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Underrepresented minorities and social cognitive career theory: an investigation of the effectiveness of increasing math and science interest and self-efficacy in the context of a healthcare career intervention with rural Latino and White-identified middle school students

Dominique LaShawn Brooks
University of Iowa

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UNDERREPRESENTED MINORITIES AND SOCIAL COGNITIVE
CAREER THEORY: AN INVESTIGATION OF THE EFFECTIVENESS OF
INCREASING MATH AND SCIENCE INTEREST AND SELF-EFFICACY IN THE
CONTEXT OF A HEALTHCARE CAREER INTERVENTION WITH RURAL
LATINO AND WHITE-IDENTIFIED MIDDLE SCHOOL STUDENTS

by

Dominique LaShawn Brooks

A thesis submitted in partial fulfillment of the
requirements for the Doctor of Philosophy degree
in Psychological and Quantitative Foundations
(Counseling Psychology) in the Graduate College of
The University of Iowa

May 2014

Thesis Supervisors: Professor Elizabeth Altmaier
Associate Professor Saba Ali

Graduate College
The University of Iowa
Iowa City, Iowa

CERTIFICATE OF APPROVAL

PH.D. THESIS

This is to certify that the Ph. D thesis of

Dominique LaShawn Brooks

has been approved by the Examining Committee
for the thesis requirement for the Doctor of Philosophy
degree in Psychological and Quantitative Foundations (Counseling
Psychology) at the May 2014 graduation

Thesis Committee:

Elizabeth Altmaier, Thesis Supervisor

Saba Ali, Thesis Supervisor

Timothy Ansley

Stewart Ehly

Jodi Saunders

To my family and friends who have encouraged me through their actions and words.
Thank you for the pressure to perform and not giving me the option to fail.

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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

Introduction

The population of the United States is becoming increasingly diverse. However, in the field of healthcare there is a lack of ethnic minority representation (Cohen, Gabriel, & Terrell, 2002; Freeman, Ferrer, & Greiner, 2007). More specifically, the actual percentage of racial/ethnic minorities in healthcare professions does not reflect the number of those in the American population (Terrell, 2006). This underrepresentation has been linked to the cultural/racial disparity in quality of healthcare and subsequent health outcomes (Sullivan, 2004; Arora, Schneider, Thal, & Meltzer, 2011). This problem of underrepresentation implies an issue with supply, demand, or both. The current study serves to increase awareness regarding the benefits of an ethnically diverse healthcare workforce, thereby creating support for a demand; and also proposes a solution for an increase of ethnic minorities successfully pursuing a career in healthcare, thereby increasing the supply.

There are numerous factors that, in concert, contribute to the lack of diversity in healthcare. Some factors are related to personal and individual characteristics (e.g. self-efficacy and resources) while some operate on the institutional level (e.g. recruitment strategies and cultural sensitivity). Perhaps as a result of perceived distance between the two levels or limitation based on available resources, past approaches have focused on factors within each level (e.g. affirmative action, *No Child Left Behind*) neglecting the possibility of factors interacting between levels. While it is not possible to address all of these issues at once, it is possible to create a dual approach that focuses on important factors for both the individual and institutions. This idea of a dual approach has fueled the call for educational pipelines (Carline, Davis, & Patterson, 2003; Sullivan, 2004; Terrell, 2006).

Pipeline interventions have most recently become the primary recommendation for addressing the lack of underrepresented minorities (URMs) in the healthcare field (Patterson & Carline, 2006). Ideally, they include participation from educational institutions, professional organizations and businesses, and governing bodies to help facilitate educational success and career interest and achievement. While the participation of all three levels is desired, for various reasons it may not be accomplished. Partnerships have the same goal but require fewer pieces than the optimal pipeline. The most common participants in healthcare-related pipelines and partnerships are: K-12 institutions, colleges and universities, and local businesses and organizations (Ewell, Jones, & Kelly, 2003; Hughes & Karp, 2006). Although there is a relatively finite possibility of external designs (i.e. participating parties), there are infinite possibilities for internal construction (e.g. program content, degree of partner engagement, mechanisms for change) and a gap in the literature regarding “best practices” (Baldwin & Agho, 2003; Yehieli, et al., 2005; Hughes & Karp, 2006). The resulting overall variability in pipeline interventions has led to equally varying success rates.

Consistently, the idea of improving math and science education has been part of the conversation regarding increasing URMs in healthcare (Patterson & Carline, 2006). The validity of this recommendation has been supported by the findings of several successful interventions aimed at the latter which have incorporated, to varying degrees, math- and science-related content (e.g. Junior Fellows, Health Sciences and Technology Academy). Complementary findings demonstrating the relationship between math and science interest and ability and interest in related careers (e.g. healthcare careers) (Fouad, 1995; O’Brien, Martinez-Ponz, & Kopala 1999; Stroup & Thacker, 2007) further support the inclusion of this material in these interventions.

Rationale for Study

Math and science interest has been linked to healthcare-career interest for high school and undergraduate URMs; however, this link has not been established for URM

middle school students. There is also a lack of healthcare career interventions and vocational interventions in general for this population. Fouad and Smith (1996) and Navarro, Flores, and Worthington (2007) have demonstrated a developmental link between middle school years and interest development. Further, Fouad (1995) asserts that career-related choices “must be addressed” before high school and that math and science-related skills may be beyond “remediation” upon high school entry.

As the theoretical underpinning of the present study, Social Cognitive Career Theory (SCCT) (Lent, Brown, and Hackett, 1994) provides the framework for potentially creating and/or increasing students’ interests in healthcare careers through providing positive experiences with math and science. SCCT posits that career choice (e.g. becoming a healthcare professional) is heavily influenced by career interest (e.g. math and science). Also, career choice behavior and interest are largely impacted by career self-efficacy (e.g. beliefs about math and science ability). Further, Lent et al. state that career-related self-efficacy can be increased through successful experiences with career-related tasks.

According to Adelson and McCoach (2011), attitude towards a given domain can be measured by assessing a person’s self-efficacy and interest in that domain (e.g. math). Based on this premise, the current study was designed to determine if the addition of math- and science-related content to an existing healthcare career intervention would increase positive attitudes toward math, science, and healthcare careers for middle school students. The results of this study expand the current body of career development research by adding interest development implications for the middle school population. Also, this study provides population-specific results regarding the relationship between math- and science-related content and healthcare careers. Finally, this study adds to the current body of research regarding the SCCT variables of interest, self-efficacy and career consideration (interest) for middle school students and URMs.

Lack of Diversity in Healthcare

Part of the disparity in healthcare workforce demand and supply has been caused by a decrease in the rate at which adolescents are entering institutions of higher learning (Perry, Liu, & Pabian, 2010; Roman, Jr., 2004). The other side of this disparity, the increase in demand, is made more complex by a population that is rapidly aging and diversifying (Roman, Jr., 2004; Sullivan, 2004). Within the field of healthcare, there is an enormous effort to increase the number of qualified underrepresented minorities (URMs) entering the field (e.g. Health Professions Partnership Initiative (HPPI) (1996), Sullivan Commission on Diversity in the Healthcare Workforce (2004)). By 2050, it is believed that URMs will constitute over 50% of the U.S.'s population (Sullivan, 2004). This increase in both size and diversity means two things for healthcare: 1) an increase in the potential supply of healthcare workers and 2) an increased need for a diverse healthcare workforce.

As mentioned previously, the rates of students entering into higher education does not reflect the rates at which our population is increasing (Roman, Jr., 2004). This means that although there is an increase in college-aged adolescents, this number is not translating into equally higher rates of college-bound adolescents. What is happening to the students between high school and college? The unfortunate truth is that there are some students who do not view higher education as attainable for them, a problem that has a direct impact on the number of people entering positions that require a minimum of an associate's degree, including many healthcare positions. This subpopulation of students is mainly characterized by having a low socioeconomic status (SES) (Kenny et al., 2010). In the United States, URMs are unfortunately overrepresented within the lower levels of SES (Sullivan, 2004). Having a low SES is highly correlated with low educational aspirations (Sullivan, 2004; Crosnoe & Huston, 2007) and given the overrepresentation of URMs in this category, it appears that it is also having a negative

impact on the potential diversification of higher education and ultimately the healthcare field.

Diversifying the healthcare field is not only beneficial for the field, but for those being served by the field as well. In addition to potentially increasing the field of applicants, creating a diverse healthcare workforce can also improve level of care and access to healthcare for URMs and those with financial difficulties, lead to a culturally competent workforce and training programs, and increase research that uses a diversity of participants that reflect the actual population (Betancourt, Green, & Carrillo, 2002; Cohen, Gabriel, & Terrell, 2002; Grumbach & Mendoza, 2008; Arora, Schneider, Thal, & Meltzer, 2011).

Level of care and access to healthcare for URMs are both currently at unacceptably low levels (Betancourt, Green, & Carrillo, & Ananeh-Firempong, II, 2003; Reede, 2003). Addressing these disparities would have the additional benefit of decreasing the disparity in overall health of URMs. According to the research, the majority of current health professionals and those soon to enter the workforce have very little desire to work in underserved areas causing an access barrier in the quality of care received in these areas while URMs are less likely to successfully enter the healthcare field but are more likely to work in underserved areas as professionals (Reede, 2003; Yehieli et al., 2005). It is essential to incorporate more ethnically and racially diverse persons into the healthcare field in order to increase access to healthcare for these areas and to improve the level of care received. A more diverse healthcare policymaking body concerned with issues specific to URMs would also improve the level of care received by this population (Betancourt, Green, Carrillo, & Ananeh-Firempong, II, 2003).

Cultural concordance between healthcare providers and recipients is one of the most important factors that affect patient satisfaction for URMs (Cohen, Gabriel, & Terrell, 2002). Saha et al. (2000) found that patients not only feel better cared for by racially and ethnically congruent healthcare workers, but that they seek those individuals

out. Implicit in this statement is the lack of treatment received by URMs due to a lack of providers who are URMs, leading to poor healthcare overall for URMs. Another potential benefit of creating more opportunities for cultural concordance within the healthcare field comes from the social cognitive career theory. Modeling has a significant impact on career decisions for children and adolescents and concordance is a key feature of modeling (Lent, Brown, & Hackett, 1992). By increasing the diversity of the healthcare field, the field of potentially interested youth is also widened and diversified.

Cultural competence will also be enhanced by diversifying the healthcare field. For the purposes of this research, *cultural competence* will be defined as follows: the knowledge, skills, attitudes, and behaviors required of a practitioner to provide optimal health care services to persons from a wide range of cultural and ethnic backgrounds (Cohen, Gabriel & Terrell, 2002). It is impossible to understand and serve such a diverse population as that of the United States without making efforts to include those with diverse backgrounds in learning, teaching, and working environments. Language is an aspect of culture that is highly salient and critical to forming any relationship, including that of doctor-patient. Without the ability to communicate, any experience becomes frustrating, unpleasant and otherwise unsuccessful.

One component of diversifying the healthcare field would be to increase the number of languages represented in the workforce. The healthcare field relies heavily on assessment, which is greatly impeded by a mismatch of language between provider and recipient. This in itself can lead to a decrease in the quality of care received by a patient. Given the unique experiences of each culture, it is imperative that healthcare field reflect those they serve in order to share and exchange the knowledge, skills, attitudes, and behavior necessary to serve a diverse population competently. Overall, a lack of cultural competence creates a less than acceptable environment for URMs to receive services.

Research in medicine is responsible for creating technologically advanced techniques and expanding an ever-increasing knowledge base in all things normal and abnormal. Culturally defined norms and abnormalities are beginning to appear in medical literature but there still exists a gap in the knowledge (Dankwa-Mullen et al., 2010). This disparity contributes to the deficit in care experienced by URMs. Without adequate information on cultural specificity, the chances of misdiagnoses and/or incomplete assessment are increased for URMs (Betancourt, Green, & Carrillo, 2002; Betancourt, Green, Carrillo, & Ananeh-Firempong, II, 2003). A stronger presence of minorities at every level of healthcare could lead to increase in research with URMs. Cohen, Gabriel and Terrel (2002) argue that researchers and policymakers tend to focus on what is visible to them. Increasing the diversity of healthcare workers at this level will potentially lead to a broader scope for research aims. In addition to an increase in the scope of awareness, the pool of research subjects has a greater chance of diversifying as a result of researcher-subject concordance, which has been found to positively affect URM participation in research (Cohen, Gabriel, & Terrell, 2002).

The population of the United States is continuing to grow in both size and diversity. Having a healthcare workforce that mimics this growth is beneficial to the welfare of all Americans. Given the current trajectories of the population and healthcare workforce, the current deficit in healthcare for URMs will be the reality for the majority of U.S. citizens without a well-informed, evidence-based intervention.

Increasing Diversity in Healthcare

In order to diversify the field of healthcare, the field of applicants must also increase in diversity. There has been a longstanding issue in this country of not having a representative sample of URMs within the field of healthcare. As a result, the United States has a history of implementing initiatives to increase the enrollment of URMs in healthcare-related fields in higher education, and subsequently encouraging their entry into healthcare (Cohen, Gabriel, & Terrel, 2002; Treatment, 2008).

