval from the IRB prior to implementing any/all modifications as changes could affect the exempt status determination.
- Maintain accurate and complete study records for evaluation by the HRPP Quality Improvement Program and, if applicable, inspection by regulatory agencies and/or the study sponsor.
- Notify the IRB at the completion of the project.

If you have questions about this notification or using iRIS, contact the IRB @ 405-325-8110 or irb@ou.edu.

Cordially,

Fred Beard, Ph.D.
Vice Chair, Institutional Review Board

November 1, 2016

STUDY TITLE: Examination of the Variables that influence a student's choice to major in forensic science: instrument development, reliability, and validity

Dear Ms. Steinmetz:

The University of Central Oklahoma Institutional Review Board has reviewed your application and accepts the decision made by the Institutional Review Board at the University of Oklahoma in regards to IRB Application #7426.

This approval is granted with the understanding that the research will be conducted in a manner consistent with the regulatory requirements in section 45 CFR 46, and under the policies and procedures as outlined in the Standard Operating Procedures of the OU Institutional Review Board.

If there are any modifications to the application, adverse events or allegations of non---compliance, the UCO IRB must be notified.

If you have any questions please do not hesitate to contact us. We wish you all the best with your research.

Best regards,



Robert D. Mather, Ph.D.
Chair, Institutional Review Board
University of Central Oklahoma
100 N. University Dr.
Edmond, OK 73034
405---974---5497
irb@uco.edu

October 31, 2016

Institutional Review Board
University of Oklahoma

I have reviewed the research design prepared by Stacey Steinmetz and I am willing for her to utilize my class in Introduction to Forensic Science (FRSC 2503), University of Central Oklahoma. She may recruit any willing student from that class to complete her survey on a date to be determined during the current fall 2016 semester.

Sincerely,



Dwight E. Adams, Ph.D.
Director

Appendix B: Oral Recruitment Script

Oral Recruitment Script to Participate in Research

Good morning. Would you be interested in participating in a research project being conducted at the Forensic Science Institute at the University of Central Oklahoma for a graduate research study at University of Oklahoma? You are being asked to participate because you are currently enrolled in FRSC 2503—Introduction to Forensic Science at UCO.

Our academic program coordinator, Stacey Steinmetz, is conducting this research project because she is hoping to learn more about what motivates students to major in forensic science. About 130 people will participate. If you agree to participate, she will be asking you to complete a survey she designed that addresses different motivations for majoring in forensic science. The survey should take about 15-20 minutes to complete. Only students over 18 years of age can participate.

Your participation in this research doesn't involve any direct risks or benefits to you, and no identifiable information is requested in the survey. All of the information she is collecting will still be kept secure and confidential, and only the researchers or the University of Oklahoma – Norman Campus Institutional Review Board will be able to look at it. If you have any questions about your rights as a participant or any concerns or complaints regarding your participation, you can contact Stacey Steinmetz at 405-974-6916 or ssteinmetz@uco.edu, her graduate advisor, Dr. Timothy Laubach, at 405-325-1498 or laubach@ou.edu, or OU's IRB at 405-325-8110 or irb@ou.edu.

Before you agree to participate, remember that your participation is completely voluntary, you don't have to answer any question, and you can stop at any time. If you do choose to participate and then change your mind, you won't be penalized in any way. If you choose not to participate, you will be asked to leave the classroom while other students complete the survey. No class content will be missed for non-participation. Finally, if you would like a printed copy of the information I've just read to you, you are welcome to have this one.

Appendix C: Online Consent Form

Online Consent to Participate in Research

Would you like to be involved in research at the University of Oklahoma?

I am Stacey Steinmetz from the department of Instructional Leadership and Academic Curriculum (ILAC) at the University of Oklahoma (OU), and I invite you to participate in my research project entitled Examination of the Variables that Influence a Student's Decision to Major in Forensic Science. This research is being conducted at the University of Central Oklahoma (UCO). You were selected as a possible participant because you are currently enrolled in FRSC 2503—Introduction to Forensic Science at UCO. You must be at least 18 years of age to participate in this study.

Please read this document and contact me to ask any questions that you may have BEFORE agreeing to take part in my research.

What is the purpose of this research? The purpose of this research is to determine the validity and reliability of a new survey instrument. This survey is designed to determine the factors that most influence a student's decision to major in forensic science.

How many participants will be in this research? About 130 students will take part in this research.

What will I be asked to do? If you agree to be in this research, you will be asked to complete a one-time survey during your Introduction to Forensic Science course.

How long will this take? Your participation will take approximately 15-20 minutes.

What are the risks and/or benefits if I participate? There are no risks and no benefits from being in this research.

Will I be compensated for participating? You will not be reimbursed for your time and participation in this research.

Who will see my information? In research reports, there will be no information that will make it possible to identify you. Research records will be stored securely and only approved researchers and the OU Institutional Review Board will have access to the records.

Do I have to participate? No. If you do not participate, you will be asked to leave the classroom while participants complete the survey. No course content will be missed due to non-participation. You will not be penalized or lose benefits or services unrelated to the research for non-participation. If you decide to participate, you do not have to answer any question and can stop participating at any time.

Who do I contact with questions, concerns or complaints? If you have questions, concerns or complaints about the research or have experienced a research-related injury, contact me or my graduate advisor.

Stacey Steinmetz: 405-974-6916 or ssteinmetz@uco.edu

Dr. Timothy Laubach: 405-325-1498 or laubach@ou.edu

You can also contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at 405-325-8110 or irb@ou.edu if you have questions about your rights as a research participant, concerns, or complaints about the research and wish to talk to someone other than the researcher(s) or if you cannot reach the researcher(s).

Please print this document for your records. By providing information to the researcher(s), I am agreeing to participate in this research.

__ I agree to participate

__ I do not want to participate

This research has been approved by the University of Oklahoma, Norman Campus IRB.

IRB Number: ____**7426**____ **Approval date:** __11/01/2016__

Appendix D: Online Survey Instrument

Online Consent to Participate in Research

Would you like to be involved in research at the University of Oklahoma? I am Stacey Steinmetz from the department of Instructional Leadership and Academic Curriculum (ILAC) at the University of Oklahoma (OU), and I invite you to participate in my research project entitled Examination of the Variables that Influence a Student's Decision to Major in Forensic Science. This research is being conducted at the University of Central Oklahoma (UCO). You were selected as a possible participant because you are currently enrolled in FRSC 2503—Intro to Forensic Science at UCO. You must be at least 18 years of age to participate in this study.

Please read this document and contact me to ask any questions that you may have BEFORE agreeing to take part in my research.

What is the purpose of this research? The purpose of this research is to determine the validity and reliability of a new survey instrument. This survey is designed to determine the factors that most influence a student's decision to major in forensic science.

How many participants will be in this research? Approximately 120 students will take part in this research.

What will I be asked to do? If you agree to be in this research, you will be asked to complete a one-time survey during your Introduction to Forensic Science course. How long will this take? Your participation will take approximately 15-20 minutes.

What are the risks and/or benefits if I participate? There are no risks and no benefits from being in this research.

Will I be compensated for participating? You will not be reimbursed for your time and participation in this research.

Who will see my information? In research reports, there will be no information that will make it possible to identify you. Research records will be stored securely and only approved researchers and the OU Institutional Review Board will have access to the records.

Do I have to participate? No. If you do not participate, you will be asked to leave the classroom while participants complete the survey. No course content will be missed due to non-participation. If you do not participate, you will not be penalized or lose benefits or services unrelated to the research. If you decide to participate, you don't have to answer any question and can stop participating at any time.

Who do I contact with questions, concerns or complaints? If you have questions, concerns or complaints about the research or have experienced a research-related injury, contact me or my graduate advisor.

Stacey Steinmetz: 405-974-6916 or ssteinmetz@uco.edu

Dr. Timothy Laubach: 405-325-1498 or laubach@ou.edu

You can also contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at 405-325-8110 or irb@ou.edu if you have questions about your rights as a research participant, concerns, or complaints about the research and wish to talk to someone other than the researcher(s) or if you cannot reach the researcher(s).

Please print this document for your records. By providing information to the researcher(s), I am agreeing to participate in this research.

This research has been approved by the University of Oklahoma, Norman Campus IRB.

IRB Number: _____ Approval date: _____

- ❍ I agree to participate
- ❍ I do not want to participate

If I do not want to participate Is Selected, Then Skip To End of Survey

As of today, are you 18 years old or older?

- ❍ Yes
- ❍ No

If No Is Selected, Then Skip To End of Survey

This survey contains questions related to **STEM** and **Non-STEM**. **STEM stands for science, technology engineering, and mathematics. Non-STEM includes all other subjects.**

For the purposes of this study, STEM majors and subjects include actuarial science, biology, chemistry, computer science, engineering, funeral service, mathematics, management of information systems (MIS), nursing, physics, science education, and related majors and subjects.

For the purposes of this study, Non-STEM majors and subjects include any majors or subjects not listed above. Examples of non-STEM majors and subjects include, but are not limited to, art, business, communications, criminal justice, English, foreign languages, history, psychology, sociology, and related majors and subjects.

Which degree track are you currently pursuing (or planning to pursue) in Forensic Science?

- ❍ B.S. in Forensic Science
- ❍ B.S. in Forensic Science-Chemistry
- ❍ B.S. in Forensic Science-Digital Forensics
- ❍ B.S. in Forensic Science-Molecular Biology
- ❍ M.S. in Forensic Science
- ❍ M.S. in Forensic Science-Biology/Chemistry
- ❍ I do not plan to pursue a degree in Forensic Science

If I do not plan to pursue a d... Is Selected, Then Skip To End of Survey

What concurrent major are you currently pursuing (or planning to pursue) with Forensic Science? If you are undecided, please list either "Undecided-STEM" or "Undecided-Non-STEM" _____

Indicate your level of confidence in your ability to _____.

	No Confidence	Slight Confidence	Moderate Confidence	High Confidence
Be Organized	❍	❍	❍	❍
Be Detailed	❍	❍	❍	❍
Be Innovative	❍	❍	❍	❍
Be Objective	❍	❍	❍	❍
Be Honest	❍	❍	❍	❍
Be Patient	❍	❍	❍	❍
Follow Rules	❍	❍	❍	❍
Solve Problems	❍	❍	❍	❍
Think Critically	❍	❍	❍	❍
Think Independently	❍	❍	❍	❍
Take Notes	❍	❍	❍	❍
Write Reports	❍	❍	❍	❍
Utilize The Scientific Method	❍	❍	❍	❍
Interpret Data	❍	❍	❍	❍
Learn To Use New Tools	❍	❍	❍	❍
Learn New Skills	❍	❍	❍	❍
Present Information To A Group	❍	❍	❍	❍
Work Alone	❍	❍	❍	❍
Work In A Group	❍	❍	❍	❍

Work In A Laboratory Setting	❍	❍	❍	❍
Work In Variable Conditions	❍	❍	❍	❍
Work Under Stressful Conditions	❍	❍	❍	❍
Pursue Concurrent Degrees	❍	❍	❍	❍
Obtain Above Average Grades (A's & B's) in Forensic Science Courses	❍	❍	❍	❍
Obtain Above Average Grades (A's & B's) in Math Courses	❍	❍	❍	❍
Obtain Above Average Grades (A's & B's) in Science Courses	❍	❍	❍	❍

If I major in Forensic Science, I will _____.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Get To Use My Talents & Skills	❍	❍	❍	❍	❍
Make A Good Salary	❍	❍	❍	❍	❍
Make A Difference	❍	❍	❍	❍	❍
Be Respected	❍	❍	❍	❍	❍
Be Proud of Myself	❍	❍	❍	❍	❍
Be Connected To A Larger Organization	❍	❍	❍	❍	❍
Enjoy My Job	❍	❍	❍	❍	❍
Have An Exciting Job	❍	❍	❍	❍	❍
Have Many Job Opportunities	❍	❍	❍	❍	❍
Have Educational & Professional Growth Opportunities	❍	❍	❍	❍	❍
Have Work-Life Balance	❍	❍	❍	❍	❍
Have Job Stability	❍	❍	❍	❍	❍

Read each question carefully and decide how you would feel about doing each type of work. Try not to think about if you have enough education or training to do the work or how much money you would make doing the work. Just think about if you would like or dislike doing the work.