Historical Efforts

Triggered by the Civil Rights Movement and subsequent activism following the assassination of Dr. Martin Luther King, Jr. in the 1960's, medical schools began to adjust enrollment practices to increase the number of URMs accepted and created the Association of American Medical Colleges Taskforce for Minority-group Enrollment (Nickens, Ready, & Petersdorf, 1994; Cohen, Gabriel, & Terrell, 2002). In the 1970's the National Institute of Health (NIH) created the Minority Biomedical Research program (1972) and the Sophie Davis School of Biomedical Education (1973) began its combined BS/MD degree program, both aimed at increasing the number of URMs receiving advanced degrees in healthcare (Roman, 2004; Syed & Chemers, 2011). In the 1990's, following roughly a decade of stagnation, there was a recommitment to increasing diversity in healthcare with the initiation of programs such as Project 3000 by 2000 (1990) and the Health Professions Partnerships Initiative (HPPI) (1996), both aimed at creating a healthcare workforce that more accurately reflected the rapidly diversifying population of the United States (Nickens, Ready, & Petersdorf, 1994; Carline & Davis, 2003).

Present Efforts

Here in the new millennium, there continues to be programs, initiatives, and taskforces aimed at addressing the shortage. The Sullivan Commission on Diversity in the Healthcare Workforce (2004), A Strategic Plan to Increase Minorities in the Health Professions in Iowa (2005), and the Committee on Institutional and Policy-level Strategies for Increasing the Diversity of the U.S. Healthcare Workforce (2004) were all implemented to continue the charge of diversifying the field of healthcare in an effort to eliminate the health disparities between URMs and non-URMs (Sullivan, 2004; Yehieli, et al., 2005; Patterson and Carline, 2006).

The aforementioned strategies have all attempted to intervene at multiple levels within the educational process. Recruitment strategies, enrollment criteria, educational

policies, as well as student and teacher skill level have all been considered potential avenues for reform. The consistent variable within all of these strategies appears to be access: access to universities and colleges, access to human capital, access to life's necessities that make future planning possible. In recent literature, there has been an overwhelming and persistent call for immediate action in the form of *partnerships* or *pipelines* (Patterson & Carline, 2006; Dankwa-Mullan, Rhee et al., 2010). A partnership is defined as "cooperation between schools and community, business, and higher learning institutions to improve educational outcomes in K-12 education (Patterson & Carline, 2006, p. 5)." Similarly, a pipeline creates a link between these pieces to encourage and facilitate entry into a specific field/occupation (Carline & Patterson, 2003; Roman, Jr., 2004; Pew Commission, 1998; Sullivan Commission, 2004). Pew Health Professions Commission (1998), the Sullivan Commission on Diversity in the Healthcare Workforce (2004), and the Iowa Department for Public Health Center for Workforce Planning all strongly recommend the implementation of educational pipelines between K-12 institutions, institutions of higher learning and healthcare professionals and organizations in order to increase the number of URMs entering the field of healthcare (Pew Health Professions Commission, 1998; Sullivan Commission, 2004; Yehieli, et al., 2005).

As previously stated, pipelines require the cooperation of organizations on the local, state, and, sometimes, national levels. Some plans suggest national campaigns (e.g. Pew Health Professions Commission), inter-state collaboration (e.g. the Iowa Department for Public Health Center for Workforce Planning), or even national education policy reform (e.g. Health Professions Partnerships Initiative). Consistent in the pipeline literature, and implicit in the definition, is the requisite partnering and constant collaboration between K-12 institutions, colleges and universities, and health professionals to ensure a highly informed, comprehensive effort (Pew Health Professions Commission, 1998; Ramsey, et al., 2001; Sullivan Commission, 2004; Yehieli, et al., 2005). This collaborative and comprehensive approach has been a reason why

educational pipelines have been found to be the most effective method of addressing the prevalent issue of URMs lack of access to entering the field of healthcare (Murray-Garcia & Garcia, 2002; Carline & Patterson, 2003; Roman, 2004; Terrell, 2006).

Characteristics of a Successful Pipeline

While there may not be a total consensus on the structure of the pipelines, there are some characteristics that seem to be correlated with successful pipelines according to the literature: collaborative, concerted efforts throughout pipeline construction and activity development and implementation (Ramsey et al., 2001, Carline & Patterson, 2003), access to professionals and professional settings (Carline & Patterson, 2003; Yehiel et al., 2005), frequent and consistent contact between colleges and universities and K-12 institutions prior to students entering high school (Sullivan, 2004; Grumbach & Mendoza, 2008), and a program that addresses specific population-related barriers for URM K-12 students (Lent & Brown, 1996; Lent & Brown, 2001; Kenny et al., 2003).

By definition, a pipeline has multiple levels and multiple members working within those levels. In order to achieve optimal results, it is necessary for those members to provide structural input from their various perspectives and areas of expertise (Ramsey et al., 2001; Carline & Patterson, 2003). In addition to comprehensiveness, total member contribution facilitates feelings of ownership and value which has been found to contribute to program success (Ramsey et al. 2001; Carline & Patterson, 2003). Implementation also benefits from having all parties interacting within various levels of the pipeline. Specifically, early and frequent positive interaction with healthcare professionals in- and outside of healthcare settings has a positive impact on healthcare career interest development (Zayas & McGuigan, 2006; Arora, Schneider, Thal, & Meltzer, 2011). Similar interactions between K-12 participants and members in higher education can have comparable impacts on attitudes regarding educational attainment (Lent, et al., 1999). For URMs, the absence of these interactions has not only led to an aversion to healthcare and higher education but to an overall lack of knowledge about

these two areas (Fouad, 1995; Baldwin & Agho, 2003; Cohen, Gabriel, & Terrell, 2002; Bluestein, et al., 2010). Creating new experiences that contradict previously held beliefs about the unattainability of higher education and the insignificance of URMs in healthcare may subsequently have a positive effect on educational engagement.

It is imperative to make contact with these youth prior to high school, especially given that URMs are far more likely than their majority counterparts to drop out of high school (Fouad, 1995; Kenny et al., 2003; Grumbach & Mendoza, 2008; Perry & Wallace, 2012). In addition to attrition, URMs are likely to disengage from the educational process in high school as a result of perceived barriers in multiple areas resulting in a disconnect between high school and future success (Kenny et al., 2003; Kenny et al., 2007; Bluestein, et al., 2010). The best chance of intervening is to do so before negative views regarding education are formed and crystallized within the student. In addition to timing, frequency and consistency of contact has also been found to be critical (Ramsey, et al., 2001; Roman, Jr., 2004). Carline and Davis (2003) evaluated the success of programs implemented as a result of the HPPI over two years and found that the most successful programs were those that were able to reform local K-12 education policy and that allowed for comprehensive, frequent, and contiguous intervention throughout K-12 matriculation process.

One way to combat the pattern of high school attrition for URMs is to identify and address the actual and perceived barriers to education for this population (Kenney et al., 2003). Kenny et al. (2003) and Kenny et al. (2007) both identify contextual barriers to education for URMs. Some perceived barriers to educational and career attainment, such as racism and classism, are at a systemic level and have a negative impact on students' career choices and beliefs about the usefulness of education. In both articles, level of support acted as a mediating factor between barriers and potential negative impact, such as educational disengagement. For other perceived barriers, such as lack of resources (or knowledge regarding resources), lack of skills (e.g math and science) and a

lack of role models in diverse professions, their concreteness readily translates to solutions, (e.g. increased contact with ethnically diverse professionals, additional math and science exposure) (Fouad, 1995; Crosnoe & Huston, 2007) .

Given the presence of unique barriers to entering the healthcare field, it is important for pipelines and interventions to be focused on and specific to this population. Creating a positive experience, both personally and academically, is critical to expanding URM career interests to include healthcare. For URMs, it is important for an intervention to transcend the content in an effort to establish real-life relevance.

School-to-Work Link

As previously mentioned, URMs are more likely to drop out of high school than their majority counterparts creating a gap in the educational pipeline. This is due in large part to the fact that while it may be possible for adolescents to comment on the sequence of school and work, where the former precedes the latter, it is not always as easy, especially for URMs, to clearly articulate and internalize the relationship between academic achievement and future career options and attainment (Bluestein, et al., 2010; Kenny et al., 2010). School-to-Work (STW) programs and research focus on clarifying this connection in an effort to help students to engage academically and ultimately continue on to have meaningful and productive careers (Kenny et al., 2006; Bluestein, et al., 2010; Kenny et al., 2010).

As Perry and Wallace (2012) details, *A Nation at Risk*, published in 1983, sparked a movement in the U.S. to prepare all students to enter a 4-year college/university by focusing on language, math, and science acquisition. Unfortunately, those youth uninterested in higher education were not given as much attention and inspired *The Forgotten Half* in 1988 as a result of their lack of preparation for the workforce. In 1994, the School-to-Work Opportunities Act (STWOA), which ended in 2001, was passed in an effort to balance the attention given to all students' post-high school aspirations by encouraging school-based learning, work-based learning, and connecting activities; and

offered financial incentives to programs meeting these requirements (Solberg, et al., 2002; Perry & Wallace, 2012).

According to Krumboltz and Worthington (1999), STW initiatives began as an effort to equip graduating, non-college bound high school students with skills needed to enter the workforce as a means of increasing America's human capital and strengthening the economy. As a result, much of the STW literature focuses on how to best facilitate this transition. Perry and Wallace (2012) also refer to this imbalance in the literature while acknowledging a similar imbalance in STW programs that favors work-bound youth over the "college and career readiness" programs that offer "multiple pathways for success." More importantly, due in large part to the ending of the STWOA in 2001 and the resulting lack of resources, there still remains an overall lack of STW research, policy, and programs, including outcome information for programs currently in place (Ali et al., in press; Juntunen & Wettersten, 2004).

A review of the available STW research in 2004 by Juntunen and Wettersten focused on what they considered to be three important and growing areas of interest: adolescent employment, career education, and school-to-work-activities. Regarding adolescent employment, the authors found relatively mixed results. All reviewed studies acknowledged some positive short-term gains of adolescent employment, including adult employment, income, self-confidence, and equal academic performance compared to non-working peers. However, these studies also found a negative correlation between adolescent employment and educational attainment, which may pose problems in later life for those students. Some studies found that positive academic gains were only found in those working less than 12-hours per week, while Schoenals et al. (1998) (as cited in Juntunen & Wettersten, 2004) found no difference in academic performance for the more than 15,000 10th graders in their study. When delivered in a ratio of 3:4 with academic credits, career education was positively linked to higher graduation rates for "at-risk" youth according to Plank (2001) (as cited in Juntunen & Wettersten, 2004) but negatively

associated with performance in core subject areas. Kemple and Snipes (2000) (as cited in Juntunen & Wettersten, 2004) found similar positive results when considering career academies, crediting the increased engagement to the high levels of interpersonal support made possible by the structure of these schools. Finally, Juntunen and Wettersten (2004) note that the major issue with attempting to review and/or evaluate school-to-work activities is that they are extremely varied since rarely do multiple programs employ the same activities.

The authors noted one school-to-work-to-life program grounded in developmental-contextualism theory that focuses on activities that “empower youth to make their own decisions and shape their own career development” (p. 583). Based on a sample of 131 9th-graders, the program led to significant academic gains. Overall, the most commonly employed activities were those that focused on “increasing career awareness.” Less frequent were the more focused activities (e.g. internships, apprenticeships) and Tech Prep programs administering activities in a “lock-step” fashion due to the lack of preparation for four-year colleges. The authors also noted a lack of programs that provided linkages between school-based and work-based activities, neglecting a potential source of increasing academic engagement (Arora, Schneider, Thal, & Meltzer, 2011).

Mekinda (2012) analyzed four STW programs located across the U.S. differing on the basis of methodology: Citizen Schools, After School Matters, career academies, and Job Corps. Citizen Schools focuses on low-income, middle-school students in 18 cities across the U.S. and takes place after school during the school year. The program emphasizes attaining careers through high academic achievement, including enrollment in a 4-year institution, and includes 1-day per week apprenticeship for the participants who meet for 3 hours per day, 4 days per week for 10 weeks. After School Matters (ASM), as the name implies, takes place after school and is an apprenticeship-heavy program for low-income, minority high school students in Chicago, IL. For 3 hours per

day, 3 days per week for 10 weeks, students are equipped with job-related skills, with less attention paid to academics, in an effort to increase their employability and likelihood of obtaining careers. Career academies have been implemented in over 2500 U.S. schools and, according to Mekinda (2012), share the following 3 features: 1) schools within a school (small learning communities) design; 2) integration of occupational and academic curricula (college prep); and 3) partnerships with local employers for the purposes of curriculum advising, work-based learning opportunities, and mentoring. Students can choose to participate for 2 or 4 years and do so during school hours for credit. The final program, Job Corps, is federally funded, has 125 centers across the continental U.S. and Puerto Rico and is open to all U.S. residents who are low-income and between the ages of 16 and 24 years. On average, participants spend 8 months working toward their high school diploma or General Education Development (GED) and various vocational certificates in a classroom setting. Job Corps also provides students with other services, e.g. healthcare, nutrition, and counseling, through its centers. Job Corps uniquely targets academically disengaged students and uses “hands-on and work-based vocational training” as well as job placement services to “[prepare] participants for immediate entry into the workforce.” All four of these programs were shown to be effective and have yielded significant academic and/or employment gains. Mekinda concluded that there are three “key lessons” to be gained from these programs: 1) Career programming address youth at various stages of life as career development is an ongoing process; 2) Career programming can co-occur with academic training and college preparation; and 3) Programs should take care to produce desired outcomes by assuring quality construction and proper implementation.

Based on the presented overview of the research, there is not a complete set of guidelines for implementing STW programs. However, based on the research, there are four important considerations that should be addressed during the program development process. First, program objectives and outcomes should be clarified. Knowing what the

end result should be can help to inform program structure and aid in program evaluation. Second, securing resources is paramount. People, space, and funding will dictate the size, duration, complexity, and scope of the program. Being aware of resources will allow for a realistic assessment of what the program is going to be and whom it can help. Third, the parameters of the population need to be defined. Location, ethnicity, socio-economic status, and age will all inform programming and help to increase perceived relevance and effectiveness. Lastly, programs, like the present study, with the objective of increasing occupational options for high school graduates should emphasize education attainment and related skill acquisition versus short-term employment opportunities.

Math and Science and Healthcare Pipelines

Math and science abilities are essentially prerequisites for math and science interests (Lent, Brown & Hackett, 1994). Illuminated in the literature is the emphasis of math and science in healthcare-related occupations (Carmichael & Sevenair, 1991; Rye & Chester, 1999; Zayas & McGuigan, 2006). As a result, the field of healthcare is included among the Science Technology Engineering Mathematics (STEM) fields. A deficit in math and science ability can prematurely exclude healthcare-related careers from student consideration on the basis of the aforementioned emphasis. For this reason, it is necessary for pipelines and interventions focused on diversifying the field of healthcare to include math and science-related components.

Recently in the United States, there has been heavy attention given to improving student math and science performance (Bybee & Kennedy, 2005, Lowell & Salzman, 2007). In 2001, former President, George W. Bush instituted his “No Child Left Behind” educational reform policy in an effort to “strengthen our elementary and secondary schools (foreword)”. Within this reform was the goal of improving K-12 math and science instruction and performance (Bush, 2001). Specifically, the policy was designed to address the “academic achievement gap between rich and poor, Anglo and minority (p. 1).” In addition to the former president, researchers have also been interested in this

achievement gap and have focused on investigating the pattern of academic underperformance, and consequent professional underrepresentation, of minorities in math and science.

Overwhelmingly, research has supported the finding that URMs and their majority counterparts have significantly different academic experiences, even within the same educational system (e.g. school, district) (Lent et al., 1994), which has resulted in the above-mentioned achievement gap, particularly in the areas of math and science (Fouad, 1995; O'Brien, Martinez-Pons, & Kopala, 1999; Gandara, 2006). Middle school is a critical period for career development wherein attitudes toward academic areas (e.g. math and science) and career-related goals (e.g. occupational choice) are developed (Pinquart, Juang & Silbereisen, 2003; Gandara, 2006). For URMs, this is often a period characterized by career foreclosure due to developing negative attitudes regarding math and science and related careers (e.g. healthcare) (Betz, 1994; Navarro, Flores, & Worthington, 2007). For this population, in the absence of adequate support and contradicting evidence, math and science are perceived to be irrelevant to success in life (Lent & Brown, 2001, Arora, Schneider, Thal, & Meltzer, 2011).

Math and science are two fields traditionally overlooked by URMs. Given that performance on science and math-related tasks has implications for competence within the field of healthcare, this omission has direct effects on URMs entering this field. An avoidance of math and science education decreases competitiveness for higher education institution which further limits URMs exposure to career opportunities and possibilities. It is important to help clarify these long-term consequences in relevant terms. Career pipeline programs that target URMs and aim to increase diversity of the healthcare workforce must incorporate links between academic subjects of math and science to future health science careers.

Vocational Psychology

Psychologists have researched various contributions to academic performance and other facets of career development (e.g. Betz & Hackett (1983), Lent, et al., (1994), Perry, Liu & Pabian (2010)). Perhaps, most relevant to healthcare pipeline objectives is research exploring career selection. Given the intense effort to increase interest in healthcare careers and subsequent entry into the field, vocational psychologists have long-been accumulating a wealth of relevant and readily applicable knowledge regarding occupational choice behaviors. Specifically, vocational psychology offers valuable findings that can inform interventions at various levels of the healthcare pipeline.

Although there are individual differences regarding familiarity with the various levels of the healthcare pipeline, as a whole, psychologists have contributed most often to specific intervention development (Lent & Brown, 1996; Navarro, Flores & Worthington, 2007). Psychologists have found that there are different needs at various stages of career development. Lent, Brown, and Hackett (1994) posit that these different stages and needs coincide with cognitive development. Based on this and similar findings, psychologists have the expertise to develop the most effective methods for affecting behavior to approach the desired outcomes. The next section details more closely the relevant psychological research that was instrumental in developing the present intervention.

Review of Healthcare Career Interventions

In 2006, Zayas and McGuidan identified experiences that encouraged healthcare career interests and those that discouraged interest in this area for adolescent. Their findings were based on 7 focus groups (N=51) consisting of students, parents, and teachers. They found that positive experience with receiving healthcare, academic and career support at home and school, school exposure to healthcare-related activities and strong performance in related academic areas (e.g. math and science), professional experience within healthcare, and having role models in healthcare, in addition to positive

media portrayals of healthcare and a desire to help others, were all linked to developing an interest in healthcare careers. In addition to the absence or inverse of the aforementioned facilitative factors, discouragement from healthcare careers was linked to an aversion to perceived high levels of academic commitment beyond high school and the corresponding financial burden, perceived racism and discrimination, and an overall lack of knowledge about healthcare career options. This study was unique in that it allowed students to identify for themselves factors related to an interest (or lack thereof) in becoming a healthcare professional. Interestingly, findings are highly consistent with the literature regarding career development and healthcare career interest development.

The need to diversify the field of healthcare has drawn interest from different areas including the government, counseling psychology, and, the medical field. The resulting body of research is vast and comprehensive in its assessments and recommendations. This section will consolidate intervention-related findings and implications based on the previously presented research and evaluate several career interventions designed to address the lack of diversity and overall shortage of personnel in the healthcare field.

Research presented thus far has provided a comprehensive framework for developing and implementing a healthcare career intervention. There was a surprising overlap in recommendations presented from the various represented professional perspectives. The following is a brief review of the relevant recommendations and findings that will be used to evaluate the reviewed interventions. The literature presents recommendations for both structure and content, thus findings will be separated based on their belonging to one or both of these areas. Given that rationale for inclusion has been established in the previous pages, presented here is a listing of the literature-supported recommendations for intervention development and implementation. Each item is followed by the anticipated outcome of its inclusion.

Structural considerations

- ***Collaboration.*** A collective effort by all parties involved in development and implementation to increase success rate
- ***Clear objectives and desired outcomes.*** Having clear objectives and desired outcomes eases development, facilitation, and evaluation
- ***Duration and frequency.*** High frequency over an extended period of time positively impacts effectiveness
- ***Resources.*** Structural and facilitation components are limited by available resources
- ***Timing.*** Interventions directed at students prior to high school are more successful at increasing their number of career interests

Content Recommendations

- ***Population specificity.*** Establish relevance of content and increase intervention validity
- ***Supports and barriers.*** An attempt to increase supports to effectively navigate population specific barriers; create awareness of types of supports and barriers
- ***Healthcare professionals and college students.*** Regular presence of these two groups to counter perceived inaccessibility/unattainability of higher education and healthcare field
- ***Healthcare career-related activities.*** Increase self-efficacy for healthcare relevant tasks
- ***Healthcare settings.*** Experience within these sites to increase self-efficacy
- ***Emphasis on education.*** Increase interest in careers that capitalize on academic experience and abilities
- ***Math and science inclusion.*** Increase content self-efficacy and positive attitudes toward math and science
- ***School-to-work link.*** Increase academic engagement and inform career planning

The following interventions were chosen on the basis of their meeting the following criteria: goal of increasing URMs in healthcare, focus on single intervention/partnership program (as opposed to linked programs within a pipeline), and established effectiveness. Given the limited literature on these types of interventions with URM middle school students, this final criterion was excluded. It should be noted that there are varying amounts of program details presented, limiting the breadth of review for some interventions. Also, outcome data were restricted by variables studied further limiting usefulness of findings.

Career Linking: An Intervention to Promote Math and Science Career Awareness (Fouad, 1995)

Goal. Career Linking was developed to “improve minority students’ awareness of and preparation for math and science careers” (p. 527) in addition to “increas[ing] students’ self-esteem through counseling, parent participation, and ‘real-world’ experiences.” (p. 533)

Hypotheses. 1) Intervention participation will lead to an increase in student occupational knowledge; 2) Intervention participation will lead to an increase in student self-esteem; 3) Intervention participation will lead to an increase in student achievement and effort in math and science; 4) Intervention participation will lead to students’ deliberate choice of a high school; and 5) Intervention participation will affect high school math and science course selection and achievement.

Intervention team. The facilitation and intermediate planning was carried out by an unspecified number of teachers, counselors, and university faculty.

Intervention description. Over the course of one year, students participated in multiple 6-week units, each covering a different career field (e.g. healthcare). The intervention was merged with math, science, English, and history classes. Over the six weeks, students were introduced to the career field through discussions and activities, taken on a field trip to tour relevant professional businesses, presented with professional

speakers from the unit's field of interest, able to shadow a professional for half a day, and asked to evaluate the unit, along with teachers, on the basis of activities and speakers. Throughout the six weeks, team members collaborated to facilitate activities and secure speakers and representative professionals.

Reported findings. Overall, the intervention was found to be moderately successful. Hypothesis-consistent findings were: students' occupational knowledge increased; students made informed, deliberate high school choices; they showed more effort and achievement in math and science than the control group; and chose different math courses in high school than the control group. Findings inconsistent with hypotheses were: there was insignificant support for an increase in self-esteem; students' math and science grades declined while in the intervention; and students showed no difference in high school math and science achievement and high school science course selection compared to control group. An interesting, URM-specific finding was that minorities in the intervention were more likely to take advanced math courses than those in the control group.

Evaluation and limitations. Based on the selected criteria, this intervention appears to be structurally sound and efficacious. This program was substantial in duration and had built-in elements that constantly linked school and career. There was constant collaboration between parties and regular contact between the students and those various parties. However, there are areas that can be improved upon. Although some barriers were addressed (e.g. math and science) through implicit, covert methods (e.g. math instruction during intervention), perhaps an increase in benefit (e.g. increase in help-seeking behaviors) could have resulted from explicit attention to the constructs of barriers and supports. There was also a lack of participatory career-related activities outside of academics. This reliance on student observation and the optional shadowing experience increased the variability of experience and complicates effectiveness measurement. The evaluation was limited by a lack of specificity in the program

description. While this was expected, examples of and a rationale for intervention components would have been helpful. Further, it is unclear how material from the subjects interwoven with the intervention was delivered.

WVU-Community Partnership That Provides Science and Math Enrichment for Underrepresented High School Students (Rye & Chester, 1999)

Goal. Health Sciences and Technology Academy (The Academy) was designed to help “West Virginia secondary school students overcome educational and economic barriers and to increase the number of health professionals in the state” (p. 352)

Intervention team. The partnership connects West Virginia University (WVU) with local secondary school teachers, healthcare professionals, and other community leaders.

Intervention description. The Academy targets underrepresented high school students who participate in programs both during the school year and over the summer. Academy clubs meet during the school year two to four times a month after school. Students engage in activities ranging from conversations with health professionals to “extended investigations” that require students to engage in problem posing, problem solving, and peer persuasion, the “3 Ps,” culminating in participation in an Academy fair. There are sporadic shadowing opportunities. The summer institute is separated based on grade level and can range from one to three weeks. Younger participants engage in leadership development, science investigations (emphasis on 3Ps), and concept mapping. Rising sophomores participate in anatomy investigations and experimental design exercises. Rising seniors focus on math skills and have a chance to earn college credit. In addition to students, the Academy also offers educational opportunities for participating secondary school teachers to align with program goals for teacher professional development.