	Strongly Dislike	Dislike	Unsure	Like	Strongly Like
Build kitchen cabinets	❍	❍	❍	❍	❍
Lay brick or tile	❍	❍	❍	❍	❍
Develop a new medicine	❍	❍	❍	❍	❍
Study ways to reduce water pollution	❍	❍	❍	❍	❍
Write books or plays	❍	❍	❍	❍	❍
Play a musical instrument	❍	❍	❍	❍	❍
Teach an individual an exercise routine	❍	❍	❍	❍	❍
Help people with personal or emotional problems	❍	❍	❍	❍	❍
Buy and sell stocks and bonds	❍	❍	❍	❍	❍
Manage a retail store	❍	❍	❍	❍	❍

Develop a spreadsheet using computer software	❍	❍	❍	❍	❍
Proofread records or forms	❍	❍	❍	❍	❍
Repair household appliances	❍	❍	❍	❍	❍
Raise fish in a fish hatchery	❍	❍	❍	❍	❍
Conduct chemical experiments	❍	❍	❍	❍	❍
Study the movement of planets	❍	❍	❍	❍	❍
Compose or arrange music	❍	❍	❍	❍	❍
Draw pictures	❍	❍	❍	❍	❍
Give career guidance to people	❍	❍	❍	❍	❍
Perform rehabilitation therapy	❍	❍	❍	❍	❍
Operate a beauty salon or barber shop	❍	❍	❍	❍	❍

Manage a department within a large company	❍	❍	❍	❍	❍
Install software across computers on a large network	❍	❍	❍	❍	❍
Operate a calculator	❍	❍	❍	❍	❍
Assemble electronic parts	❍	❍	❍	❍	❍
Drive a truck to deliver packages to offices and homes	❍	❍	❍	❍	❍
Examine blood samples using a microscope	❍	❍	❍	❍	❍
Investigate the cause of a fire	❍	❍	❍	❍	❍
Create special effects for movies	❍	❍	❍	❍	❍
Paint sets for a play	❍	❍	❍	❍	❍
Do volunteer work at a non-profit organization	❍	❍	❍	❍	❍

Teach children how to play sports	❍	❍	❍	❍	❍
Start your own business	❍	❍	❍	❍	❍
Negotiate business contracts	❍	❍	❍	❍	❍
Keep shipping and receiving records	❍	❍	❍	❍	❍
Calculate the wages of employees	❍	❍	❍	❍	❍
Test the quality of parts before shipment	❍	❍	❍	❍	❍
Repair and install locks	❍	❍	❍	❍	❍
Develop a way to better predict the weather	❍	❍	❍	❍	❍
Work in a biology lab	❍	❍	❍	❍	❍
Write scripts for movies or television shows	❍	❍	❍	❍	❍
Perform jazz or tap dance	❍	❍	❍	❍	❍

Teach sign language to people with hearing disabilities	❍	❍	❍	❍	❍
Help conduct a group therapy session	❍	❍	❍	❍	❍
Represent a client in a lawsuit	❍	❍	❍	❍	❍
Market a new line of clothing	❍	❍	❍	❍	❍
Inventory supplies using a hand-held computer	❍	❍	❍	❍	❍
Record rent payments	❍	❍	❍	❍	❍
Set up and operate machines to make products	❍	❍	❍	❍	❍
Put out forest fires	❍	❍	❍	❍	❍
Invent a replacement for sugar	❍	❍	❍	❍	❍
Do laboratory tests to identify diseases	❍	❍	❍	❍	❍

Sing in a band	❍	❍	❍	❍	❍
Edit movies	❍	❍	❍	❍	❍
Take care of children at a daycare center	❍	❍	❍	❍	❍
Teach a high school class	❍	❍	❍	❍	❍
Sell merchandise at a department store	❍	❍	❍	❍	❍
Manage a clothing store	❍	❍	❍	❍	❍
Keep inventory records	❍	❍	❍	❍	❍
Stamp, sort, and distribute mail for an organization	❍	❍	❍	❍	❍

What year did you graduate high school or get your GED? _____

Did you take Forensic Science or a related course in high school?

- ❍ Yes
- ❍ No, but it was offered at my school
- ❍ No, and it was not offered at my school

Indicate all of the liberal arts courses you completed for high school credit. Please check all that apply.

- ❑ Anthropology
- ❑ Criminal Justice
- ❑ Drawing
- ❑ Government/Civics
- ❑ Law
- ❑ Photography
- ❑ Political Science
- ❑ Psychology
- ❑ Sociology
- ❑ Another liberal arts course not listed
- ❑ Did not take liberal arts in high school

Indicate ALL of the math courses you completed for high school credit. Please check all that apply.

- ❑ Algebra 1
- ❑ Algebra 2
- ❑ Algebra 3
- ❑ Discrete Mathematics
- ❑ Geometry
- ❑ Math Analysis
- ❑ Pre-Calculus
- ❑ Statistics
- ❑ Trigonometry
- ❑ AP Calculus AB
- ❑ AP Calculus BC
- ❑ AP Statistics
- ❑ IB Calculus

- ❑ Concurrent college-level math course
- ❑ Another math course not listed
- ❑ Did not take math in high school

Indicate ALL of the science courses you completed in high school for credit. Please check all that apply.

- ❑ Anatomy
- ❑ Biology
- ❑ Chemistry
- ❑ Earth Science
- ❑ Environmental Science
- ❑ Physical Science
- ❑ Physics
- ❑ AP Biology
- ❑ AP Chemistry
- ❑ AP Physics B
- ❑ AP Physics C: Electricity and Magnetism
- ❑ AP Physics C: Mechanics
- ❑ IB Biology
- ❑ IB Chemistry
- ❑ IB Physics
- ❑ Concurrent college-level science course
- ❑ Another science course not listed
- ❑ Did not take science in high school

Indicate ALL Advanced Placement (AP) courses you completed for high school credit (with or without registering for the exam). Please check all that apply.

- ❑ Art History
- ❑ Biology
- ❑ Calculus AB
- ❑ Calculus BC
- ❑ Chemistry
- ❑ Chinese Language and Culture
- ❑ Computer Science A
- ❑ Computer Science Principles (AB)
- ❑ English Language and Composition
- ❑ English Literature and Composition
- ❑ Environmental Science

- ❑ European History
- ❑ French Language
- ❑ French Literature
- ❑ German Language
- ❑ German Literature
- ❑ Government & Politics: Comparative
- ❑ Government & Politics: United States
- ❑ Human Geography
- ❑ Italian Language and Culture
- ❑ Japanese Language and Culture
- ❑ Latin
- ❑ Latin: Literature
- ❑ Latin: Virgil
- ❑ Macroeconomics
- ❑ Microeconomics
- ❑ Music Theory
- ❑ Physics 1
- ❑ Physics 2
- ❑ Physics B
- ❑ Physics C: Electricity and Magnetism
- ❑ Physics C: Mechanics
- ❑ Psychology
- ❑ Spanish Language
- ❑ Spanish Literature
- ❑ Statistics
- ❑ Studio Art: 2-D Design
- ❑ Studio Art: 3-D Design
- ❑ Studio Art: Drawing
- ❑ United States History
- ❑ World History
- ❑ I did not take AP classes, but they were offered at my school
- ❑ AP classes were not offered at my school

Did you participate in an International Baccalaureate (IB) program in high school?

- ❍ Yes
- ❍ No, but IB was available at my school
- ❍ No, and IB was not available at my school

Please indicate your highest overall score on the ACT.If you did not take the ACT,

please enter DID NOT TAKE. _____

Please indicate your highest overall score on the SAT.If you did not take the SAT,

please enter DID NOT TAKE. _____

Did you participate in any summer camps, clubs, or extracurricular activities related to Forensic Science while in elementary, middle, or high school?

- ❍ Yes
- ❍ No

Do you qualify for federal financial aid through FAFSA?

- ❍ Yes. I do qualify, and I choose to receive financial aid
- ❍ Yes. I do qualify, but I choose not to receive financial aid
- ❍ No. I do not qualify, but I need financial aid
- ❍ No. I do not qualify, and I do not need financial aid

Please indicate the level of financial support you receive from your family for your education.

- ❍ None
- ❍ Some
- ❍ Most
- ❍ All

Please indicate the level of financial aid you receive that does not have to be paid back (ex. grants, scholarships, etc.).

- ❍ None
- ❍ Some
- ❍ Most
- ❍ All

Please indicate the level of financial aid you receive that must be paid back in the future (ex. loans).

- ❍ None
- ❍ Some
- ❍ Most
- ❍ All

Do you work while going to school?

- ❍ Yes, Full-Time
- ❍ Yes, Part-Time
- ❍ No, School is my job

If No, School is my job Is Selected, Then Skip To Rate the level of support you receive...

Is your job related to your career goals?

- ❍ Yes
- ❍ No

Rate the level of emotional support you received from the following environments when selecting to major in Forensic Science.

	No Support	Slight Support	Moderate Support	High Support
Home Environment	❍	❍	❍	❍
Social Environment	❍	❍	❍	❍
Academic Environment	❍	❍	❍	❍

Rate the level of influence the following people had on your decision to major in Forensic Science.

	No Influence	Slight Influence	Moderate Influence	High Influence
Father/Male Guardian	❍	❍	❍	❍
Mother/Female Guardian	❍	❍	❍	❍
Sibling(s)	❍	❍	❍	❍
Other Relative(s)	❍	❍	❍	❍
Peers	❍	❍	❍	❍
Personal Mentor(s)	❍	❍	❍	❍
High School STEM Teacher(s)	❍	❍	❍	❍
High School Non-STEM Teacher(s)	❍	❍	❍	❍
College STEM Professor(s)	❍	❍	❍	❍
College Non-STEM Professor(s)	❍	❍	❍	❍
High School Guidance Counselor(s)	❍	❍	❍	❍
College Academic Advisor(s)	❍	❍	❍	❍

Do you have any family, friends, or mentors currently or previously pursuing a degree in forensic science or a related field?

❍ Yes
❍ No

Do you have any family, friends, or mentors currently or previously employed in the field of forensic science or a related career?

- ❍ Yes
- ❍ No

Prior to taking Intro to Forensic Science, did you speak to, job shadow, or intern with a forensic scientist?

- ❍ Yes
- ❍ No. I tried but was unable to do so.
- ❍ No

Prior to taking Intro to Forensic Science, did you obtain any information about becoming a forensic scientist?

- ❍ Yes
- ❍ No. I tried but was unable to do so.
- ❍ No

From where did you obtain your information about becoming a forensic scientist? Please check all that apply.

- ❑ In Person--Professional in Forensic Science or a related field
- ❑ In Person--Advisor (ex. career counselor, guidance counselor, academic advisor, etc.)
- ❑ In Person--Personal Contact (ex. family, friends, acquaintances, etc.)
- ❑ Internet--Official local, state, or national websites on forensic science careers (ex. AAFS, FBI, BLS, Interpol, etc.)
- ❑ Internet--Search Engines (Google, Bing, Yahoo, etc.)
- ❑ TV Shows--Fiction (ex. CSI, NCIS, Criminal Minds, etc.)
- ❑ TV Shows--Non-Fiction (ex. Forensic Files, The First 48, Cold Case Files, etc.)
- ❑ Books--Fiction (ex. Body Farm series, Tempe Brennan series, Kay Scarpetta series, etc.)
- ❑ Books--Non-Fiction (ex. Beyond the Body Farm, No Stone Unturned, Justice for the Dead, etc.)
- ❑ Periodicals (ex. National Geographic, New York Times, etc.)
- ❑ Other--Please List _____

From which of the previous sources did you receive the MOST INFORMATION about becoming a forensic scientist?