Reported findings. WVU conducts annual program evaluations and at the time of this article had accumulated data for two implementation years. Teachers have taken

advantage of the opportunity to pursue and obtain a master's degree in secondary education through the academy. Also, teachers report learning a great deal through program facilitation and received positive ratings from students. Academy retention rates for students range from 54% to 100%. Factors contributing to self-selection for academy participation were identified as possible confounding variables in high retention rates. Students reported learning from doing science projects and those who participated in both years reported learning more during the second project, again confounding variables are a possibility. Overall, students generally reported developing an increased interest in health careers as a result of participation in the Academy. The state legislature implemented a bill in 1997 that allowed state colleges and universities to provide financial awards on the basis of participation in the Academy for graduating seniors over the four year period following the implementation.

Evaluation and limitations. This program is consistent with many of the recommendations in the literature. There is a unique collaborative model that encourages educational attainment/advancement for teachers as well as students. It is a year-round program that allows for up to four years of participation in an array of career-related activities. There is math and science education and activities that use these skills linking academics to career performance. Hindering potential program impact is a lack of attention given to several considerations. Although there are implicit components, there is a lack of an explicit effort to illuminate and reinforce function of supports and the existence of barriers. Population specificity is also lacking. While the program targets underrepresented students, it does not address issues specific to this population that lead to the problematic underrepresentation. The timing of this program is problematic given that factors influencing self-enrollment in the Academy are those that would potentially facilitate a career in health care and should therefore be increased and developed before the starting point of this intervention. Limitations for this evaluation include a lack of program specifics, a lack of outcome data focused on underlying mechanisms for change,

and no conclusive data on program influence on observed outcomes due to the potential presence of confounding variables.

The Junior Fellows Program: Motivating Urban Youth toward Careers in Health, Science, and Medicine (Marcelin et al., 2004)

Goal. The Junior Fellows Program was designed to “introduce selected urban middle and high school students to current issues in health, science, medicine, and medical research; engage them in conducting self-directed research projects in these areas; motivate them to pursue careers in health, science, and medicine.” (p. 517)

Intervention team. The Junior Fellows Academy is facilitated by professionals within the New York Academy of Medicine, New York City Department of Education’s instructional regions, and regional medical centers.

Intervention description. The Junior Fellows Program involves various levels of instruction and participation delivered over the course of 15-20 sessions during the school year for selected eighth through twelfth graders. Program activities include: staff training, student introduction, research skill development, hospital and laboratory tour, role modeling with health professionals, medical ethics, writing skills, educational seminars, learning presentation skills, medical school visit, practice poster presentations, and research poster session. Throughout the program, students work with their individual schools to develop and carry out research projects. Additionally, students participate in library skills sessions to help facilitate the research process.

Reported findings. Evaluation was conducted solely via self-report measures. More than half of the respondents reported being more interested in pursuing a career in health, science, medicine or research. Three-fourths of respondents said that the program had an influence on their career interests. All respondents reported being enrolled in a college or university. Students also reported an increase in academic engagement as evidenced by participation in advanced science courses and science-related electives and

an increase in career development and planning (participation in facilitative programs and volunteering with professional organizations in an area of interest).

Evaluation and limitations. This program has placed a high emphasis on developing career-related skills and encourages participants to seek assistance from cooperating professionals. Students spend a significant amount of time at institutions of higher learning and medical settings and are required to transition between settings facilitating school to work connections. To its detriment, the combination of an intense focus on research and the prerequisite of an interest in science, health, medicine, and research further marginalizes students who have foreclosed on careers in the aforementioned areas. The lack of population specificity and the absence of content regarding supports and barriers potentially decrease the level of student engagement and effectiveness for those students attempting to navigate the deterrents to healthcare careers for URM students. This evaluation was limited by a lack of outcome data and clarity in program description.

Design of an Intervention to Promote Entry of Minority Youth into Clinical Research Careers by Aligning Ambition: The TEACH (Training Early Achievers for Careers in Health) Research Program (Arora, Schneider, Thal, & Meltzer, 2011)

Goal. TEACH was designed to “promote the entry of minority youth into careers in health research” (p. 581)

Intervention team. The TEACH Research program team consists of University of Chicago undergraduate and professional students and faculty and local high schools.

Intervention description. The TEACH Research program is a 6-week summer program for selected high school students who are concurrently participants in the University of Chicago’s Collegiate Scholars Program. Students are exposed to realistic career experiences through participation in the University of Chicago Hospitalist Project, where they conduct hospital research alongside of undergraduate and professional student researchers, and observe clinical rounds, where they shadow a doctor on his/her rounds.

Students are also exposed to a “multi-tiered” structure of mentors both through attending lectures and discussions facilitated by professionals and students and through participation on a research team made up of high school students, university students, and professionals. Throughout the intervention, research teams work on researching a given topic presented in a poster session attended by healthcare professionals.

Reported findings. The data collection process had not been completed before the article was written; as a result the reported findings are tentative. TEACH Research participants were found to adjust to the challenges and demands of the program following an acclimation period of 3 weeks. Participants who were one year out of the program demonstrated a continued interest in medical and research-based careers. In addition, students developed knowledge regarding research-related career acquisition and performance. Compared to control students, TEACH participants reported more career-specific role models.

Evaluation and limitations. Participants were able to develop career-related skills and knowledge. The immersion of the intervention in an academic setting and the prerequisite academic performance underscores the importance of education in career acquisition. However, there is a participant selectivity bias that favors those who have already demonstrated the necessary skills and content interest levels for achievement. Also, there is no mention of the role played by local area high schools other than providing students, which can have negative implications for interest maintenance during the school year. The failure to address relevant barriers and options for support can cause impeding factors to negate program gains.

Conclusion

The above interventions were all assumed to have adequate resources for implementation, resulting in the omission of this criterion during the evaluation process. Collectively, the programs demonstrated the structural impact of objectives and desired outcomes. The location, content, and team member participation all differed on the basis

of these considerations. Consistently, the interventions made efforts to connect school to work which may explain their reported success rates. The presence of math- and/or science-related content was also a recurring theme observed for these interventions. The consistency in success reported given the variation in duration of implementation highlights the significance of the role of program quality. Equally consistent was the lack of explicit attention given to supports and barriers. Given the relevance of this construct to and pervasiveness through URM career development, this is a severe oversight. Similarly, the intentional selectivity bias, seemingly implicit in high school health career interventions for URMs, is an equally critical failure of the reviewed interventions. This supports the need for earlier interventions that focus on interest development and career exploration.

While there were some important commonalities between the programs, there was little consistency in implementation. This observed variation in program-level variables (e.g. length of program) could potentially reflect the variation in underlying theories. These theories provide a framework for program design and subsequent evaluation. The next section presents the theoretical underpinnings of the current study in addition to theory-relevant research.

Social Cognitive Career Theory and Related Theories and Research

Over the years, many theories explored numerous career outcome variables (e.g., goal intentions, supports and barriers, cognition) found to be critical in the career development pathway (Lent & Brown, 1996; Lent & Brown, 2001; Navarro, Flores, & Worthington, 2007). The present study focuses on the finding that URMs have a unique career development process as a result of the interaction of race and ethnicity with other personal and environmental variables (Lent, Et al., 1994; Fouad, 1995; O'Brien, Martinez-Pons, & Kopala, 1999; Gandara, 2006). Consequently, the present study was developed using the Lent, et al.'s (1994) Social Cognitive Career Theory (SCCT) which takes such factors into account. This section will provide an overview of this theory,

discuss the roles of self-efficacy, outcome expectation, and supports and barriers on academic engagement, and review school-to-work research to establish the framework from which the current study was designed.

Social Cognitive Career Theory

The following overview is based on Lent and Brown's (1996) *Social Cognitive Approach to Career Development: An Overview* and will therefore parallel its organization. Social Cognitive Career Theory (SCCT) combines Bandura's (1986) Social Cognitive Theory with career development theories (e.g., Holland's theory) in an effort to both synthesize career development theories and inform career interventions (Lent & Brown, 1996). SCCT assumes the "triadic reciprocal model of causality" (p.312) whereby the interplay of personal attributes (e.g., self-efficacy, values, and race), external environmental factors (e.g., learning opportunities, gendered socialization, socio-economic status) and overt behaviors (e.g., course selection, past experience) leads to career-related outcomes. Based on this assumption, SCCT posits that career development is a continuous cycle of information gathering, sense making, and action that lasts throughout the life course. In addition to its foundation in Social Cognitive Theory, SCCT is based within the framework of constructivism which posits that an individual is an "active shaper of his or her experience" (Lent & Brown, 1996, p. 319).

SCCT (Lent, et al., 1994) addresses the following three career-related behaviors: 1) academic and career interest development; 2) the impact of interests and other variables on career-relevant choices; and 3) performance attainment and persistence in educational and career endeavors. Within the domains of the above-mentioned career-related behaviors, SCCT further assumes that three personal attributes, in particular, are primarily responsible for regulating behavior: 1) self-efficacy ("people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391)); 2) outcome expectations ("beliefs about the consequences or the outcomes of performing particular behavior" (Lent & Brown,

1996, p. 312); and 3) personal goals (“one’s intention to engage in a certain activity or to produce a particular outcome” (Lent & Brown, 1996, p. 312). Of these, self-efficacy and outcome expectations are the most relevant for the current study. SCCT posits that both constructs are influenced by past performance, first-hand and vicarious. Further, “social persuasion” and “physiological states and reactions” can also, to a lesser degree, inform self-efficacy. The remainder of this overview considers models addressing the relationship between these social cognitive variables, along with other personal and environmental variables, and their impact on vocational interests, occupational choice, and career-related performance.

Vocational Interests. The process of developing vocational interests begins early and uses continual information from the environment (both people and activities) for further expansion and refinement. According to SCCT, self-efficacy and outcome expectancy have especially important roles in this process given that they govern approach and avoidance behaviors. Individuals will approach an activity for which they feel efficacious and expect positive outcomes and will avoid an activity for which the opposite is true. Personal goals are formed based on a desire to increase exposure to those activities of interest, creating opportunities to further refine those interests based on actual outcomes and resulting impacts on both self-efficacy and outcome expectancy. Based on this idea of developing interest through activity exposure and performance, one will develop a small range of interests if exposed to a small range of activities. Conversely, a more varied range of interests will result from exposure to a large range of activities.

In addition to self-efficacy, outcome expectancy, and personal goals, Lent and Brown (1996) identify aptitudes, values, race and ethnicity, and sex and gender as key contributors to vocational interest development. The authors explain the impact of aptitude and values on interests via their impacts on self-efficacy and outcome expectations, respectively. Namely, one’s actual ability or skill in a given activity will

impact self-efficacy for that activity and activities yielding value-aligned outcomes will result in an interest in that activity. Sex, race, gender, and ethnicity all have implications for career-related opportunities (e.g., jobs, activities) and external influence (e.g., family disapproval, societal expectations). Within the domain of these constructs, one may experience varying degrees of support or discouragement depending upon group identity. Additionally, there are those activities and opportunities that are presented or withheld based on the same criteria. Consequently, opportunities for vocational interest development are afforded or denied based on attributes outside of one's control. It is important to note that there are individual differences in how environmental information is perceived and therefore how it impacts vocational interest development through its influence on self-efficacy and outcome expectancy.

Occupational Choice. Under “supportive environmental conditions” (p. 316), occupational choice is heavily influenced by vocational interests and, as a result, self-efficacy and outcome expectations have an indirect effect. Specifically, people will seek out careers that are aligned with and allow them to satisfy personal and vocation-related interests. Similarly, in environments that foster personal agency, personal goals also have a direct impact on occupational choice in that people will choose an occupation that aligns with their personal goals. When these conditions are not met, SCCT postulates that self-efficacy, outcome expectations, and contextual factors (e.g. employment availability, discrimination) have a more direct impact on occupational choice whereby people make occupational decisions based on criteria such as beliefs about ability, sufficient outcomes, and/or external expectations. As a result, people tend to, consciously or unconsciously, decrease their number of occupational possibilities in order to satisfy other, possibly more pressing, needs (e.g. survival, familial/societal acceptance).

Career-Related Performance. Within the domain of career-related performance, SCCT focuses on two “primary” aspects: level of attainment and degree of

persistence and/or resiliency. Level of attainment, or degree of mastery, is affected both directly and indirectly by actual ability, and indirectly by self-efficacy and outcome expectation. Actual ability, or skill level, directly translates to how well a task can be completed and indirectly exerts its influence via its impact on self-efficacy and outcome expectation. Self-efficacy and outcome expectation are positively correlated with ability and influence the setting of performance goals, which within this domain refers to the level of attainment to which one aspires. According to SCCT, there exists a feedback loop between level of attainment, ability, and self-efficacy and outcome expectations in which “mastery experiences promote development of abilities and, in turn, self-efficacy and outcome expectations” (p. 318). In terms of the current study, having positive (e.g. mastery) experiences within a domain will lead to an increase in both actual ability and beliefs about one’s own ability, and potential positive outcomes within that domain. The authors note that the relationship between self-efficacy and actual ability functions optimally when both are congruent whereas an over/underestimation of self-efficacy can lead to negative outcomes (e.g. failure due to ability overestimation, stagnation due to underestimation).

This brief overview highlights key features of Social Cognitive Career Theory (SCCT), namely its founding in social cognitive theory, the intricate dynamic processes of career development, the integral and ever-present influences of self-efficacy and outcome expectancies, and the emphasis of the individual as an active agent in this process. Lent, et al. (1994) identified vocational interests, occupation choice, and career-related performance as the three interconnected areas responsible for individual variance and outcomes within career development. Within these areas, SCCT focuses on personal attributes as a means for perpetuating the career development process while acknowledging and accounting for contextual factors. In congruence with Lent and Brown’s (1996) intentions, this overview also serves as a foundation for the current study

based on the above-elaboration of the pervasive influence of self-efficacy and outcome expectation on internal and external behaviors related to career development.

Theory of Circumscription and Compromise

Another career theory that has informed the current study is that of Circumscription and Compromise (herein referred to as TCC). In her monograph, *Circumscription and Compromise: A Developmental Theory of Occupational Aspirations*, Gottfredson (1981) describes the increasingly complex nature of interest development and refinement as being, in large part, the result of the increase in an individual's cognitive ability and capacity due to his/her natural maturation. Similar to SCCT, TCC acknowledges the individual's use of both external and internal variables for decision-making (p. 548). Both theories also agree that by high school age, individuals have determined their relative strengths and weaknesses and have begun to make career-related decisions based on these (p. 567; Lent & Brown, 1996).

However, there are key differences between the two theories that allow for a stronger alignment of the current study with SCCT. While SCCT assumes continuous, dynamic process fueled by the "triadic reciprocal model of causality" (Lent & Brown, 1996), TCC postulates that interest development occurs in four stages (characterized by various targets of orientation/attention (e.g. sex roles, self)) and as cognitive ability increases, there is a cognitive shift in which individuals begin to make use of more internal (e.g. personal interests, personality traits, and values) versus external (e.g. social class, sex, ability) characteristics and sources of information for occupational decision-making and self-concept (pp. 549, 558-566). Further divorcing from SCCT, which asserts that interest development and vocational decision-making is a cyclical, life-long process (Lent & Brown, 1996), TCC is linear and asserts that the final stage of "occupational aspiration" development occurs during adolescence (beginning age 14), at the end of which the individual has a narrowed field of occupational aspirations, that has been refined (circumscribed) at each of the four stages, within which to job-seek (pp.

549, 571). TCC does not account for waning interests or the development of new interests beyond job acquisition. Furthermore, difficulties or conflicts experienced during this final stage are said to be addressed through compromise (p.571), or sacrificing of a potential occupational option to satisfy more “central aspects of [one’s] self-concept” (p. 549), with no consideration of additional exploration.

For the purposes of the current study, TCC provide the following contributions:

1) It highlights the need to address students prior to high school (stage 4) in order to effectively impact their occupational interests; and 2) The concept of compromise, as used by TCC, offers a less victimizing approach to the shortage of ethnic minorities in the field of healthcare than does the focus on barriers as external impositions. First, as stated above, TCC asserts that during stage 4, individuals significantly reduce their reliance on external sources of information for occupational aspirations. As such, it is essential to make contact prior to this shift away from information-seeking that occurs in high school. Secondly, the concept of compromise gives the actor control in a moment of adversity. While SCCT treats barriers and supports as factors outside of the individual’s control, TCC provides a context for reframing them as decision-making opportunities. While the process of navigating a barrier may look the same within both theories, TCC places the power and focus on the individual rather than the circumstance (internal locus of control), which leads to a lower stress response and a better outcome for the individual (Abouserie, 1994; Anderson, 1977).

Although the theory of circumscription and compromise conflicts with some assertions of SCCT, the primary framework for the current study, its useful contributions are noteworthy. In addition to providing further support for the use of middle school students in the current study, it also provides support for the chosen approach to barriers, which focuses on the decision-making behavior of the actor while providing resources for successful navigation. Unfortunately, TCC, in its vagueness, neglects integral internal variables (e.g. self-efficacy) which limit its usefulness when attempting to influence and

enhance adolescents' vocational interests and related behaviors (e.g. educational attainment).

Academic Engagement

The overview of Social Cognitive Career Theory (SCCT) (Lent, et al., 1994) underscored the impact of self-efficacy and outcome expectation, in addition to environment, on vocational interests, occupational choice, and career-performance. In addition to these processes, self-efficacy, outcome expectation and environment also influence career development through their impact on academic engagement. Academic (school) engagement is characterized by: behavioral engagement (school effort, attendance, homework completion, attention, and extracurricular activities); cognitive engagement (self-regulated learning strategies, and preference for challenging work); and emotional engagement (valuing education, sense of belonging in school, taking pride in school, and relating to school personnel and structural aspects (e.g. curriculum)) (Perry, Liu, & Pabian, 2010). Academic engagement has been found to be positively correlated with academic performance and subsequent achievement and career acquisition and negatively correlated with school attrition (Nauta & Epperson, 2003; Piquart, et al., 2003; Rojewski & Kim, 2003; Kenny et al., 2006; Perry, Liu, & Pabian 2010).

The relationship between self-efficacy and academic engagement has been repeatedly established and referenced throughout the literature. Whereas some research demonstrates a direct effect of self-efficacy on academic engagement (Lent & Brown, 1996; Piquart et al., 2003), other research shows that this effect is indirect via other social cognitive constructs (e.g. interest, outcome expectation) (Lent & Brown, 1996; Fouad & Smith, 1996; Lent & Brown, 2001). It has been long-accepted that people tend to engage in activities for which they feel efficacious, including academic and career-related tasks (Fouad & Smith, 1996, Lent, Et al., 1994; Nauta & Epperson, 2003). Conversely, when students are not confident in their ability to perform academically, they tend to disengage from school (Piquart et al., 2003). Most prevalent in the literature is

the finding that this relationship is moderated by both interest and outcome expectation (Lent & Brown, 2001; Rojewski & Kim, 2003; Navarro, Flores, & Worthington, 2007).

Similar to self-efficacy, the effect of outcome expectation on academic engagement has been found to be both direct and indirect (Rojewski & Kim, 2003; Kenny et al., 2006; Kenny et al., 2010). Positive outcome expectations for educational attainment lead to an increase in academic engagement while expected negative outcomes (or an expected lack of positive outcomes) lead to a disengagement from academics (Fouad & Smith, 1996; Nauta & Epperson, 2003; Kenny et al., 2010; Bluestein, et al., 2010). This pattern was highlighted by Pinguart, et al. (2003) who found that grades (one measure of school engagement) were positively associated with career aspirations (outcome expectation) for a group of German high school students. The relationship between outcome expectation and academic engagement can be mediated by interest, self-efficacy, and the perception of supports and barriers (Lent & Brown, 1996; Kenny et al., 2003).

Particularly relevant for this study is the impact of perceived supports and barriers on academic engagement for URMs. Lent et al. (1994) assert that the impact of self-efficacy and outcome expectation on career development should be considered within the individual's environment. For URMs, that context is greatly characterized by the presence (or absence) of supports and barriers (Kenny et al., 2003; Carline & Patterson, 2003; Kenny et al., 2010; Bluestein, et al., 2010). The impact of supports and barriers on career development was addressed in SCCT where perceived support was linked to positive, approach behaviors (e.g. interest development, persistence) and perceived discouragement (barriers) was linked to avoidance behaviors (e.g. foreclosure on career options, decreased self-efficacy) (Lent & Brown, 1996; Lent & Brown, 2001). Kenny et al. (2003) examined the relationship between perceived supports and barriers and school engagement for a group of urban high school students, primarily consisting of URMs. They found that perceived barriers were linked to lower levels of engagement while

perceived support was linked to higher levels of engagement. The latter finding was also demonstrated by Perry et al. (2010) who found that parental career support and teacher support have a significant, positive effect on school engagement.

The relationship between academic engagement and career development has recently become a focus of counseling and vocational research. Perhaps more importantly, the relationship between academic engagement and the potential for continued career development is of particular interest. Higher levels of engagement have been found to be correlated with positive outcomes for students, whether work or college-bound (Perry, Liu, & Pabian, 2010; Arora, Schneider, Thal, & Meltzer, 2011). The cognitive constructs of self-efficacy, outcome expectations and perceptions of supports and barriers share a bulk of the variance seen in levels of academic engagement and therefore have major implications for career interventions aimed at school-aged children, in particular URMs.

Social Cognitive Career Theory (SCCT) with Middle School-Aged Underrepresented Minorities

SCCT, components and the theory as a whole, has been widely applied and supported in the literature (e.g. Lent, Brown & Hackett, 2000; McWhirter, Rasheed, & Crothers, 2000). The bulk of the research has been conducted with students beyond the eighth grade level and largely with an absence of URM's, though the latter is gaining momentum in the literature (Kenny, et al., 2007; Navarro, et al., 2007). Despite this void, Navarro, Flores and Worthington (2007) argue that "middle school is a critical period in which students begin to form and make academic course decisions that will have a strong influence on later academic and career outcomes" (p.322). The results of the following study were copious and significant to the field of vocational psychology as a whole as well as with regards to cultural validity of widely-used and supported theories and models.

In 2007, Navarro et al. applied SCCT to a sample of 409 Mexican American eighth grade students. The purpose of the study was to “examine whether sociocontextual and sociocognitive variables explained the goals” (p. 320) for the students in an effort to determine the applicability of SCCT to this subset of URMs. Data were collected using a survey, distributed and completed during homeroom, consisting of a demographic form and measures (Child and Adolescent Social Support Scale (CASSS), Math/Science Self-Efficacy Scale (MSSES), Math/Science Outcome Expectations Scale (MSOES), Math/Science Interest Scale (MSIS), and Math/Science Intentions and Goals Scale (MSIGS)); in addition, the authors also used self-report methods to obtain 7th grade math and science performance after which students received a debriefing form.

This study resulted in the following findings in support of prior SCCT research and assertions: 1) a direct link between perceived social support and math/science self-efficacy; 2) Mexican American females, when compared to male counterparts, are more Mexican oriented, have parents with less education, have more supportive teachers and peers, and are less confident in the area of math and science; 3) higher SES was associated with higher past math/science achievement and higher math/science self-efficacy; 4) a positive link between past math/science performance and math/science self-efficacy; 5) positive predictability of math/science outcome expectations based on math/science self-efficacy and positive predictability of math/science interest and goals based on the aforementioned variables; 6) a positive link between math/science interests and math/science goals; 7) math/science self-efficacy is more strongly linked to math/science interests than math/science outcome expectations; and 7) perceived parental support was positively linked to math/science self-efficacy; and 8) support for the blanket implementation of sociocognitive-based math and science-related career interventions with respect to gender.

The following findings occurred in contradiction to SCCT and thus imply a need for more focused research in the areas of model complexity and cultural validity.

Navarro et al. did not find support for the following: 1) link between math/science performance and math/science outcome expectations; 2) link between both generation status and bidimensional acculturation and past math/science performance and math/science self-efficacy; 3) link between SES and math/science outcome expectations; 4) link between social support and math/science goal intentions; and 5) a link between Anglo orientation and math/science goal intentions (mixed findings).

The findings presented here have important implications for the current study. First, given the extensive empirical support of hypotheses derived from SCCT, it validates the use of this model among Mexican American middle school students, both qualities present in the current study. Second, they have demonstrated a strong, positive relationship between math/science self-efficacy, interest, and goal intentions, three variables that are the target of influence in the current study. Finally, there are variables (e.g. social support, generation status) previously determined to be significant that were not supported by Navarro et al.'s findings.

Future in Iowa Career Education (FICE)

The above-mentioned study informs career interventions for eight grade URM students by supporting the use of SCCT. As previously demonstrated, most career interventions and SCCT research have excluded this population in favor of older, and often majority-identified, adolescents. While there is growing research supporting the use of career theories (e.g. SCCT), previously validated with high school students, with younger adolescents, this growth is not reflected in literature that similarly examines the effectiveness of existing high school career interventions with younger populations. As such, the current study uses a method evolved from one such intervention that has been demonstrated to be effective with high school URM students.

In 2012, Ali et al. investigated the effectiveness of the Future in Iowa Career Education (FICE) program. This SCCT-based career intervention was delivered across three rural high schools to 206 high school students, of which data from 133 participants

qualified for analysis. Of the 133, 78 identified as Caucasian, 45 as Hispanic, and 10 as other. The analysis included data from pre- and posttests (consisting of demographic information, Academic Self-Efficacy Scale (ASE), Vocational Skills Self-Efficacy measure (VSSE), Career Decision Outcome Expectations Scale (CDOE), Perceptions of Educational Barriers measure (PEB), and Career Aspirations Scale (CAS)), student evaluations consisting of two prompts: 1) “One thing I learned from this program is...” and 2) “One thing I found helpful from this program was...”, and focus groups to assess participant-generated strengths, weaknesses, and general experience of the program and suggestions for improvement.