- ❍ In Person--Professional in Forensic Science or a related field
- ❍ In Person--Advisor (ex. career counselor, guidance counselor, academic advisor, etc.)
- ❍ In Person--Personal Contact (ex. family, friends, acquaintances, etc.)
- ❍ Internet--Official websites on forensic science careers (ex. AAFS, FBI, BLS, etc.)
- ❍ Internet--Search Engines (ex. Google, Bing, Yahoo, etc.)
- ❍ TV Shows--Fiction (ex. CSI, NCIS, Criminal Minds, etc.)
- ❍ TV Shows--Non-Fiction (ex. Forensic Files, The First 48, Cold Case Files, etc.)
- ❍ Books--Fiction (ex. Body Farm series, Tempe Brennan series, Kay Scarpetta series, etc.)
- ❍ Books--Non-Fiction (ex. Beyond the Body Farm, No Stone Unturned, Justice for the Dead, etc.)
- ❍ Periodicals (ex. National Geographic, New York Times, etc.)
- ❍ Other--Please list _____

What is your age?

- ❍ 18-24 years
- ❍ 25-34 years
- ❍ 35-44 years
- ❍ 45-54 years
- ❍ 55-64 years
- ❍ 65+ years

What is your gender?

- ❍ Male
- ❍ Female
- ❍ Other
- ❍ Prefer not to answer

Are you of Hispanic, Latino, or Spanish origin?

- ❍ Yes
- ❍ No
- ❍ Prefer not to answer

What is your race? For purposes of this question, persons of Hispanic/Latino/Spanish origin may be of any race.

- ❍ American Indian/Native American
- ❍ Asian
- ❍ Black/African American
- ❍ Pacific Islander
- ❍ White/Caucasian
- ❍ Multiple/Mixed Races
- ❍ Other Race
- ❍ Prefer not to answer

What is your student type?

- ❍ In-State Undergraduate Student
- ❍ Out-of-State Undergraduate Student
- ❍ International Undergraduate Student
- ❍ In-State Graduate Student
- ❍ Out-of-Sate Graduate Student
- ❍ International Graduate Student

What is your student classification?

- ❍ Freshman
- ❍ Sophomore
- ❍ Junior
- ❍ Senior
- ❍ Post-Bach
- ❍ Graduate
- ❍ Special (not working toward degree)

Appendix E: Results of Frequency Statistics by Construct

Table 33

Frequency Statistics for Survey Items Measuring Self-Efficacy

Item	Frequency	%
Be Organized		
No Confidence	1	1.3
Slight Confidence	3	3.8
Moderate Confidence	37	46.8
High Confidence	38	48.1
Be Detailed		
No Confidence	0	0
Slight Confidence	6	7.6
Moderate Confidence	36	45.6
High Confidence	37	46.8
Be Innovative		
No Confidence	1	1.3
Slight Confidence	9	11.4
Moderate Confidence	43	54.4
High Confidence	26	32.9
Be Objective		
No Confidence	0	0.0
Slight Confidence	6	7.6
Moderate Confidence	36	45.6
High Confidence	37	46.8
Be Honest		
No Confidence	0	0.0
Slight Confidence	0	0.0
Moderate Confidence	9	11.4
High Confidence	70	88.6
Be Patient		
No Confidence	1	1.3
Slight Confidence	13	16.5
Moderate Confidence	33	41.8
High Confidence	32	40.5
Follow Rules		
No Confidence	0	0.0
Slight Confidence	2	2.5
Moderate Confidence	8	10.1
High Confidence	69	87.3
Solve Problems		
No Confidence	0	0.0
Slight Confidence	0	0.0
Moderate Confidence	42	53.2
High Confidence	37	46.8

(continued)

Item	Frequency	%
Think Critically		
No Confidence	0	0.0
Slight Confidence	3	3.8
Moderate Confidence	38	48.1
High Confidence	38	48.1
Think Independently		
No Confidence	0	0.0
Slight Confidence	1	1.3
Moderate Confidence	24	30.4
High Confidence	54	68.4
Take Notes		
No Confidence	0	0.0
Slight Confidence	2	2.5
Moderate Confidence	21	26.6
High Confidence	56	70.9
Write Reports		
No Confidence	0	0.0
Slight Confidence	11	13.9
Moderate Confidence	34	43.0
High Confidence	34	43.0
Utilize the Scientific Method		
No Confidence	0	0.0
Slight Confidence	11	13.9
Moderate Confidence	31	39.2
High Confidence	37	46.8
Interpret Data		
No Confidence	0	0.0
Slight Confidence	10	12.7
Moderate Confidence	34	43.0
High Confidence	35	44.3
Learn to Use New Tools		
No Confidence	0	0.0
Slight Confidence	2	2.5
Moderate Confidence	20	25.3
High Confidence	57	72.2
Learn New Skills		
No Confidence	0	0.0
Slight Confidence	1	1.3
Moderate Confidence	19	24.1
High Confidence	59	74.7
Present Information to a Group		
No Confidence	3	3.8
Slight Confidence	12	15.2
Moderate Confidence	32	40.5
High Confidence	32	40.5

(continued)

Item	Frequency	%
Work Alone		
No Confidence	1	1.3
Slight Confidence	6	7.6
Moderate Confidence	10	12.7
High Confidence	62	78.5
Work In a Group		
No Confidence	0	0.0
Slight Confidence	9	11.4
Moderate Confidence	28	35.4
High Confidence	42	53.2
Work in a Laboratory Setting		
No Confidence	1	1.3
Slight Confidence	10	12.7
Moderate Confidence	20	25.3
High Confidence	48	60.8
Work in Variable Conditions		
No Confidence	0	0.0
Slight Confidence	8	10.1
Moderate Confidence	31	39.2
High Confidence	40	50.6
Work under Stressful Conditions		
No Confidence	1	1.3
Slight Confidence	8	10.1
Moderate Confidence	34	43.0
High Confidence	36	45.6
Pursue Concurrent Degrees		
No Confidence	0	0.0
Slight Confidence	5	6.3
Moderate Confidence	28	35.4
High Confidence	46	58.2
Obtain Above Average Grades in Forensic Science Courses		
No Confidence	0	0.0
Slight Confidence	4	5.1
Moderate Confidence	18	22.8
High Confidence	57	72.2
Obtain Above Average Grades in Math Courses		
No Confidence	5	6.3
Slight Confidence	25	31.6
Moderate Confidence	25	31.6
High Confidence	24	30.4
Obtain Above Average Grades in Science Courses		
No Confidence	2	2.5
Slight Confidence	11	13.9
Moderate Confidence	31	39.2
High Confidence	35	44.3

Table 34
Frequency Statistics for Survey Items Measuring Outcome Expectations

Item	Frequency	%
Get to Use My Talents & Skills		
Strongly Disagree	0	0.0
Somewhat Disagree	0	0.0
Neither Agree Nor Disagree	3	3.8
Somewhat Agree	28	35.4
Strongly Agree	48	60.8
Make a Good Salary		
Strongly Disagree	0	0.0
Somewhat Disagree	2	2.5
Neither Agree Nor Disagree	12	15.2
Somewhat Agree	38	48.1
Strongly Agree	27	34.2
Make a Difference		
Strongly Disagree	0	0.0
Somewhat Disagree	0	0.0
Neither Agree Nor Disagree	2	2.5
Somewhat Agree	18	22.8
Strongly Agree	59	74.7
Be Respected		
Strongly Disagree	0	0.0
Somewhat Disagree	0	0.0
Neither Agree Nor Disagree	5	6.3
Somewhat Agree	24	30.4
Strongly Agree	50	63.3
Be Proud of Myself		
Strongly Disagree	0	0.0
Somewhat Disagree	0	0.0
Neither Agree Nor Disagree	0	0.0
Somewhat Agree	5	6.3
Strongly Agree	74	93.7
Be Connected to A Larger Organization		
Strongly Disagree	0	0.0
Somewhat Disagree	0	0.0
Neither Agree Nor Disagree	5	6.3
Somewhat Agree	12	15.2
Strongly Agree	62	78.5
Enjoy My Job		
Strongly Disagree	0	0.0
Somewhat Disagree	0	0.0
Neither Agree Nor Disagree	1	1.3
Somewhat Agree	8	10.1
Strongly Agree	70	88.6

(continued)

Item	Frequency	%
Have an Exciting Job		
Strongly Disagree	0	0.0
Somewhat Disagree	0	0.0
Neither Agree Nor Disagree	3	3.8
Somewhat Agree	14	17.7
Strongly Agree	62	78.5
Have Many Job Opportunities		
Strongly Disagree	0	0.0
Somewhat Disagree	3	3.8
Neither Agree Nor Disagree	8	10.1
Somewhat Agree	33	41.8
Strongly Agree	35	44.3
Have Educational & Professional Growth Opportunities		
Strongly Disagree	0	0.0
Somewhat Disagree	0	0.0
Neither Agree Nor Disagree	3	3.8
Somewhat Agree	24	30.4
Strongly Agree	52	65.8
Have Work-Life Balance		
Strongly Disagree	0	0.0
Somewhat Disagree	4	5.1
Neither Agree Nor Disagree	12	15.2
Somewhat Agree	33	41.8
Strongly Agree	30	38.0
Have Job Stability		
Strongly Disagree	0	0.0
Somewhat Disagree	1	1.3
Neither Agree Nor Disagree	4	5.1
Somewhat Agree	25	31.6
Strongly Agree	49	62.0

Table 35

Frequency Statistics for Survey Items Measuring Realistic Interests

Item	Frequency	%
Build Kitchen Cabinets		
Strongly Dislike	14	17.7
Dislike	25	31.6
Unsure	11	13.9
Like	24	30.4
Strongly Like	5	6.3
Lay Brick or Tile		
Strongly Dislike	19	24.1
Dislike	28	35.4
Unsure	14	17.7
Like	15	19.0
Strongly Like	3	3.8
Repair Household Appliances		
Strongly Dislike	3	3.8
Dislike	6	7.6
Unsure	7	8.9
Like	40	50.6
Strongly Like	23	29.1
Raise Fish in a Fish Hatchery		
Strongly Dislike	6	7.6
Dislike	10	12.7
Unsure	16	20.3
Like	31	39.2
Strongly Like	16	20.3
Assemble Electronic Parts		
Strongly Dislike	5	6.3
Dislike	14	17.7
Unsure	13	16.5
Like	24	30.4
Strongly Like	23	29.1
Drive a Truck or Deliver Packages to Offices and Homes		
Strongly Dislike	9	11.4
Dislike	17	21.5
Unsure	7	8.9
Like	26	32.9
Strongly Like	20	25.3
Test the Quality of Parts Before Shipment		
Strongly Dislike	5	6.3
Dislike	14	17.7
Unsure	15	19.0
Like	24	30.4
Strongly Like	21	26.6

(continued)

Item	Frequency	%
Repair and Install Locks		
Strongly Dislike	7	8.9
Dislike	17	21.5
Unsure	18	22.8
Like	23	29.1
Strongly Like	14	17.7
Set Up and Operate Machines to Make Products		
Strongly Dislike	20	25.3
Dislike	19	24.1
Unsure	21	26.6
Like	19	24.1
Strongly Like	0	0.0
Put Out Forest Fires		
Strongly Dislike	20	25.3
Dislike	21	26.6
Unsure	16	20.3
Like	19	24.1
Strongly Like	3	3.8

Table 36

Frequency Statistics for Survey Items Measuring Investigative Interests

Item	Frequency	%
Develop a New Medicine		
Strongly Dislike	12	15.2
Dislike	25	31.6
Unsure	10	12.7
Like	25	31.6
Strongly Like	7	8.9
Study Ways to Reduce Water Pollution		
Strongly Dislike	19	24.1
Dislike	23	29.1
Unsure	17	21.5
Like	16	20.3
Strongly Like	4	5.1
Conduct Chemical Experiments		
Strongly Dislike	8	10.1
Dislike	16	20.3
Unsure	12	15.2
Like	23	29.1
Strongly Like	20	25.3
Study the Movement of Planets		
Strongly Dislike	6	7.6
Dislike	6	7.6
Unsure	10	12.7
Like	21	26.6
Strongly Like	36	45.6
Examine Blood Samples Using a Microscope		
Strongly Dislike	6	7.6
Dislike	22	27.8
Unsure	11	13.9
Like	20	25.3
Strongly Like	20	25.3
Investigate the Cause of a Fire		
Strongly Dislike	17	21.5
Dislike	27	34.2
Unsure	10	12.7
Like	15	19.0
Strongly Like	10	12.7
Develop a Way to Better Predict the Weather		
Strongly Dislike	18	22.8
Dislike	16	20.3
Unsure	11	13.9
Like	18	22.8
Strongly Like	16	20.3

(continued)

Item	Frequency	%
Work in a Biology Lab		
Strongly Dislike	9	11.4
Dislike	25	31.6
Unsure	18	22.8
Like	21	26.6
Strongly Like	6	7.6
Invent a Replacement for Sugar		
Strongly Dislike	11	13.9
Dislike	22	27.8
Unsure	11	13.9
Like	16	20.3
Strongly Like	19	24.1
Do Laboratory Tests to Identify Diseases		
Strongly Dislike	5	6.3
Dislike	17	21.5
Unsure	6	7.6
Like	29	36.7
Strongly Like	22	27.8

Table 37

Frequency Statistics for Survey Items Measuring Artistic Interests

Item	Frequency	%
Write Books or Plays		
Strongly Dislike	6	7.6
Dislike	23	29.1
Unsure	14	17.7
Like	27	34.2
Strongly Like	9	11.4
Play a Musical Instrument		
Strongly Dislike	30	38.0
Dislike	32	40.5
Unsure	9	11.4
Like	8	10.1
Strongly Like	0	0.0
Compose or Arrange Music		
Strongly Dislike	9	11.4
Dislike	23	29.1
Unsure	16	20.3
Like	23	29.1
Strongly Like	8	10.1
Draw Pictures		
Strongly Dislike	3	3.8
Dislike	11	13.9
Unsure	10	12.7
Like	33	41.8
Strongly Like	22	27.8
Create Special Effects for Movies		
Strongly Dislike	15	19.0
Dislike	16	20.3
Unsure	11	13.9
Like	21	26.6
Strongly Like	16	20.3
Paint Sets for a Play		
Strongly Dislike	8	10.1
Dislike	16	20.3
Unsure	12	15.2
Like	29	36.7
Strongly Like	14	17.7
Write Scripts for Movies or Television Shows		
Strongly Dislike	6	7.6
Dislike	24	30.4
Unsure	24	30.4
Like	20	25.3
Strongly Like	5	6.3

(continued)

Item	Frequency	%
Perform Jazz or Tap Dance		
Strongly Dislike	4	5.1
Dislike	20	25.3
Unsure	20	25.3
Like	27	34.2
Strongly Like	8	10.1
Sing in a Band		
Strongly Dislike	2	2.5
Dislike	1	1.3
Unsure	7	8.9
Like	34	43.0
Strongly Like	35	44.3
Edit Movies		
Strongly Dislike	2	2.5
Dislike	1	1.3
Unsure	2	2.5
Like	37	46.8
Strongly Like	37	46.8

Table 38

Frequency Statistics for Survey Items Measuring Social Interests

Item	Frequency	%
Teach an Individual an Exercise Routine		
Strongly Dislike	9	11.4
Dislike	24	30.4
Unsure	23	29.1
Like	20	25.3
Strongly Like	3	3.8
Help People with Personal and Emotional Problems		
Strongly Dislike	16	20.3
Dislike	37	46.8
Unsure	15	19.0
Like	10	12.7
Strongly Like	1	1.3
Give Career Guidance to People		
Strongly Dislike	10	12.7
Dislike	19	24.1
Unsure	19	24.1
Like	20	25.3
Strongly Like	11	13.9
Perform Rehabilitation Therapy		
Strongly Dislike	2	2.5
Dislike	7	8.9
Unsure	7	8.9
Like	36	45.6
Strongly Like	27	34.2
Do Volunteer Work at a Non-Profit Organization		
Strongly Dislike	20	25.3
Dislike	23	29.1
Unsure	25	31.6
Like	10	12.7
Strongly Like	1	1.3
Teach Children How to Play Sports		
Strongly Dislike	11	13.9
Dislike	28	35.4
Unsure	16	20.3
Like	20	25.3
Strongly Like	4	5.1
Teach Sign Language to People With Hearing Disabilities		
Strongly Dislike	12	15.2
Dislike	28	35.4
Unsure	19	24.1
Like	13	16.5
Strongly Like	7	8.9

(continued)

Item	Frequency	%
Help Conduct a Group Therapy Session		
Strongly Dislike	5	6.3
Dislike	14	17.7
Unsure	18	22.8
Like	34	43.0
Strongly Like	8	10.1
Take Care of Children at a Daycare Center		
Strongly Dislike	12	15.2
Dislike	30	38.0
Unsure	18	22.8
Like	16	20.3
Strongly Like	3	3.8
Teach a High School Class		
Strongly Dislike	11	13.9
Dislike	32	40.5
Unsure	26	32.9
Like	9	11.4
Strongly Like	1	1.3

Table 39

Frequency Statistics for Survey Items Measuring Enterprising Interests

Item	Frequency	%
Buy and Sell Stocks and Bonds		
Strongly Dislike	16	20.3
Dislike	26	32.9
Unsure	24	30.4
Like	13	16.5
Strongly Like	0	0.0
Manage a Retail Store		
Strongly Dislike	10	12.7
Dislike	18	22.8
Unsure	6	7.6
Like	36	45.6
Strongly Like	9	11.4
Operate a Beauty Salon or Barber Shop		
Strongly Dislike	7	8.9
Dislike	12	15.2
Unsure	15	19.0
Like	29	36.7
Strongly Like	16	20.3
Manage a Department within a Large Company		
Strongly Dislike	3	3.8
Dislike	5	6.3
Unsure	7	8.9
Like	23	29.1
Strongly Like	41	51.9
Start Your Own Business		
Strongly Dislike	22	27.8
Dislike	30	38.0
Unsure	7	8.9
Like	12	15.2
Strongly Like	8	10.1
Negotiate Business Contracts		
Strongly Dislike	6	7.6
Dislike	13	16.5
Unsure	20	25.3
Like	28	35.4
Strongly Like	12	15.2
Represent a Client in a Lawsuit		
Strongly Dislike	1	1.3
Dislike	11	13.9
Unsure	22	27.8
Like	29	36.7
Strongly Like	16	20.3

(continued)

Item	Frequency	%
Market a New Line of Clothing		
Strongly Dislike	7	8.9
Dislike	24	30.4
Unsure	23	29.1
Like	22	27.8
Strongly Like	3	3.8
Sell Merchandise at a Department Store		
Strongly Dislike	12	15.2
Dislike	28	35.4
Unsure	18	22.8
Like	19	24.1
Strongly Like	2	2.5
Manage a Clothing Store		
Strongly Dislike	11	13.9
Dislike	31	39.2
Unsure	22	27.8
Like	14	17.7
Strongly Like	1	1.3

Table 40

Frequency Statistics for Survey Items Measuring Conventional Interests

Item	Frequency	%
Develop a Spreadsheet Using Computer Software		
Strongly Dislike	4	5.1
Dislike	7	8.9
Unsure	19	24.1
Like	37	46.8
Strongly Like	12	15.2
Proofread Records or Forms		
Strongly Dislike	4	5.1
Dislike	20	25.3
Unsure	17	21.5
Like	29	36.7
Strongly Like	9	11.4
Install Software Across Computers on a Large Network		
Strongly Dislike	2	2.5
Dislike	12	15.2
Unsure	19	24.1
Like	31	39.2
Strongly Like	15	19.0
Operate a Calculator		
Strongly Dislike	3	3.8
Dislike	15	19.0
Unsure	21	26.6
Like	24	30.4
Strongly Like	16	20.3
Keep Shipping and Receiving Records		
Strongly Dislike	0	0.0
Dislike	2	2.5
Unsure	6	7.6
Like	37	46.8
Strongly Like	34	43.0
Calculate the Wages of Employees		
Strongly Dislike	6	7.6
Dislike	12	15.2
Unsure	6	7.6
Like	29	36.7
Strongly Like	26	32.9
Inventory Supplies Using a Hand-Held Computer		
Strongly Dislike	7	8.9
Dislike	16	20.3
Unsure	14	17.7
Like	25	31.6
Strongly Like	17	21.5

(continued)

Item	Frequency	%
Record Rent Payments		
Strongly Dislike	11	13.9
Dislike	19	24.1
Unsure	15	19.0
Like	22	27.8
Strongly Like	12	15.2
Keep Inventory Records		
Strongly Dislike	13	16.5
Dislike	26	32.9
Unsure	22	27.8
Like	17	21.5
Strongly Like	1	1.3
Stamp, Sort, and Distribute Mail for an Organization		
Strongly Dislike	18	22.8
Dislike	26	32.9
Unsure	14	17.7
Like	21	26.6
Strongly Like	0	0.0

Table 41

Frequency Statistics for Survey Items Measuring Contextual Supports and Barriers

Item	Frequency	%
High School Graduation Year		
Support	75	94.9
Barrier	4	5.1
Forensic Science Course in High School		
Support	18	22.8
Barrier	61	77.2
Liberal Arts Courses in High School		
Support	48	60.8
Barrier	31	39.2
Math Courses in High School		
Support	59	74.7
Barrier	20	25.3
Science Courses in High School		
Support	43	54.4
Barrier	36	45.6
AP Courses in High School		
Support	71	89.9
Barrier	8	10.1
IB Courses in High School		
Support	0	0.0
Barrier	79	100
ACT or SAT Score		
Support	67	84.8
Barrier	12	15.2
Forensic Science Extracurricular Activities		
Support	8	10.1
Barrier	71	89.9
Financial Aid Status		
Support	68	86.1
Barrier	11	13.9
Financial Aid from Family		
Support	60	75.9
Barrier	19	24.1
Financial Aid, Debt-Free		
Support	58	73.4
Barrier	21	26.6
Financial Aid, Debt		
Support	35	44.3
Barrier	44	55.7
Work Status		
Support	17	21.5
Barrier	62	78.5

(continued)

Item	Frequency	%
Home Environment		
Support	68	86.1
Barrier	11	13.9
Social Environment		
Support	62	78.5
Barrier	17	21.5
Academic Environment		
Support	72	91.1
Barrier	7	8.9
Paternal Figure's Influence on Decision		
Support	24	30.4
Barrier	55	69.6
Maternal Figure's Influence on Decision		
Support	29	36.7
Barrier	50	63.3
Siblings' Influence on Decision		
Support	17	21.5
Barrier	62	78.5
Relatives' Influence on Decision		
Support	17	21.5
Barrier	62	78.5
Peers' Influence on Decision		
Support	15	19.0
Barrier	64	81.0
Mentor's Influence on Decision		
Support	15	19.0
Barrier	64	81.0
High School STEM Teachers' Influence on Decision		
Support	8	10.1
Barrier	71	89.9
High School Non-STEM Teachers' Influence on Decision		
Support	8	10.1
Barrier	71	89.9
College STEM Teachers' Influence on Decision		
Support	17	21.5
Barrier	62	78.5
College Non-STEM Teachers' Influence on Decision		
Support	11	13.9
Barrier	68	86.1
High School Counselor's Influence on Decision		
Support	8	10.1
Barrier	71	89.9
College Advisor's Influence on Decision		
Support	20	25.3
Barrier	59	74.7

(continued)

Item	Frequency	%
Family or Friends Majoring in Forensic Science		
Support	20	25.3
Barrier	59	74.7
Family or Friends Working in Forensic Science Field		
Support	15	19.0
Barrier	64	81.0
Job Shadowed with Forensic Scientist		
Support	13	16.5
Barrier	66	83.5
Obtained Information about Forensic Science Before Making Decision		
Support	63	79.7
Barrier	16	20.3
Source of Most Information Obtained about Forensic Science		
Support	54	68.4
Barrier	25	31.6
Age		
Support	74	93.7
Barrier	5	6.3
Gender		
Support	20	25.3
Barrier	59	74.7
Race/Ethnicity		
Support	47	59.5
Barrier	32	40.5

Appendix F: Inter-Item Correlation Matrices for Each Construct or Subconstruct

Table 42

Inter-Item Correlation Matrix for Survey Items Measuring Self-Efficacy (M = 0.153)