FICE was developed through a collaborative process using input from a research team (lead author and four graduate students), school personnel, and various ninth grade students. The resulting curriculum was comprised of 9 “Lessons” (Introduction, What’s Up, Holland Party, Career Related Influences, DISCOVER Activity, Panel of Experts, Mock Resume, Mock Interviews, and The Real World) each addressing components of SCCT with corresponding activities (see Ali et al., 2012). The program was implemented based on the preference of each of the three schools: School 1, once a week for 9 weeks; School 2, every other week for 18 weeks; and School 3, 3-day workshop. Students began by completing the pretest during the “Introduction”, followed by the remaining 8 lessons, which culminated in a field trip, and was immediately followed up by the post-test. Focus groups were conducted subsequent to the completion of the posttest.

The overall findings for this study demonstrate significant support for program effectiveness. All 3 schools demonstrated an increase in vocational skills self-efficacy based on pre- and posttest performance. There was an increase in career aspirations from time 1 to time 2 observed on measures for both School 1 and 2. This increase in was also supported by other sources of information from both schools, student evaluations in School 1 and focus groups in School 2. There was a demonstrated increase in academic self-efficacy beliefs from pre- to posttest in both School 2 and 3, corroborated through

student evaluations and focus groups for School 2. In School 3, there was also a decrease in perception of barriers to education following FICE participation based on measure performance, which was supported by student evaluations. While all 3 schools demonstrated relatively equal gains, both School 2 and 3 reported negative reactions to the implementation style. Students complained about the implementation being too spread out in School 2, while school personnel in School 3 commented on the desire to lengthen student program exposure.

Given the design of FICE, it will be difficult to both assess and produce long-term gains and establish validity. Despite this, FICE and the presented evaluation has the following merits: 1) It demonstrates the benefits of using a collaborative approach to intervention development; 2) It highlights the importance of having consistency between target variables and evaluative measures; 3) It presents evidence for having theory inform intervention design, implementation, and measurement; 4) It supports the concept of having multiple sources of information to strengthen evaluation; and 5) It supports prior research demonstrating gains in SCCT constructs in ways defined by the theory.

Despite lacking a focus on healthcare, FICE has greatly informed the current intervention. In addition to some overlapping activities and objectives, there is an emphasis on SCCT constructs, having a highly collaborative development process and incorporating participant feedback.

Project HOPE

Project HOPE (Health career Opportunities, Preparation, & Exploration; Ali, 2013) is a career intervention based on the aforementioned FICE program (Ali, et al. 2012). Project HOPE was designed to increase awareness of and interest in the field of healthcare while also increasing self-efficacy in healthcare-related activities. In addition, to having a more narrow content focus, HOPE also differs from FICE in that it is implemented in two locations instead of three, the participants are in middle school instead of high school, and it contains six (6) modules (not including pre- and post-

measures) instead of nine (9). Even with the narrowed focus and reduction in modules, HOPE still contains many critical components from the FICE program (Ali, et al., 2012): baseline measures, world of work information, interest assessment and feedback, barriers and supports, performance accomplishment and personalized feedback, and access to role models. While there are several examples of programming designed to increase health science career interests among URMs, HOPE is the only program that is based in career development theory and evaluated from this perspective. The present study evaluates the third implementation of HOPE in a middle school with over 50% Latino students.

Statement of Problem

As demonstrated in the previous section, career interventions have focused on increasing URMs by targeting underserved populations at an age before high school. Social Cognitive Career Theory (SCCT) (Lent, et al., 1994) highlights the dynamic nature of career development and suggests that, as a result, it is an ongoing process versus a discreet event. This process occurs over the lifespan and begins as early as elementary school (Lent & Brown, 1999) with key developmental processes occurring in middle school (Navarro, Flores, & Worthington, 2007). Complementary to this research are findings that suggest interventions should be designed to address age-specific needs (Mekinda, 2012). Particularly for middle school students, interventions should encourage career exploration and consideration of career-related skills, including academic abilities (Krumboltz & Worthington, 1999; Mekinda, 2012). These assertions, in addition to literature that illustrates the necessity of making contact with youth prior to high school (Fouad, 1995; Pinquart, Rainer, & Silbereisen, 2002), are the rationale for the focus of the current study on middle school students.

The purpose of the present study was to investigate the impact of modifications to Project HOPE on attitudes towards math and science focused career related activities and increasing self-efficacy toward careers with math and science focus, namely healthcare careers. In order to study this, Project HOPE was delivered over six days to eighth

graders in a predominantly minority community; pre-intervention measures of attitudes toward and interest in careers with math and science and self-efficacy toward activities of math and science were compared to post-intervention measures of the same.

Hypotheses

Attitude towards a given subject can be determined through gauging self-efficacy and interest in the same domain (Adelson & McCoach, 2011). The current study investigated how the variables of math and science interest and self-efficacy and healthcare career interest changed from time 1 (pretest) to time 2 (posttest) for students enrolled in Project HOPE. Specific hypotheses were that: 1) Students who are exposed to math- and science-related content during a health career intervention will demonstrate an increase in math and science interest; 2) Students who are exposed to math- and science-related content during a health career intervention will demonstrate an increase in math and science self-efficacy; and 3) Students who are exposed to math- and science-related content during a health career intervention will demonstrate an increase in interest in healthcare careers.

CHAPTER II

METHODOLOGY

Participants

At the time of this study in 2010, all participants were eighth grade students from a middle school in a rural, Midwestern city. With a population of less than 4,000 people, the area was predominantly Latino- (47%) and White-identified (46%) and had a high foreign-born population (18%) compared to the state rate (3%). While approximately 34% of residents hold a high school diploma or equivalent, 12% have at least a bachelor's degree. In this manufacturing-based town, there are no hospitals and most work-aged individuals are employed in production-related occupations, earning on average, \$45,000 per household.

As part of their curriculum, the participants were enrolled in a career class. Implementation of the HOPE career intervention took place during their career class meeting time. The intervention occurred in a class room in the middle school; pre- and post-intervention testing took place in the computer lab; and the interview segment of the intervention occurred in the library. A total of 83 students participated in this implementation of Project HOPE. In order to be included in the analyses relevant to the current study, students needed to have both pre- and post-data submitted. Based on this criterion, 13 participants were excluded from the analysis. The resulting 70 participants were further scrutinized to ensure there were no significant gaps in data (e.g. an entire measure omitted). Based on this criterion, no other participants were omitted. Of the 70 who responded, 36 (52%) were female and 33 (48%) were male, with a mean age of 13 years, 38 (55%) were White, 24 (35%) were Latino, 4 (6%) were Asian, and 3 (4%) endorsed multiple ethnicities (it should be noted that students were only included in one category based on their self-identification). There was 1 student who did not respond to the question regarding ethnicity and 1 student who did not identify a sex.

Given the high population of Spanish speaking individuals within the local population, there was the potential for exclusion of data from those students who were not comfortable reading and writing in English due to the pre- and post-tests and activity instructions being in English only (additional criteria for inclusion/exclusion of participant data will be discussed later in the statistical analysis). However, these students participated in the intervention.

Procedure

Informed Consent

Consent forms were taken to the middle school by a HOPE team member and distributed to students by their teachers 2 weeks prior to the pre-tests. Consent forms were available in both English and Spanish and were distributed based on the student's/parents' language preference. Parents were given information regarding the purpose, procedure, and duration of the intervention and were provided with a telephone number and email of the primary investigators in the case of questions and/or concerns. The informed consent forms included spaces for indicating both parental consent and student assent. If parents or students did not desire to have the student participate, the student was excused from the intervention.

Team Members

The Project HOPE team consists of students and faculty from the University of Iowa. The primary investigators of this research project are responsible for organization of teams, procurement and dissemination of materials, meeting facilitation, securing interviewers, and curriculum finalization. All team members are responsible for the daily implementation of modules, daily modifications based on outcomes reported by each team from the previous day (blogs, see below), and participation in weekly meetings to evaluate the week's activities and to prepare for the next module. The entire team is divided into sub-teams grouped based on their day of implementation (e.g. Monday team, Tuesday team). Sub-teams are responsible for delegating responsibilities for the day to

each of its members. In order to assist with implementation, each sub-team is responsible for providing a blog about their experience to the rest of team in order to enable them to make adjustments for their implementation.

Project Hope Curriculum

Pretest. One week prior to curriculum implementation, a team of 2-3 members visit the school to deliver the pretest. The pretest is a survey consisting of 6 measures and a demographic form. This data collection takes place in the computer lab, which upon entering and getting seated, participants are given an index card with their name, 3-digit code, and URL for the survey. Participants type in the provided URL and are instructed to input the 3-digit code they were provided prior to the survey. Following, the students proceed to complete the survey and turn in their index cards upon completion. Team members' primary duties are to assist with typing in the URL and help students navigate the survey, including answering questions and providing clarity and explanations.

Curriculum. During each week, each of four sub-teams (one for each day), made up of 3-5 members, deliver the following modules to their respective class (see Table 1 for a summary of Modules).

- Module (Day) 1: Introduction & Jeopardy consists of an overview of the purpose and objectives of Project HOPE, an introduction of the team members, students receiving their own journals which include pages that correspond to the day's activities and a feedback section for each day, and a modified version of Jeopardy that contains questions in the categories of: Myth Busters, Are You Smarter than a 5th Grader, Famous Faces, W.O.W. (World of Work), and R & B (Resources and Barriers). Questions are of the following types: True or false, multiple choice, and free response. The module concludes with students providing written feedback regarding the day's activity in their journals to aid in future

implementations. Also, students receive candy as an indication of appreciation for their participation.

- Module (Day) 2: Holland Career Fair consists of a review of the activity, implementation, and discussion of the activity. There are 6 stations with information and pictures on poster boards and activities, each corresponding to an individual Holland type (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional). The students are led, in groups, to the 6 stations during the fair (students may not be able to visit each station). In their journals, students are provided a grid in order to rank the stations before and after participating in the fair. Once the fair has ended, students participate in a discussion, based on questions provided to them in their journals, regarding their experiences. The module concludes with students providing written feedback regarding the day's activity in their journals to aid in future implementations. Students receive candy to reward their participation.
- Module 3: LIFE: Education Edition consists of a review of the activity, activity implementation, and a discussion of the activity. Students compete in 3 teams in a modified and truncated version of the Game of LIFE focused on resources and barriers present in a pursuit of education. Teams draw cards to determine their course/path in pursuit of education. Following the game, students participate in a discussion regarding their experiences. The module concludes with students providing written feedback regarding the day's activity in their journals to aid in future implementations. Students receive candy as a token of appreciation for their participation.
- Module 4: Career Fair & BINGO consists of an overview of the activity and activity implementation. Students separate into 3 groups and visit 2 of 6 stations, a different set of 2 for each group, that have information regarding occupations

Table 1. Summary of Project HOPE Modules.

Module	Activity	Purpose	SCCT Components
Intro and Jeopardy	Adapted version of traditional Jeopardy game; Students compete in groups to earn the most points	Introduce participants to the world of work in healthcare; Enhance understanding of the diversity of occupations, possible paths to healthcare careers	World of work information
Holland Career Fair	Students visit poster/prop stations describing Holland career codes; Comparative self-assessment of interests, preferences	Introduce participant to the idea that personality/interests may guide career choice; Encourage students to consider codes that may fit them	Interest assessment and feedback; World of work information
LIFE: Education Edition	In groups, students play a “game of chance” in which each phase of the game identifies a barrier to achievement and “chance” cards to illustrate possible ways of coping with barriers	Help students identify who/what influences their career-related decisions, appropriate ways of coping with barriers and utilizing available resources	Supports and overcoming barriers; Attention to building support and self-efficacy
Career Fair And BINGO	Students visit poster/prop stations to learn about specific healthcare careers (grouped by Holland code); BINGO clues related to information from career fair, spaces	Help students understand the connection between code types and career choice; Disclose career-specific knowledge related to a variety of healthcare occupations	World of work information

Table 1 (continued)

	on BINGO cards marked for correct response		
Interview Day	Students sit down with a team member or volunteer to discuss their interests, thoughts about the program, and aspirations for the future	Help students identify strengths and areas for improvement; Provide each student participant with individualized feedback in a one-on-one setting	Access to role models; Attention to building support; Personalized feedback; World of work information
Fieldtrip	Students visit the campus of a nearby university where they participate in two on-site simulations	Allow students to have a simulated experience on a college campus and within the work of healthcare	World of work information; Self-esteem building; access to role models

Source: Ali, S.R. (2011). *Project HOPE (Healthcare, Occupations, Preparation and Exploration): Building a Pipeline to Healthcare Professions for Iowa's Underserved Youth*. Unfunded grant proposal.

that correspond to each of the 6 Holland types. Students record as much information as possible about these occupations and use this information for occupation BINGO. After the fair, the students play a modified version of BINGO. Groups receive verbal descriptions of occupations from the caller, and have to respond as a group with the occupation they believe is being described. The groups mark off the corresponding square on their group cards. Groups receive candy once they have achieved a verified BINGO. At the end of the activity, students receive information regarding their upcoming interviews the following week. They are instructed to review the information in their journals regarding preparation for the interviews. The module concludes with students

providing written feedback regarding the day's activity in their journals to aid in future implementations.