	SE01	SE02	SE03	SE04	SE05	SE06	SE07	SE08	SE09	SE10	SE11
SE01	1.000	.356	.081	.098	-.015	.050	.048	.022	.262	.076	.212
SE02	.356	1.000	.483	.092	.161	.089	.034	.223	.188	.049	.228
SE03	.081	.483	1.000	.243	.277	.167	-.032	.224	.374	.224	.244
SE04	.098	.092	.243	1.000	.225	.143	.130	.060	.259	.376	.149
SE05	-.015	.161	.277	.225	1.000	.260	.060	.257	.139	.244	.166
SE06	.050	.089	.167	.143	.260	1.000	.141	.068	.043	.054	.142
SE07	.048	.034	-.032	.130	.060	.141	1.000	.097	.017	-.117	.012
SE08	.022	.223	.224	.060	.257	.068	.097	1.000	.340	.060	.084
SE09	.262	.188	.374	.259	.139	.043	.017	.340	1.000	.383	.046
SE10	.076	.049	.224	.376	.244	.054	-.117	.060	.383	1.000	.137
SE11	.212	.228	.244	.149	.166	.142	.012	.084	.046	.137	1.000
SE12	.329	.319	.366	.203	.093	.241	.021	.008	.314	.351	.502
SE13	.232	.080	.161	.252	.054	-.038	-.044	.245	.425	.273	.112
SE14	.105	.124	.280	.183	.107	.015	.035	.270	.453	.306	.068
SE15	.040	.096	.240	.135	.021	.005	-.096	.111	.332	.454	.115
SE16	.033	.010	.318	.054	.052	-.053	-.012	.207	.299	.222	.332
SE17	.004	-.037	.190	.086	.126	-.102	-.104	.014	.022	.236	.162
SE18	.134	.207	.077	.116	-.051	-.066	.099	-.011	-.064	.144	.040
SE20	-.081	-.003	.324	.210	.163	.094	.018	.172	.353	.331	.142
SE21	-.041	.166	.391	.318	.158	.178	-.141	.039	.262	.289	.078
SE22	.089	.166	.214	.195	.280	.175	-.171	.030	.236	.345	.077
SE23	-.037	.096	.312	.261	.303	.196	-.086	-.050	.285	.437	-.041
SE24	.066	.150	-.002	.043	.003	-.100	-.103	-.081	.256	.110	.206
SE25	.122	.073	-.039	.051	.032	.115	-.183	.169	.286	.149	-.092
SE26	.068	.261	.076	.133	.065	-.070	-.150	.214	.344	.213	.073

(continued)

	SE12	SE13	SE14	SE15	SE16	SE17	SE18	SE19	SE20	SE21	SE22
SE01	.329	.232	.105	.040	.033	.004	.134	-.199	-.081	-.041	.089
SE02	.319	.080	.124	.096	.010	-.037	.207	.001	-.003	.166	.166
SE03	.366	.161	.280	.240	.318	.190	.077	.293	.324	.391	.214
SE04	.203	.252	.183	.135	.054	.086	.116	-.087	.210	.318	.195
SE05	.093	.054	.107	.021	.052	.126	-.051	.102	.163	.158	.280
SE06	.241	-.038	.015	.005	-.053	-.102	-.066	.314	.094	.178	.175
SE07	.021	-.044	.035	-.096	-.012	-.104	.099	.088	.018	-.141	-.171
SE08	.008	.245	.270	.111	.207	.014	-.011	.131	.172	.039	.030
SE09	.314	.425	.453	.332	.299	.022	-.064	-.053	.353	.262	.236
SE10	.351	.273	.306	.454	.222	.236	.144	-.042	.331	.289	.345
SE11	.502	.112	.068	.115	.332	.162	.040	-.056	.142	.078	.077
SE12	1.000	.191	.231	.390	.314	.131	.226	-.069	.228	.264	.268
SE13	.191	1.000	.726	.381	.264	.139	.141	-.179	.381	.228	.163
SE14	.231	.726	1.000	.418	.301	.215	.136	.096	.404	.246	.151
SE15	.390	.381	.418	1.000	.717	.188	.163	.037	.356	.472	.276
SE16	.314	.264	.301	.717	1.000	.220	.014	.187	.375	.344	.187
SE17	.131	.139	.215	.188	.220	1.000	.310	.340	.255	.262	.096
SE18	.226	.141	.136	.163	.014	.310	1.000	-.071	.160	.232	.060
SE19	-.069	-.179	.096	.037	.187	.340	-.071	1.000	.072	.267	.082
SE20	.228	.381	.404	.356	.375	.255	.160	.072	1.000	.561	.310
SE21	.264	.228	.246	.472	.344	.262	.232	.267	.561	1.000	.604
SE22	.268	.163	.151	.276	.187	.096	.060	.082	.310	.604	1.000
SE23	.239	.248	.242	.341	.171	.018	-.032	.026	.335	.446	.453
SE24	.082	.081	.268	.092	.147	.179	-.108	-.005	.084	.085	.175
SE25	.004	.283	.289	.071	-.056	-.084	-.092	-.008	.162	.133	.264
SE26	.027	.351	.415	.222	.148	.028	.008	-.102	.273	.142	.214

(continued)

	SE23	SE24	SE25	SE26
SE01	-.037	.066	.122	.068
SE02	.096	.150	.073	.261
SE03	.312	-.002	-.039	.076
SE04	.261	.043	.051	.133
SE05	.303	.003	.032	.065
SE06	.196	-.100	.115	-.070
SE07	-.086	-.103	-.183	-.150
SE08	-.050	-.081	.169	.214
SE09	.285	.256	.286	.344
SE10	.437	.110	.149	.213
SE11	-.041	.206	-.092	.073
SE12	.239	.082	.004	.027
SE13	.248	.081	.283	.351
SE14	.242	.268	.289	.415
SE15	.341	.092	.071	.222
SE16	.171	.147	-.056	.148
SE17	.018	.179	-.084	.028
SE18	-.032	-.108	-.092	.008
SE19	.026	-.005	-.008	-.102
SE20	.335	.084	.162	.273
SE21	.446	.085	.133	.142
SE22	.453	.175	.264	.214
SE23	1.000	.127	.127	.200
SE24	.127	1.000	.130	.328
SE25	.127	.130	1.000	.518
SE26	.200	.328	.518	1.000

Table 43

Inter-Item Correlation Matrix for Survey Items Measuring Outcome Expectations (*M* = 0.257)

	OE01	OE02	OE03	OE04	OE05	OE06	OE07	OE08	OE09	OE10	OE11	OE12
OE 01	1.00	.257	.291	.123	.170	.333	.406	.321	.199	.204	.272	.326
OE 02	.257	1.00	.368	.321	.116	.264	.244	.252	.466	.394	.366	.384
OE 03	.291	.368	1.00	.436	.167	.347	.220	.119	.091	.255	.202	.270
OE 04	.123	.321	.436	1.00	.243	.346	.152	.258	.211	.078	.252	.080
OE 05	.170	.116	.167	.243	1.00	.146	.334	.377	.087	.009	.100	.058
OE 06	.333	.264	.347	.346	.146	1.00	.373	.276	.219	.105	.073	.101
OE 07	.406	.244	.220	.152	.334	.373	1.00	.431	.159	.320	.051	.181
OE 08	.321	.252	.119	.258	.377	.276	.431	1.00	.414	.194	.248	.373
OE 09	.199	.466	.091	.211	.087	.219	.159	.414	1.00	.429	.252	.505
OE 10	.204	.394	.255	.078	.009	.105	.320	.194	.429	1.00	.369	.498
OE 11	.272	.366	.202	.252	.100	.073	.051	.248	.252	.369	1.00	.448
OE 12	.326	.384	.270	.080	.058	.101	.181	.373	.505	.498	.448	1.00

Table 44

Inter-Item Correlation Matrix for Survey Items Measuring Realistic Interests (*M* = 0.173)

	I01 R	I02 R	I13 R	I14 R	I25 R	I26 R	I37 R	I38 R	I49 R	I50 R
I01 R	1.000	.641	.120	.359	.115	.109	.101	-.010	-.052	.071
I02 R	.641	1.000	.143	.182	.072	.222	.062	-.068	.170	.222
I13 R	.120	.143	1.000	.103	-.011	.101	.231	.207	.185	.101
I14 R	.359	.182	.103	1.000	.400	.333	.072	.147	-.041	-.048
I25 R	.115	.072	-.011	.400	1.000	.483	.062	.094	.176	.251
I26 R	.109	.222	.101	.333	.483	1.000	.283	.160	.181	.154
I37 R	.101	.062	.231	.072	.062	.283	1.000	.472	.030	.137
I38 R	-.010	-.068	.207	.147	.094	.160	.472	1.000	.214	.146
I49 R	-.052	.170	.185	-.041	.176	.181	.030	.214	1.000	.722
I50 R	.071	.222	.101	-.048	.251	.154	.137	.146	.722	1.000

Table 45

Inter-Item Correlation Matrix for Survey Items Measuring Investigative Interests (*M* = 0.266)

	I03 I	I04 I	I15 I	I16 I	I27 I	I28 I	I39 I	I40 I	I51 I	I52 I
I03 I	1.000	.238	-.168	-.060	-.074	.171	-.029	-.037	.073	.094
I04 I	.238	1.000	.203	.212	.081	.353	.231	.159	.260	.154
I15 I	-.168	.203	1.000	.523	.715	.530	.389	.339	.658	.286
I16 I	-.060	.212	.523	1.000	.386	.443	.241	.145	.614	.313
I27 I	-.074	.081	.715	.386	1.000	.413	.305	.244	.570	.279
I28 I	.171	.353	.530	.443	.413	1.000	.183	.252	.519	.217
I39 I	-.029	.231	.389	.241	.305	.183	1.000	.290	.277	.219
I40 I	-.037	.159	.339	.145	.244	.252	.290	1.000	.080	.198
I51 I	.073	.260	.658	.614	.570	.519	.277	.080	1.000	.476
I52	.094	.154	.286	.313	.279	.217	.219	.198	.476	1.000

Table 46

Inter-Item Correlation Matrix for Survey Items Measuring Artistic Interests (*M* = 0.189)

	I05A	I06A	I17A	I18A	I29A	I30A	I41A	I42A	I53A	I54A
I05A	1.000	.315	.326	.391	-.082	.196	.244	.221	.131	.234
I06A	.315	1.000	.233	.117	.295	.283	.224	.049	.020	.094
I17A	.326	.233	1.000	.439	.171	.324	.099	.140	.384	.282
I18A	.391	.117	.439	1.000	-.034	.189	.168	.143	.706	.469
I29A	-.082	.295	.171	-.034	1.000	.464	-.004	-.027	-.008	.105
I30A	.196	.283	.324	.189	.464	1.000	.104	-.100	.043	.242
I41A	.244	.224	.099	.168	-.004	.104	1.000	.469	.133	-.088
I42A	.221	.049	.140	.143	-.027	-.100	.469	1.000	.043	-.045
I53A	.131	.020	.384	.706	-.008	.043	.133	.043	1.000	.419
I54A	.234	.094	.282	.469	.105	.242	-.088	-.045	.419	1.000

Table 47

Inter-Item Correlation Matrix for Survey Items Measuring Social Interests (*M* = 0.225)

	I07S	I08S	I19S	I20S	I31S	I32S	I43S	I44S	I55S	I56S
I07S	1.000	.426	.178	.142	.135	.195	.152	.303	.336	.410
I08S	.426	1.000	.212	.273	.193	.094	.401	.240	.264	.129
I19S	.178	.212	1.000	.494	.058	.079	.164	.264	.189	.219
I20S	.142	.273	.494	1.000	-.024	-.022	.193	.105	.209	.041
I31S	.135	.193	.058	-.024	1.000	.506	.270	-.037	.196	.313
I32S	.195	.094	.079	-.022	.506	1.000	.162	.199	.278	.380
I43S	.152	.401	.164	.193	.270	.162	1.000	.233	.297	.135
I44S	.303	.240	.264	.105	-.037	.199	.233	1.000	.548	.273
I55S	.336	.264	.189	.209	.196	.278	.297	.548	1.000	.340
I56S	.410	.129	.219	.041	.313	.380	.135	.273	.340	1.000

Table 48

Inter-Item Correlation Matrix for Survey Items Measuring Enterprising Interests (*M* = 0.174)

	I09 E	I10 E	I21 E	I22 E	I33 E	I34 E	I45 E	I46 E	I57 E	I58 E
I09 E	1.000	.466	.125	.042	.174	.272	.030	.201	.396	.378
I10 E	.466	1.000	.147	.222	.285	-.056	.083	.357	.082	-.077
I21 E	.125	.147	1.000	.311	.098	.218	.236	.205	-.001	.004
I22 E	.042	.222	.311	1.000	.186	.081	.069	.135	-.222	-.227
I33 E	.174	.285	.098	.186	1.000	.175	.242	.291	.162	.163
I34 E	.272	-.056	.218	.081	.175	1.000	.471	.260	.142	.312
I45 E	.030	.083	.236	.069	.242	.471	1.000	.478	.078	.136
I46 E	.201	.357	.205	.135	.291	.260	.478	1.000	.128	-.009
I57 E	.396	.082	-.001	-.222	.162	.142	.078	.128	1.000	.579
I58 E	.378	-.077	.004	-.227	.163	.312	.136	-.009	.579	1.000

Table 49

Inter-Item Correlation Matrix for Survey Items Measuring Conventional Interests (*M* = 0.203)

	I11 C	I12 C	I23 C	I24 C	I35 C	I36 C	I47 C	I48 C	I59 C	I60 C
I11 C	1.000	.316	.130	.163	.157	.057	.268	.251	.195	.201
I12 C	.316	1.000	.145	.169	.227	-.015	.127	.237	.407	.390
I23 C	.130	.145	1.000	.511	.328	.378	.120	.058	.045	-.051
I24 C	.163	.169	.511	1.000	.289	.494	.296	.294	.094	-.039
I35 C	.157	.227	.328	.289	1.000	.273	-.053	.197	.187	.166
I36 C	.057	-.015	.378	.494	.273	1.000	.008	.226	.027	-.066
I47 C	.268	.127	.120	.296	-.053	.008	1.000	.287	.155	.126
I48 C	.251	.237	.058	.294	.197	.226	.287	1.000	.386	.277
I59 C	.195	.407	.045	.094	.187	.027	.155	.386	1.000	.678
I60 C	.201	.390	-.051	-.039	.166	-.066	.126	.277	.678	1.000

Table 50

Inter-Item Correlation Matrix for Survey Items Measuring Contextual Supports and Barriers (*M* = 0.075)

	SB01	SB02	SB03	SB04	SB05	SB06	SB08	SB09	SB10	SB11	SB12
SB01	1.000	.125	-.186	-.002	-.211	-.078	.063	.078	-.093	.275	-.008
SB02	.125	1.000	.128	.247	.012	.182	-.022	.418	.044	.164	-.015
SB03	-.186	.128	1.000	-.170	-.163	.332	-.051	.012	-.024	.094	-.073
SB04	-.002	.247	-.170	1.000	.169	-.002	.159	.195	.018	.081	.111
SB05	-.211	.012	-.163	.169	1.000	-.139	-.033	.223	.146	.139	.140
SB06	-.078	.182	.332	-.002	-.139	1.000	.092	.113	-.014	.106	-.012
SB08	.063	-.022	-.051	.159	-.033	.092	1.000	.025	-.068	.092	-.015
SB09	.078	.418	.012	.195	.223	.113	.025	1.000	.135	.189	.107
SB10	-.093	.044	-.024	.018	.146	-.014	-.068	.135	1.000	.116	.255
SB11	.275	.164	.094	.081	.139	.106	.092	.189	.116	1.000	.131
SB12	-.008	-.015	-.073	.111	.140	-.012	-.015	.107	.255	.131	1.000
SB13	-.026	.184	-.014	.226	.100	-.038	-.049	.038	.064	.144	.248
SB14	-.301	.156	.042	.022	.170	-.131	-.122	.028	.122	.078	.176
SB15	-.093	-.043	-.173	.018	.146	-.014	.135	.014	-.056	.201	.337
SB16	-.121	.064	-.105	-.092	-.170	.233	-.050	-.028	.056	-.006	.034
SB17	-.072	-.043	.023	-.182	-.017	.043	-.132	-.191	-.125	-.071	-.087
SB18	-.099	-.031	-.033	-.122	.052	.039	.050	.052	-.052	.114	.086
SB19	-.064	.025	-.087	-.100	.011	.082	.103	.093	-.149	.121	.042
SB20	.121	.083	.168	.022	-.016	-.028	-.036	-.074	-.056	.078	.036
SB21	.121	.009	-.021	-.262	-.016	-.233	.050	.028	.211	.006	.176
SB22	-.035	.122	.059	.059	.054	-.158	.025	-.056	.008	-.030	.218
SB23	-.035	.122	.125	-.163	-.011	-.051	-.065	.051	.008	-.030	.145
SB24	.078	.118	.098	-.094	-.030	-.026	.025	.026	.014	.189	.107
SB25	.078	.318	.098	-.094	-.114	.113	-.209	.165	.014	.091	.012

(continued)

	SB01	SB02	SB03	SB04	SB05	SB06	SB08	SB09	SB10	SB11	SB12
SB26	-.020	.083	.105	.022	.046	-.028	-.036	-.074	-.056	.006	.036
SB27	-.241	.130	.248	-.186	-.072	.135	-.135	-.014	-.049	-.116	.076
SB29	.002	-.039	.170	-.063	.124	-.094	.003	-.002	-.270	-.013	.153
SB30	.134	-.039	-.188	.071	.065	-.094	.084	.191	-.102	-.081	.021
SB31	.112	-.032	-.008	-.015	-.140	-.051	-.155	.051	.101	.121	-.001
SB32	.102	.084	.077	.023	-.005	.149	.188	.304	.080	.170	.190
SB33	-.116	.199	.111	.286	.045	.144	.225	.169	.161	.159	-.089
SB34	-.157	.045	.178	.042	.142	.042	.167	.228	.119	.063	-.101
SB35	.888	.141	-.209	-.032	-.238	-.087	.035	.087	-.105	.219	.079
SB36	.002	-.108	.110	.004	-.052	.002	.165	-.195	.066	.123	-.177
SB37	.045	.018	-.188	.053	-.185	-.021	.369	-.065	.115	-.042	-.030

	SB13	SB14	SB15	SB16	SB17	SB18	SB19	SB20	SB21	SB22	SB23
SB01	-.026	-.301	-.093	-.121	-.072	-.099	-.064	.121	.121	-.035	-.035
SB02	.184	.156	-.043	.064	-.043	-.031	.025	.083	.009	.122	.122
SB03	-.014	.042	-.173	-.105	.023	-.033	-.087	.168	-.021	.059	.125
SB04	.226	.022	.018	-.092	-.182	-.122	-.100	.022	-.262	.059	-.163
SB05	.100	.170	.146	-.170	-.017	.052	.011	-.016	-.016	.054	-.011
SB06	-.038	-.131	-.014	.233	.043	.039	.082	-.028	-.233	-.158	-.051
SB08	-.049	-.122	.135	-.050	-.132	.050	.103	-.036	.050	.025	-.065
SB09	.078	.418	.012	.195	.223	.113	.025	1.000	.135	.189	.107
SB10	.064	.122	-.056	.056	-.125	-.052	-.149	-.056	.211	.008	.008
SB11	.144	.078	.201	-.006	-.071	.114	.121	.078	.006	-.030	-.030
SB12	.248	.176	.337	.034	-.087	.086	.042	.036	.176	.218	.145
SB13	1.000	.153	.212	.095	.009	.187	.114	.029	-.033	.283	.153
SB14	.153	1.000	.033	-.101	-.270	.257	.176	.101	.176	.139	.139
SB15	.212	.033	1.000	.323	.261	.186	.230	.033	.122	.101	.008
SB16	.095	-.101	.323	1.000	.379	.145	.143	.124	-.026	.018	.018
SB17	.009	-.270	.261	.379	1.000	.012	-.040	.055	-.054	.037	.151
SB18	.187	.257	.186	.145	.012	1.000	.867	.458	.257	.242	.382
SB19	.114	.176	.230	.143	-.040	.867	1.000	.432	.304	.234	.301
SB20	.121	.083	.168	.022	-.016	-.028	-.036	-.074	-.056	.078	.036
SB21	-.033	.176	.122	-.026	-.054	.257	.304	.400	1.000	.296	.453
SB22	.283	.139	.101	.018	.037	.242	.234	.375	.296	1.000	.589
SB23	.153	.139	.008	.018	.151	.382	.301	.375	.453	.589	1.000
SB24	.123	.131	.135	-.028	.105	.234	.180	.233	.233	.479	.479
SB25	.292	.131	.135	-.028	.105	.234	.180	.131	.131	.158	.265

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	SB13	SB14	SB15	SB16	SB17	SB18	SB19	SB20	SB21	SB22	SB23
SB26	.153	.026	.122	-.026	.163	.391	.304	.176	.176	.375	.37
SB27	.157	.234	.056	.033	.125	.450	.376	.234	.234	.365	.551
SB28	.123	.028	.135	-.028	.105	.143	.093	.233	.335	.265	.265
SB29	.184	-.022	-.018	-.191	.079	.248	.161	.262	.262	.460	.386
SB30	-.050	-.022	.150	-.049	-.023	.122	.161	.049	.049	.163	.015
SB31	-.042	-.175	.008	-.139	-.076	.101	.167	.061	.139	.013	.095
SB32	.085	.017	.179	-.017	-.102	.226	.229	.017	.100	-.041	.046
SB33	-.058	.034	.070	-.034	-.046	-.010	-.074	-.043	-.196	.003	-.238
SB34	-.160	-.041	.041	-.091	-.021	.094	.010	.025	.025	.121	-.018
SB35	-.082	-.370	.046	-.010	.102	-.167	-.126	.010	.136	-.007	-.007
SB36	-.109	.049	.066	.022	-.126	.185	.100	.262	.333	.163	.163
SB37	-.147	-.133	.041	.258	.106	-.072	-.014	.056	.056	.071	.136

	SB24	SB25	SB26	SB27	SB28	SB29	SB30	SB31	SB32	SB33	SB34
SB01	.078	.078	-.020	-.241	.078	.002	.134	.112	.102	-.116	-.157
SB02	.118	.318	.083	.130	.218	-.039	-.039	-.032	.084	.199	.045
SB03	.098	.098	.105	.248	.184	.170	-.188	-.008	.077	.111	.178
SB04	-.094	-.094	.022	-.186	-.094	-.063	.071	-.015	.023	.286	.042
SB05	-.030	-.114	.046	-.072	.054	.124	.065	-.140	-.005	.045	.142
SB06	-.026	.113	-.028	.135	.113	-.094	-.094	-.051	.149	.144	.042
SB08	.025	-.209	-.036	-.135	.025	.003	.084	-.155	.188	.225	.167
SB09	.026	.165	-.074	-.014	.165	-.002	.191	.051	.304	.169	.228
SB10	.014	.014	-.056	-.049	.014	-.270	-.102	.101	.080	.161	.119
SB11	.189	.091	.006	-.116	.091	-.013	-.081	.121	.170	.159	.063
SB12	.107	.012	.036	.076	.202	.153	.021	-.001	.190	-.089	-.101
SB13	.123	.292	.153	.157	.123	.184	-.050	-.042	.085	-.058	-.160
SB14	.131	.131	.026	.234	.028	-.022	-.022	-.175	.017	.034	-.041
SB15	.135	.135	.122	.056	.135	-.018	.150	.008	.179	.070	.041
SB16	-.028	-.028	-.026	.033	-.028	-.191	-.049	-.139	-.017	-.034	-.091
SB17	.105	.105	.163	.125	.105	.079	-.023	-.076	-.102	-.046	-.021
SB18	.234	.234	.391	.450	.143	.248	.122	.101	.226	-.010	.094
SB19	.180	.180	.304	.376	.093	.161	.161	.167	.229	-.074	.010
SB20	.233	.131	.176	.234	.233	.262	.049	.061	.017	-.043	.025
SB21	.233	.131	.176	.234	.335	.262	.049	.139	.100	-.196	.025
SB22	.479	.158	.375	.365	.265	.460	.163	.013	-.041	.003	.121
SB23	.479	.265	.375	.551	.265	.386	.015	.095	.046	-.238	-.018
SB24	1.000	.444	.437	.350	.305	.384	.094	.051	.304	.065	.228
SB25	.444	1.000	.335	.471	.305	.287	.094	.051	.077	.169	.228