Prior to week 4, primary investigators secure a list of qualified individuals (students, faculty, and professionals) to act as interviewers for the students during week 5. Each day uses approximately 10 interviewers (team members can also act as interviewers). Interviewers participate in a 1-hour training session during week 4 before going out to serve as interviewers. During the training, interviewers are given guidelines for conducting the interviews and providing feedback, an opportunity to practice with each other, and an opportunity to ask questions. Prior to week 5, interviewers are given transportation options as well as information regarding the sequence of events for module 5 implementation.

- Module 5: Interview Day consists of organizing and situating interviewers and team members, an overview of the activity, implementation of the activity, brief overview of the fieldtrip and a final wrap-up. Students are taken to the interview location in groups of approximately 10. The students who are not interviewing remain in the class and fill out a preference form for the activities/simulations they would like to participate in/places they would like to visit during the University of Iowa fieldtrip (e.g. nursing school, recreation center). They are also given an opportunity to discuss interview expectations and interview experiences (for those who have returned from interviewing). Once the entire class has returned from interviewing, facilitators give final remarks, students are reminded of the fieldtrip, thanked for their time, and given candy for their participation. The module concludes with students providing written feedback regarding the day's activity in their journals to aid in future implementations.

Prior to the fieldtrip, chaperones are identified based on team member availability, students are arranged into 4 groups based on their preferences, and team members are given their assignments including where they are going and who is in their

group. Team members are responsible for coordinating with each other regarding routes to take and delegating responsibilities (e.g. lunch pick-up). Each group is led by at least 2 team members and 1 chaperone provided by the middle school. Students are provided with nametags with their name and a color for group identification prior to the fieldtrip.

On the day of the fieldtrip, students arrive on the University of Iowa campus by school bus. Team members are responsible for locating and assembling their group as students and chaperones exit the buses. Once groups are complete, team members lead the students to their first location as indicated on the schedule provided to them prior to that day. Each location (e.g. nursing school, recreation center) is responsible for providing an area relevant simulation for the students to engage in during their visit. During the simulations, the team members are responsible for keeping track of students, monitoring behavior, providing information during travel to simulations, and receiving/disseminating the lunch delivery. After the second and final simulation, team members are to return the students to the drop-location to board the buses and return them to their school.

Posttest. Following the fieldtrip, the students take a post-test. The post-test consists of the same survey they responded to on the pre-test. The students are given the same index card they used for the pre-test in order to allow for pre- and post-data comparisons. At this time, students are also given an opportunity to provide verbal feedback regarding their fieldtrip experience.

Measures

There were two points of data collection, pre- and post-intervention. The pre-intervention data collection occurred 1 week prior to the implementation of the intervention. The post-intervention data collection occurred 1 week following the fieldtrip segment of the intervention. The participants were given a 3-digit code in order to maintain anonymity. This code was the same for both points of data collection in order to allow for within- subject comparisons to be made as well as between- subjects.

Participants completed the study measures on desk top computers, using their digit code for security. If a participant did not complete both pre- and post-intervention measures, his or her data were not included in this study.

Demographic Questionnaire. Participants provided the following demographic information about themselves at the beginning of the survey: age, sex, ethnicity, parent(s)/guardian(s) in the home, education level of each parent, and the occupation of each parent.

Health Science Self-Efficacy Scale (HSSES). The Health Science Self-Efficacy Scale is a modified version of the Math-Science Self-Efficacy scale. The Math-Science Self-Efficacy Scale (Fouad & Smith, 1996) is a 12-item subscale developed by Fouad as a modified version of the Math Tasks subscale of Betz and Hackett's (1993) Math Self-Efficacy Scale. Participants were originally asked to "Indicate your ability to do each of the following statements by circling the appropriate numbers: 1 = very high, 2 = high ability, 3 = uncertain, 4 = low ability, and 5 = very low ability." In the current study, the language was changed to, "Rate how CONFIDENT (how sure you are) that you would be able to do each of the following. Select the appropriate number to the right of each statement." Based on this scale, higher scores would indicate a lower level of self-efficacy. The Math-Science Self-Efficacy Scale had an internal consistency reliability of .84 for the middle school population and correlated .54 with the Career Decision-Making Self-Efficacy Scale (Fouad & Smith, 1996).

For the purpose of this study, and with permission from the developer, a team of experts, including both the primary investigator of the current study and the Project HOPE director and counseling psychology faculty member, collaborated to replace the measure's college related activities (e.g. "compute your income tax") to reference activities more appropriate for middle school students (e.g. "Determine the amount of sales tax on clothes"). Based on Fouad and Smith's findings, that "math self-efficacy beliefs contributed significantly to the prediction of interest in math-science activities" (p.

341), the math and science-related activities were replaced with health science-related activities in order to assess self-efficacy and interests in this domain in the current study. Examples of replacement questions are: “Design a laboratory experiment with help and support” and “Connect my career interests to information I am learning in math class.” There is no psychometric information available for this measure.

Health Career Interest Scale (HCIS). The Career Consideration Scale was originally developed from Betz and Hackett’s Occupational Self-Efficacy Scale (OSES) using college students (Fleming, et al., 2005). The modified version used in this study was developed by Fleming, Berkowitz, and Cheadle (2005) for use with a high school population. The scale asks respondents to select “yes” or “no” regarding whether or not they had ever considered a listed career, after which they are asked to what degree are they interested in that career using a Likert scale ranging from 0(Strongly dislike) to 9(Strongly like). The new measure, renamed the Health Career Interest Scale (HCIS) for the current study, has an increased emphasis on healthcare careers with the 20 careers consisting of 17 healthcare careers and 3 non-healthcare careers. For the current study, participants were asked to “Please rate how much you like the following jobs” using the same scale. No psychometric properties were reported by Fleming et al. (2005), however, Parsons and Betz (1998) reported a reliability finding of .95 and a validity range of .18-.44 (separate validities for two samples of college students and two item types, traditional and nontraditional careers) for the original OSES based on the findings of a 1984 dissertation by Layton.

Math-Science Outcome Expectancies Scale (MSOES). The Math-Science Outcome Expectancies Scale (Fouad & Smith, 1996) contains 7 items responded to with a Likert scale ranging from 1(Strongly Agree) to 5(Strongly Disagree), with scores ranging from 7 to 35 and lower scores indicating a higher level of overall agreement. For the purpose of balance in the current study, one item was omitted from original scale to allow for three science and three math statements. Participants are instructed to “Please

rate how much you agree or disagree with each statement below. Select the appropriate letters to the right of each statement,” for statements such as, “If I take a math course, then I will increase my grade point average” and “If I get good grades in math and science, my friends will approve of me.”

Fouad and Smith ensured age-appropriateness (middle school) and reliability by using a team of self-efficacy experts and teachers to help develop the items. The scale correlated .71 with the Career Decision-Making Outcome Expectancies Subscale (Fouad, et al., 1995) and yielded an internal consistency reliability of .80. This was the most recent reliability and validity available.

Math-Science Intentions Scale (MSIS). The Math-Science Intentions Scale (Fouad & Smith, 1996) was developed using the same format as the Math-Science Outcome Expectancies Scale for the same population. The scale consists of six items responded to using a Likert scale ranging from 1(Strongly Agree) to 5(Strongly Disagree); with scores ranging from 6 to 30 and lower scores indicating a higher level of overall agreement. Originally, participants were asked to “Indicate the degree to which you agree or disagree with each statement below.” For the current study, participants are instructed to “Please rate how much you agree or disagree with each statement below. Select the appropriate letters to the right of each statement,” for statements such as “I am determined to use science in my future career” and “I plan to take math classes in high school.” The scale correlated .66 with the Career Decision-Making Intentions and Goals subscale and yielded an internal consistency reliability of .81.

Math-Science Interests Scale (MSInS). The Math-Science Interests Scale (Fouad & Smith, 1996) was developed by Fouad and a team of middle school teachers for use with middle school students. The scale was developed using Holland’s theory of vocational types and uses a Likert scale ranging from 1(Like) to 3(Dislike). Respondents are asked to use the scale to respond to 20 statements, such as, “Solving computer problems” and “Learning about energy and electricity” with scores ranging from 20 to

60. Reliability was .90 for this scale (Fouad & Smith, 1996) and Navarro et al. (2007) found an internal consistency of .91.

Math and Me Survey (MMS). The Math and Me Survey (Adelson & McCoach, 2011) was developed to assess elementary students' attitudes towards math. It consists of two subscales: Enjoyment of Mathematics and Mathematical Self-Perceptions. There are 18 items in this survey, 10 Enjoyment items and 8 Self-Perception items. The survey asks participants to "Please rate how much you agree or disagree with the following statements." A 4-point Likert scale ranging from 1(Strongly Disagree) to 4(Strongly Agree) was used to respond to statements such as, "Math is very hard for me," "I do math problems on my own 'just for fun'" and "I use math outside of math class." The internal consistency reliability for the Enjoyment of Mathematics subscale was .94 and .92 for the Mathematical Self-Perceptions subscale. Adelson & McCoach also found support for content, construct and external validity through analyses of data across 3 samples and through the use of additional sources of math enjoyment and self-perceptions.

Pilot study

In an effort to strengthen Project HOPE's effectiveness, math and science content was increased and activities were included that allowed for better communication of the importance of these areas (it is important to note that there was no direct math or science instruction). Prior to implementing the current study, a pilot study was conducted to allow an opportunity for revisions and adjustments. There were three objectives for the pilot study: evaluate the logistics; determine if/how revisions would interfere with the overall implementation and experience of HOPE; and determine if the language was appropriate, that it conveyed the message correctly and in a comprehensible manner.

Participants for this study were all African American elementary school students who attended a summer program that met daily. Approximately 20-25 students were present on a daily basis during the implementation period of HOPE, 65% were male and 35% were female.

Following the implementation of HOPE, a focus group was conducted with five students, 3 males and 2 females. The following questions were asked (see Table 2 for sample answers):

Table 1. Pilot Study Sample Answers.

Type of Question	Response
Perception of Project HOPE	<p>“Well, how, like, everyone got a chance to win points. And we’re learning somethin’…”</p> <p>“Mm… I don’t think there’s anything that I didn’t like.”</p>
Math-related attitudes and self-efficacy	<p>“I actually don’t like math. It’s hard. But some things, like… if I, like, get it, then I like it.”</p> <p>“I like math because you get to learn stuff about it.”</p>
Perceptions of math in school context	<p>“Nah, I like math. Math my favorite subject.”</p> <p>“It’s a lot of different ways that you can learn.</p> <p>Like, you can learn math on [dice], blocks and stuff like that.”</p>
Math/Science gains from participation in pilot study	<p>“I learned how you need to use… math in everyday life.”</p> <p>“Like, um, doctors, like that. Um, like, the body system, or whatever… how they know what to do.”</p>

1. What did you like about the HOPE program?
2. What did you dislike about the HOPE program?
3. What did you learn about health careers from the HOPE program?
4. What did you learn about yourself from the HOPE program?
5. Do you like math?
6. Do you think math is hard or easy for you? Why or why not?
7. Have you gotten better at math since the start of the school year? Why or why not?

8. How do you work on math at school (prompt for group work versus individual)?
9. When you are in school, if you work in groups with other students, how does the teacher decide who works with who?
10. During class time, how much time do you spend working with the same people each day?
11. Did you learn anything about math from the HOPE program?
12. Did you learn anything about science from the HOPE program?

In addition to the focus group, student feedback during the intervention was used to evaluate this pilot implementation of HOPE based on the previously mentioned objectives. First, adjustments were made to activities to increase continuity, applicability and student engagement. Second, it was determined that the overall objectives of HOPE were met and students reported a positive experience. Third, activities were evaluated as comprehensible and effective in their intended purposes.

CHAPTER III

RESULTS

This chapter presents results from the current study. First, there is an explanation of the statistical analyses performed is presented; including domain configuration. Following, results of analyses are presented, organized according to which hypothesis is addressed (e.g. data associated with hypothesis 1 will be first.). All assumption testing and statistical analyses were performed using SPSS version 21.0 (IBM Corp., 2012). Correlations, means (M), and standard deviations (SD) for all measures are presented in Table 3. Means and SDs for the interaction analysis is presented in Table 4.

Analysis

Based on the hypotheses, there were 3 domains of interest for the current study: math-science interest, math-science self-efficacy, and healthcare career interest. Given the demonstrated psychometric properties and domains of the Math and Me Survey, was separated into its two parts based on question type: enjoyability items were included in the math-science interest domain (scale name: MathI), and self-perception items were included in the math-science self-efficacy domain (MathSE). With this division, there existed a total of seven measures: 1) Health Science Self-Efficacy (HSSE); 2) Health Career Interest Scale (HCIS); 3) Math-Science Outcome Expectancy Scale (MSOES); 4) Math-Science Intentions Scale (MSIS); 5) Math-Science Interest Scale (MSInS); 6) Math Interest (MathI); and 7) Math Self-Efficacy (MathSE). The scales were then grouped and analyzed based on the domain each addressed (according to their intended purposes), yielding the following 2 groupings, consistent with the first two hypotheses: math-science interest (MSIS, MSInS, and MathI) and math-science self-efficacy (HSSE, MSOE, and MathSE).