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	SB24	SB25	SB26	SB27	SB28	SB29	SB30	SB31	SB32	SB33	SB34
SB26	.437	.335	1.000	.590	.335	.545	.120	.139	.100	.034	.091
SB27	.350	.471	.590	1.000	.229	.354	.102	.085	.019	.021	.116
SB28	.305	.305	.335	.229	1.000	.384	-.002	-.056	.077	-.040	.138
SB29	.384	.287	.545	.354	.384	1.000	.063	.015	.056	.004	.208
SB30	.094	.094	.120	.102	-.002	.063	1.000	.163	.056	.149	.083
SB31	.051	.051	.139	.085	-.056	.015	.163	1.000	.220	.083	-.018
SB32	.304	.077	.100	.019	.077	.056	.056	.220	1.000	.139	.155
SB33	.065	.169	.034	.021	-.040	.004	.149	.083	.139	1.000	.673
SB34	.228	.228	.091	.116	.138	.208	.083	-.018	.155	.673	1.000
SB35	.087	.087	.010	-.196	.087	.032	.151	.126	.115	-.131	-.177
SB36	.191	.094	-.022	.102	.094	.130	-.004	.015	-.101	.149	.208
SB37	.106	-.065	-.070	-.190	.021	.006	.006	.071	.088	.097	.104

	SB35	SB36	SB37
SB01	.888	.002	.045
SB02	.141	-.108	.018
SB03	-.209	.110	-.188
SB04	-.032	.004	.053
SB05	-.238	-.052	-.185
SB06	-.087	.002	-.021
SB08	.035	.165	.369
SB09	.087	-.195	-.065
SB10	-.105	.066	.115
SB11	.219	.123	-.042
SB12	.079	-.177	-.030
SB13	-.082	-.109	-.147
SB14	-.370	.049	-.133
SB15	.046	.066	.041
SB16	-.010	.022	.258
SB17	.102	-.126	.106
SB18	-.167	.185	-.072
SB19	-.126	.100	-.014
SB20	.010	.262	.056
SB21	.136	.333	.056
SB22	-.007	.163	.071
SB23	-.007	.163	.136
SB24	.087	.191	.106
SB25	.087	.094	-.065

(continued)

	SB35	SB36	SB37
SB26	.010	-.022	-.070
SB27	-.196	.102	-.190
SB28	.087	.094	.021
SB29	.032	.130	.006
SB30	.151	-.004	.006
SB31	.126	.015	.071
SB32	.115	-.101	.088
SB33	-.131	.149	.097
SB34	-.177	.208	.104
SB35	1.000	-.088	.103
SB36	-.088	1.000	.065
SB37	.103	.065	1.000

Appendix G: Classification of Responses into Support or Barrier for Items Measuring Contextual Supports and Barriers Responses

Table 51

Classification of Responses into Support or Barrier for Survey Items Measuring Contextual Supports and Barriers

Item	Response
High School Graduation Year	
Support	2010-2016
Barrier	Prior to 2010
Forensic Science Course in High School	
Support	Yes
Barrier	No
Liberal Arts Courses in High School	
Support	Any besides required government/law course
Barrier	Only required government/law course or none
Math Courses in High School	
Support	4 or more
Barrier	3 or less
Science Courses in High School	
Support	4 or more
Barrier	3 or less
AP Courses in High School	
Support	Any AP courses
Barrier	No AP courses
IB Courses in High School	
Support	Yes
Barrier	No
ACT or SAT Score	
Support	20+ ACT or 940+ SAT (school requirement)
Barrier	Below 20 ACT or 940 SAT
Forensic Science Extracurricular Activities	
Support	Yes
Barrier	No
Financial Aid Status	
Support	Yes-I qualify and chose to receive aid Yes-I qualify but chose not to receive aid No-I do not qualify and do not need aid
Barrier	No-I do not qualify but need aid
Financial Aid from Family	
Support	Most or All
Barrier	None or Some
Financial Aid, Debt-Free	
Support	Most or All
Barrier	None or Some

(continued)

Item	Response
Financial Aid, Debt	
Support	None or Some
Barrier	Most or All
Work Status	
Support	No
	Yes-Job Related to Forensic Science
Barrier	Yes-Full-time
	Yes-Part-time
Home Environment	
Support	Moderate or High Support
Barrier	No or Slight Support
Social Environment	
Support	Moderate or High Support
Barrier	No or Slight Support
Academic Environment	
Support	Moderate or High Support
Barrier	No or Slight Support
Paternal Figure's Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
Maternal Figure's Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
Siblings' Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
Relatives' Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
Peers' Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
Mentor's Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
High School STEM Teachers' Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
High School Non-STEM Teachers' Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
College STEM Teachers' Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence

(continued)

Item	Response
College Non-STEM Teachers' Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
High School Counselor's Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
College Advisor's Influence on Decision	
Support	Moderate or High Influence
Barrier	No or Slight Influence
Family or Friends Majoring or Majored in Forensic Science	
Support	Yes
Barrier	No
Family or Friends Working or Worked in Forensic Science Field	
Support	Yes
Barrier	No
Job Shadowed with Forensic Scientist	
Support	Yes
Barrier	No
Obtained Information about Forensic Science Before Making Decision	
Support	Yes
Barrier	No
Source of Most Information Obtained about Forensic Science	
Support	Professional, Advisor, Personal Contact, Official Website, Non-Fictional TV, Non-Fiction Books, or Periodicals
Barrier	Search Engines, Fictional TV, or Fiction Books
Age	
Support	18-24 years
Barrier	Any other age range provided
Gender	
Support	Male
Barrier	Female
Race/Ethnicity	
Support	White/Caucasian-Non-Hispanic
Barrier	Any other race/ethnicity considered a minority

Appendix H: Recommended Modified Survey for Future Studies

Online Consent to Participate in Research

Would you like to be involved in research at the University of Oklahoma? I am Stacey Steinmetz from the department of Instructional Leadership and Academic Curriculum (ILAC) at the University of Oklahoma (OU), and I invite you to participate in my research project entitled Examination of the Variables that Influence a Student's Decision to Major in Forensic Science. This research is being conducted at the University of Central Oklahoma (UCO). You were selected as a possible participant because you are currently enrolled in FRSC 2503—Introduction to Forensic Science at UCO. You must be at least 18 years of age to participate in this study.

Please read this document and contact me to ask any questions that you may have BEFORE agreeing to take part in my research.

What is the purpose of this research? The purpose of this research is to determine the validity and reliability of a new survey instrument. This survey is designed to determine the factors that most influence a student's decision to major in forensic science.

How many participants will be in this research? Approximately 120 students will take part in this research.

What will I be asked to do? If you agree to be in this research, you will be asked to complete a one-time survey during your Introduction to Forensic Science course. How long will this take? Your participation will take approximately 15-20 minutes.

What are the risks and/or benefits if I participate? There are no risks and no benefits from being in this research.

Will I be compensated for participating? You will not be reimbursed for your time and participation in this research.

Who will see my information? In research reports, there will be no information that will make it possible to identify you. Research records will be stored securely and only approved researchers and the OU Institutional Review Board will have access to the records.

Do I have to participate? No. If you do not participate, you will be asked to leave the classroom while participants complete the survey. No course content will be missed due to non-participation. If you do not participate, you will not be penalized or lose benefits or services unrelated to the research. If you decide to participate, you don't have to answer any question and can stop participating at any time.

Who do I contact with questions, concerns or complaints? If you have questions, concerns or complaints about the research or have experienced a research-related injury, contact me or my graduate advisor.

Stacey Steinmetz: 405-974-6916 or ssteinmetz@uco.edu

Dr. Timothy Laubach: 405-325-1498 or laubach@ou.edu

You can also contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at 405-325-8110 or irb@ou.edu if you have questions about your rights as a research participant, concerns, or complaints about the research and wish to talk to someone other than the researcher(s) or if you cannot reach the researcher(s).

Please print this document for your records. By providing information to the researcher(s), I am agreeing to participate in this research.

This research has been approved by the University of Oklahoma, Norman Campus IRB. IRB Number: _____ Approval date: _____

- ❍ I agree to participate
- ❍ I do not want to participate

As of today, are you 18 years old or older?

- ❍ Yes
- ❍ No

Which degree track are you currently pursuing (or planning to pursue) in Forensic Science?

- ❍ B.S. in Forensic Science
- ❍ B.S. in Forensic Science-Chemistry
- ❍ B.S. in Forensic Science-Digital Forensics
- ❍ B.S. in Forensic Science-Molecular Biology
- ❍ M.S. in Forensic Science
- ❍ M.S. in Forensic Science-Biology/Chemistry
- ❍ I do not plan to pursue a degree in Forensic Science

This survey contains questions related to STEM and Non-STEM. STEM stands for science, technology engineering, and mathematics. Non-STEM includes all other subjects. For the purposes of this study, STEM majors and subjects include actuarial science, biology, chemistry, computer science, engineering, funeral service, mathematics, management of information systems (MIS), nursing, physics, science education, and related majors and subjects. For the purposes of this study, Non-STEM majors and subjects include any majors or subjects not listed above. Examples of non-STEM majors and subjects include, but are not limited to, art, business, communications, criminal justice, English, foreign languages, history, psychology, sociology, and related majors and subjects. Does you concurrent degree or intended concurrent degree fall under the category of STEM or Non-STEM?

- ❍ STEM Major
- ❍ Non-STEM Major

Indicate your level of confidence in your ability to _____.

	No Confidence	Slight Confidence	Moderate Confidence	High Confidence
Be Detailed	❍	❍	❍	❍
Be Innovative	❍	❍	❍	❍
Be Objective	❍	❍	❍	❍
Be Honest	❍	❍	❍	❍
Solve Problems	❍	❍	❍	❍
Think Critically	❍	❍	❍	❍
Think Independently	❍	❍	❍	❍
Take Notes	❍	❍	❍	❍
Write Reports	❍	❍	❍	❍
Utilize The Scientific Method	❍	❍	❍	❍
Interpret Data	❍	❍	❍	❍
Learn To Use New Tools	❍	❍	❍	❍
Learn New Skills	❍	❍	❍	❍
Present Information To A Group	❍	❍	❍	❍
Work In A Laboratory Setting	❍	❍	❍	❍

Work In Variable Conditions	❍	❍	❍	❍
Work Under Stressful Conditions	❍	❍	❍	❍
Pursue Concurrent Degrees	❍	❍	❍	❍
Obtain Above Average Grades (A's & B's) in Forensic Science Courses	❍	❍	❍	❍
Obtain Above Average Grades (A's & B's) in Math Courses	❍	❍	❍	❍
Obtain Above Average Grades (A's & B's) in Science Courses	❍	❍	❍	❍

If I major in forensic science, I will _____.

	Strongly Disagree	Somewhat Disagree	Neither Agree Nor Disagree	Somewhat Agree	Strongly Agree
Get To Use My Talents & Skills	❍	❍	❍	❍	❍
Make A Good Salary	❍	❍	❍	❍	❍
Make A Difference	❍	❍	❍	❍	❍
Be Respected	❍	❍	❍	❍	❍
Be Proud of Myself	❍	❍	❍	❍	❍
Be Connected To A Larger Organization	❍	❍	❍	❍	❍
Enjoy My Job	❍	❍	❍	❍	❍
Have An Exciting Job	❍	❍	❍	❍	❍
Have Many Job Opportunities	❍	❍	❍	❍	❍
Have Educational & Professional Growth Opportunities	❍	❍	❍	❍	❍
Have Work-Life Balance	❍	❍	❍	❍	❍
Have Job Stability	❍	❍	❍	❍	❍

Read each question carefully and decide how you would feel about doing each type of work. Try not to think about if you have enough education or training to do the work or how much money you would make doing the work. Just think about if you would like or dislike doing the work.

	Strongly Dislike	Dislike	Unsure	Like	Strongly Like
Build kitchen cabinets	❍	❍	❍	❍	❍
Lay brick or tile	❍	❍	❍	❍	❍
Develop and test a new vaccine	❍	❍	❍	❍	❍
Study ways to reduce water pollution	❍	❍	❍	❍	❍
Write books or plays	❍	❍	❍	❍	❍
Play a musical instrument	❍	❍	❍	❍	❍
Teach an individual an exercise routine	❍	❍	❍	❍	❍
Help people with personal or emotional problems	❍	❍	❍	❍	❍
Buy and sell stocks and bonds	❍	❍	❍	❍	❍
Manage a retail store	❍	❍	❍	❍	❍

Develop a spreadsheet using computer software	❍	❍	❍	❍	❍
Proofread records or forms	❍	❍	❍	❍	❍
Repair household appliances	❍	❍	❍	❍	❍
Raise fish in a fish hatchery	❍	❍	❍	❍	❍
Conduct chemical experiments	❍	❍	❍	❍	❍
Study the movement of planets	❍	❍	❍	❍	❍
Compose or arrange music	❍	❍	❍	❍	❍
Draw pictures	❍	❍	❍	❍	❍
Give career guidance to people	❍	❍	❍	❍	❍
Perform rehabilitation therapy	❍	❍	❍	❍	❍
Operate a beauty salon or barber shop	❍	❍	❍	❍	❍
Manage a department within a company	❍	❍	❍	❍	❍

Install software across computers on a large network	❍	❍	❍	❍	❍
Operate a calculator	❍	❍	❍	❍	❍
Assemble electronic parts	❍	❍	❍	❍	❍
Drive a truck to deliver packages to offices and homes	❍	❍	❍	❍	❍
Examine blood samples using a microscope	❍	❍	❍	❍	❍
Investigate the cause of a fire	❍	❍	❍	❍	❍
Create special effects for movies	❍	❍	❍	❍	❍
Paint a mural	❍	❍	❍	❍	❍
Do volunteer work at a non-profit organization	❍	❍	❍	❍	❍
Teach children how to play sports	❍	❍	❍	❍	❍
Start your own business	❍	❍	❍	❍	❍

Negotiate business contracts	❍	❍	❍	❍	❍
Keep shipping and receiving records	❍	❍	❍	❍	❍
Calculate the wages of employees	❍	❍	❍	❍	❍
Test the quality of parts before shipment	❍	❍	❍	❍	❍
Repair and install locks	❍	❍	❍	❍	❍
Develop a way to better predict the weather	❍	❍	❍	❍	❍
Work in a biology lab	❍	❍	❍	❍	❍
Write scripts for movies or television shows	❍	❍	❍	❍	❍
Perform a dance routine	❍	❍	❍	❍	❍
Teach sign language to people with hearing disabilities	❍	❍	❍	❍	❍
Help conduct a group therapy session	❍	❍	❍	❍	❍

Represent a client in a lawsuit	❍	❍	❍	❍	❍
Market a new product	❍	❍	❍	❍	❍
Inventory supplies using a hand-held computer	❍	❍	❍	❍	❍
Record rent payments	❍	❍	❍	❍	❍
Set up and operate machines to make products	❍	❍	❍	❍	❍
Put out forest fires	❍	❍	❍	❍	❍
Invent a replacement for sugar	❍	❍	❍	❍	❍
Do laboratory tests to identify diseases	❍	❍	❍	❍	❍
Sing in a band	❍	❍	❍	❍	❍
Edit movies	❍	❍	❍	❍	❍
Take care of children at a daycare center	❍	❍	❍	❍	❍
Teach a high school class	❍	❍	❍	❍	❍

Sell merchandise at a department store	❍	❍	❍	❍	❍
Manage a small business	❍	❍	❍	❍	❍
Keep inventory records	❍	❍	❍	❍	❍
Stamp, sort, and distribute mail for an organization	❍	❍	❍	❍	❍

Did you find the following courses in high school to support or NOT support your choice to major in Forensic Science?

	Supported My Choice	Did NOT Support My Choice	Did Not Affect My Choice	Did Not Take This Course in High School
Forensic Science Course	❍	❍	❍	❍
Math Courses	❍	❍	❍	❍
Science Courses	❍	❍	❍	❍
Art Courses	❍	❍	❍	❍
Government/Civics/Political Science Courses	❍	❍	❍	❍
Criminal Justice Courses	❍	❍	❍	❍
Psychology/Sociology Courses	❍	❍	❍	❍
AP Courses	❍	❍	❍	❍
IB Courses	❍	❍	❍	❍

Did participating in Forensic Science camps, clubs, or extracurricular activities in elementary, middle, or high school support or NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did NOT Support My Choice
- ❍ Did Not Affect My Choice
- ❍ Did not Participate in Forensic Science camps, clubs, or extracurricular activities

Did your ACT or SAT scores support or NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did NOT Support My Choice
- ❍ Did Not Affect My Choice
- ❍ Did Not Take the ACT or SAT

Did the level of financial aid you received from your family support or NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did NOT Support My Choice
- ❍ Did Not Affect My Choice
- ❍ Did Not Request Financial Aid From My Family

Did the level of financial aid you received from FAFSA or your school that does not have to be paid back (ex. scholarships, grants) support or NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did NOT Support My Choice
- ❍ Did Not Affect My Choice
- ❍ Did Not Apply for Financial Aid through FAFSA or My School

Did the level of financial aid you received from FAFSA or your school that must be paid back in the future (ex. loans) support or NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did NOT Support My Choice
- ❍ Did Not Affect My Choice
- ❍ Did Not Apply for Financial Aid through FAFSA or My School

Did having a job or having to work support or NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did NOT Support My Choice
- ❍ Did Not Affect My Choice
- ❍ Do Not Have a Job or Have to Work

Please rate whether the following environments supported or did NOT support your choice to major in Forensic Science.

	Supported My Choice	Did NOT Support My Choice	Did Not Affect My Choice
Home Environment	❍	❍	❍
Social Environment	❍	❍	❍
Academic Environment	❍	❍	❍

Please rate whether the following individuals supported or did NOT support your choice to major in Forensic Science.

	Supported My Choice	Did NOT Support My Choice	Did Not Affect My Choice	Not Applicable (N/A)
Father/Male Guardian	❍	❍	❍	❍
Mother/Female Guardian	❍	❍	❍	❍
Sibling(s)	❍	❍	❍	❍
Other Relative(s)	❍	❍	❍	❍
Peers	❍	❍	❍	❍
Personal Mentor(s)	❍	❍	❍	❍
High School STEM Teacher(s)	❍	❍	❍	❍
High School Non-STEM Teacher(s)	❍	❍	❍	❍
College STEM Professor(s)	❍	❍	❍	❍
College Non-STEM Professor(s)	❍	❍	❍	❍
High School Guidance Counselor(s)	❍	❍	❍	❍
College Academic Advisor(s)	❍	❍	❍	❍

Did having family, friends, or mentors currently or previously pursuing a degree in Forensic Science or a related field support or NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did NOT Support My Choice
- ❍ Did Not Affect My Choice
- ❍ Did Not Have Family, Friends, or Mentors Pursuing Degrees in Forensic Science

Did having family, friends, or mentors currently or previously employed in the field of Forensic Science or a related field support or NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did Not Support My Choice
- ❍ Did Not Affect My Choice
- ❍ Did Not Have Family, Friends, or Mentors Employed in Forensic Science or Related Field

Did job shadowing, interning with, or speaking with a forensic scientist support or NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did Not Support My Choice
- ❍ Did Not Affect My Choice
- ❍ Did Not Shadow, Intern, or Speak With a Forensic Scientist

Please rate whether obtaining information from the following sources supported or did NOT support your choice to major in Forensic Science.

	Supported My Choice	Did Not Support My Choice	Did Not Affect My Choice	Did Not Obtain Information From This Source
Professional in Forensic Science or Related Field	❍	❍	❍	❍
Advisor (career counselor, guidance counselor, academic advisor, etc.)	❍	❍	❍	❍
Personal Contact (family, friends, acquaintances, etc.)	❍	❍	❍	❍
Official Local, State, or National Websites on Forensic Science Careers (ex. AAFS, FBI, BLS, Interpol, etc.)	❍	❍	❍	❍
Internet Search on Forensic Science (ex. Google, Bing, Yahoo, etc.)	❍	❍	❍	❍
Fictional TV Shows (CSI, NCIS, Criminal Minds, etc.)	❍	❍	❍	❍
Non-Fiction TV Shows (Forensic Files, The First 48, Cold Case Files, etc.)	❍	❍	❍	❍

Fictional Books (Body Farm series, Tempe Brennan series, Kay Scarpetta series, etc.)	❍	❍	❍	❍
Non-Fiction Books (Beyond the Body Farm, No Stone Unturned, Justice for the Dead, etc.)	❍	❍	❍	❍
Periodicals (ex. National Geographic, New York Times, etc.)	❍	❍	❍	❍

Which of the previous sources MOST SUPPORTED or had the MOST EFFECT ON your choice to major in Forensic Science?

- ❍ Professional in Forensic Science or Related Field
- ❍ Advisor (career counselor, guidance counselor, academic advisor, etc.)
- ❍ Personal Contact (family, friends, acquaintances, etc.)
- ❍ Official Local, State, or National Websites on Forensic Science Careers (ex. AAFS, FBI, BLS, Interpol, etc.)
- ❍ Internet Search on Forensic Science (ex. Google, Bing, Yahoo, etc.)
- ❍ Fictional TV Shows (CSI, NCIS, Criminal Minds, etc.)
- ❍ Non-Fiction TV Shows (Forensic Files, The First 48, Cold Case Files, etc.)
- ❍ Fictional Books (Body Farm series, Tempe Brennan series, Kay Scarpetta series, etc.)
- ❍ Non-Fiction Books (Beyond the Body Farm, No Stone Unturned, Justice for the Dead, etc.)
- ❍ Periodicals (ex. National Geographic, New York Times, etc.)
- ❍ None of These Sources Affected My Choice to Major in Forensic Science

Did you find that your age supported or did NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did NOT Support My Choice
- ❍ Did Not Affect My Choice

Did you find that your gender supported or did NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did NOT Support My Choice
- ❍ Did Not Affect My Choice

Did you find that your race or ethnicity supported or did NOT support your choice to major in Forensic Science?

- ❍ Supported My Choice
- ❍ Did NOT Support My Choice
- ❍ Did Not Affect My Choice

What is your age?

- ❍ 18-24 years
- ❍ 25-34 years
- ❍ 35-44 years
- ❍ 45-54 years
- ❍ 55-64 years
- ❍ 65+ years
- ❍ Prefer not to answer

What is your gender?

- ❍ Male
- ❍ Female
- ❍ Other
- ❍ Prefer not to answer

Are you of Hispanic, Latino, or Spanish origin?

- ❍ Yes
- ❍ No
- ❍ Prefer not to answer

What is your race? For purposes of this question, persons of Hispanic/Latino/Spanish origin may be of any race.

- ❍ American Indian/Native American
- ❍ Asian
- ❍ Black/African American
- ❍ Pacific Islander
- ❍ White/Caucasian
- ❍ Multiple/Mixed Races
- ❍ Other Race
- ❍ Prefer not to answer

What is your student type?

- ❍ In-State Undergraduate Student
- ❍ Out-of-State Undergraduate Student
- ❍ International Undergraduate Student
- ❍ In-State Graduate Student
- ❍ Out-of-Sate Graduate Student
- ❍ International Graduate Student

What is your student classification?

- ❍ Freshman
- ❍ Sophomore
- ❍ Junior
- ❍ Senior
- ❍ Post-Bach
- ❍ Graduate
- ❍ Special (not working toward degree)