Given that there are 6 measures loaded onto 2 dependent variables and assessed at two separate points in time, pre- and post-intervention, within the same subjects, it was determined that a repeated measures MANOVA should be performed to evaluate the each

Table 3. Pearson Correlations and Descriptive Statistics for All Measures.

Variables	1	2	3	4	5	6	7
1. HSSE		-.340**	.377**	.526**	.472**	-.355**	-.428**
2. HCI	-.329**		-.377**	-.402**	-.322**	.041	.176
3. MSOE	.562**	-.166		.760	.643**	.005	-.326
4. MSIS (intent)	.656**	-.292*	.784**		.683**	-.053	-.364**
5. MSIn	.528**	-.110	.428**	.559**		-.021	-.244*
6. MathSE	-.391**	.000	-.388**	-.395**	-.117		.457**
7. MathI	-.406**	.203	-.352**	-.355**	-.279*	.506**	
Time 1							
M	24.49	68.70	12.14	12.16	36.51	21.30	23.39
SD	8.88	36.35	4.11	4.71	8.95	4.08	7.22
Min	11	0	5	6	20	12	10
Max	54	171	23	25	57	28	33
Cronbach's α	.941	.955	.769	.858	.900	.889	.929
Time 2							
M	34.51	69.10	13.41	13.20	34.43	21.10	24.06
SD	10.65	37.25	4.42	4.97	9.18	3.43	6.95
Min	15	5	6	5	11	12	10
Max	70	167	30	30	60	28	34
Cronbach's α	.940	.943	.789	.843	.903	.856	.934

Note: Correlation coefficients at Time 1 are displayed in the lower corner and at Time 2 in the upper corner.

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

Table 4. Means and Standard Deviations by Ethnicity

Variables	1	2	3	4	5	6	7
Time 1							
White							
M	22.71	68.58	12.11	11.71	36.39	21.71	24.42
SD	7.16	36.42	4.20	4.58	8.92	4.64	6.77
Latino							
M	24.08	77.83	11.54	11.71	35.29	20.83	23.88
SD	8.41	33.22	3.62	4.63	8.26	3.63	6.66
Time 2							
White							
M	32.42	66.92	13.03	12.87	34.13	21.39	24.92
SD	11.13	36.34	3.33	4.31	8.86	3.73	6.74
Latino							
M	36.13	74.88	12.88	12.33	33.79	21.08	24.00
SD	9.40	41.51	4.91	5.11	9.63	2.84	6.61

Note: Variable numbers correspond with Table 3

White: n = 38; Latino: n = 24

of the first two hypotheses. The two groups were then separately entered into SPSS, with 2-levels and a within-subjects factor of time. Regarding the third hypothesis, a repeated measures ANOVA was performed due to there being only one true measure for healthcare career interest, HCIS. Statistical assumptions were checked prior to performing all statistical analyses.

Additional Analysis

For reasons discussed in previous sections, there was an interest in the performance of Latino-identified participants compared to that of White-identified participants. This interest was evaluated by subsequently adding “ethnicity” as a between-group factor for each analysis.

Data

The results of the performed repeated measures MANOVA and ANOVA analyses are presented next. Only significant results are reported. For the current study Wilk’s Lambda (λ), F , and η_p^2 is reported. For MANOVAs, λ is the amount of variance not accounted for by group differences and should therefore be small ($\lambda < .50$). The F test determine if the variability accounted for by between group differences (explained) is greater than that of within group difference (unexplained) and should therefore be large ($F > 1$). η_p^2 is the effect size, amount of variance explained by the model, and should therefore be relatively large ($\eta_p^2 \geq .18$).

Math-Science Interest (Hypothesis 1: Students who are exposed to math- and science-related content during a health career intervention will demonstrate an increase in math and science interest)

Levels of interest in math and science were assessed for a group of eighth-grade students at two points in time: prior to a career intervention and after (based on the previously discussed procedures). The observed means on the MSIS and MSIn were lower both pre- and posttest (see Table 3), while SDs were larger, than those reported by Fouad and Smith (1996) (MSIS: 22.898 and 4.313; MSIn: 44.663 and 8.146). Adelson &

McCoach (2011) reported means and SDs for the Math and Me Survey in terms of average score on individual items as opposed to total scores (no raw data is available) and are therefore not comparable to those of the current study. No subsequent reports of Math and Me Survey data were available.

Results from a repeated measures MANOVA analyses demonstrated significant multivariate effects for time ($\lambda = .187$, $F(3, 67) = 4.999$, $p = .003$, $\eta_p^2 = .183$). Follow-up univariate analyses did not yield any significant results for performance on individual measures.

Math-Science Self-Efficacy (Hypothesis 2: Students who are exposed to math- and science-related content during a health career intervention will demonstrate an increase in math and science self-efficacy)

Levels of interest in math and science self-efficacy were assessed for a group of eighth-grade students at two points in time: prior to a career intervention and after (based on the previously discussed procedures). The observed means on the HSSE and MSOE were lower both pre- and posttest (see Table 3), while SDs were larger, than those reported by Fouad and Smith (1996) (HSSE: 42.850 and 7.784; MSOE: 24.474 and 4.089).

Results from a repeated measures MANOVA analyses resulted in significant multivariate effects for time ($\lambda = .513$, $F(3, 67) = 21.20$, $p < .001$, $\eta_p^2 = .487$). Univariate within-group analyses demonstrated that health science self-efficacy scores (healthse) ($F(1, 69) = 60.93$, $p < .001$, $\eta_p^2 = .469$) and math-science outcome expectancy scores (msoe) ($F(1, 69) = 4.593$, $p = .036$, $\eta_p^2 = .62$) significantly improved from pre-intervention to post-intervention.

Healthcare Career Interest (Hypothesis 3: Students who are exposed to math- and science-related content during a health career intervention will demonstrate an increase in interest in healthcare careers)

Results of the repeated measures ANOVA were not significant ($F(1, 69) = .010$, $p = .921$, $\eta_p^2 = .000$). No further analyses were necessary. Fleming, Berkowitz, and Cheadle (2005) did not report overall totals, means, or SDs for the HCIS and therefore do not allow for a comparison to be made with current data (see Table 3).

Time x Ethnicity Interaction

Following the initial hypothesis tests, interaction effects were examined for all 3 domains of interest. There were no significant time x ethnicity effects found: Math/Science Interest ($\lambda = .865$, $F(9, 153.476) = 1.048$, $p = .404$, $\eta_p^2 = .047$); Math/Science Self-Efficacy ($\lambda = .870$, $F(9, 153.476) = 1.003$, $p = .440$, $\eta_p^2 = .045$); and Healthcare Career Interest ($F(3, 65) = .784$, $p = .507$, $\eta_p^2 = .035$). Overall performance for each group, White- and Latino-identified, on each measure (see Table 4) was similar to that of the total sample (see Table 3).

Summary

Based on the findings presented here, there was support for hypotheses 1 (students who are exposed to math- and science-related content during a health career intervention will demonstrate an increase in math and science interest) and 2 (students who are exposed to math- and science-related content during a health career intervention will demonstrate an increase in math and science self-efficacy). Hypothesis 3 (students who are exposed to math- and science-related content during a health career intervention will demonstrate an increase in interest in healthcare careers) was not supported. Performance on only 2 individual measures (Health Science Self-Efficacy Scale and Math-Science Self-Efficacy Scale), within the domain of math-science self-efficacy, improved significantly. Also, of note, is the lack of support for an interaction effect between time and ethnicity for all significant analyses; ethnicity did not impact performance on any of the relevant measures. As a result, the findings will be discussed in terms of the sample as a whole. The next section will elaborate on these results and discuss the implications for SCCT, future research and practice.

CHAPTER IV

DISCUSSION

The current healthcare crisis has been directly and indirectly affected by the lack of ethnically diverse workers. Directly, this void has been linked to a shortage of healthcare providers willing to work in disadvantaged areas where URMs are overrepresented (Reede, 2003; Yehieli et al., 2005). Indirectly, the absence of URMs in healthcare has resulted in poorer health outcomes for ethnic and racial minorities compared to those of the majority (Sullivan, 2004; Arora, Schneider, Thal, & Meltzer, 2011). By focusing on both an unexplored population and potential barriers to the consideration of healthcare careers for URMs, the current study seeks to contribute to the search for a solution to this crisis.

The purpose of the current study was to investigate the effectiveness of healthcare career intervention, with added math- and science-related content, delivered to middle school students from a community with a large Latino population. Specifically, the study investigated changes in math/science attitudes, interests, and health science career interests during the time students were enrolled in Project HOPE (Ali, 2013). The following section will discuss the previously presented data in terms of the hypotheses and SCCT constructs that were investigated. Next, the implications for SCCT and healthcare career interventions will be presented, followed by a review of the limitations of the current study and additional recommendations for future research.

Math and Science Interest

According to the first hypothesis, math and science interest would increase following participation in Project HOPE. This was evaluated by comparing scores on math and science interest measures before (pretest) and after the intervention (posttest). According to SCCT, having positive experiences within the areas of math and science leads to an increase in interest in these areas (Lent & Brown, 1996).

In Project HOPE, the activities of LIFE and Job Fair/BINGO were created to facilitate positive experiences in these areas. In Module 3 of Project HOPE, the activity, LIFE, gave students a pseudo-experience of navigating the world of education and subsequent job selection. Beginning with “Elementary science homework” and ending with “Choose a career,” the areas of math and science were linked to real-life educational and occupational outcomes. Following the game, students were lead in a discussion to process their experiences and how they fared in the game and facilitators reiterated connections between acquiring math and science skills and potential outcomes.

In Module 4, students participated in a job fair and BINGO that provided both actual and vicarious experiences with math and science. During the job fair students were required to gather as much information as possible on 2 healthcare occupations, including job tasks, later used in BINGO. During BINGO students used their information to fill in BINGO charts based on prompts related to one or more occupations (“This occupation uses science.”). In addition to using their own information, students had to rely on other groups to fill in answers that required information from stations they hadn’t visited (see “Module 4” in chapter 2).

In the current study, hypothesis 1 was supported: there was a significant increase in reported math and science interest following the intervention. The above-mentioned process of providing positive experiences with math and science in order to increase math and science interest is consistent with SCCT, and as such, is a reasonable explanation for the observed variance. Unfortunately, the current methodology does not allow for the evaluation of the proposed causal link. In addition, the small effect size ($\eta_p^2 = .183$) also indicates that results should be explained with caution.

A second explanation, in consideration of the small effect size, is that the link between past experiences and interest is indirect and therefore not strong. Both Lent and Brown (1996) and Navarro et al. (2007) support this idea in their respective models. Another possible explanation for the increase is based on the unsolicited feedback of

some of the participants. Consistent across implementations was the hyper-focus on making the most money following the conclusion of the LIFE game. Participants spontaneously reported “winning” and “losing” in terms of who ended up with the highest salary even though these terms were intentionally eliminated from the game and facilitators made no such conclusions. As a result, it is possible that an underlying value of money resulted in the observed increase in math and science interest, as these were connected with a higher salary in the game. This is also consistent with SCCT in that the outcome expectancy of higher earnings in math- and science-related occupations has led to an increase in interest in math and science. Again, further research is necessary to investigate this link. Lastly, the increase could be the result of an increase in math and science self-efficacy (discussed next). This link has been repeatedly supported in the literature (e.g. Fouad & Smith, 1996, Lapan & Turner, 2002, Lent et al., 2001).

Math and Science Self-efficacy

The second hypothesis was that scores on self-efficacy measures would increase following participation in Project HOPE. This hypothesis is based on the following SCCT variables and pathways: 1) past experiences are positively linked to self-efficacy within the same domain (e.g. if past performance in an area was strong then self-efficacy will be high in that area); and 2) perceived support is positively linked to self-efficacy (Lent & Brown, 1996; Navarro et al., 2007). The activities in Project HOPE that are relevant to these areas are, once again, the LIFE and Job Fair/BINGO modules.

The pseudo experience previously outlined for the LIFE activity provides an example of 3 possible education/career trajectories. To elaborate, each of the 3 groups took turns drawing cards to determine how (un)successful they were in each scenario (e.g. Elementary Science Homework scenario possibilities: 1) No Problem; 2) Problem, got help; and 3) Problem, did not get help). Based on the level of success, they were awarded points. After the High School Graduation scenario, one group is eliminated based on drawing the “decided not to go to college” card, while the other 2 groups continue on to

face 2 more scenarios in college. The final scenario in college is to select a focus, either a major with “a lot of math” or one with “not a lot of math”. In addition, at each relevant scenario and during the follow-up discussion, possible resources (supports) and strategies for navigating the posed barriers (e.g. problem with science homework) are explored. As stated above, the Job Fair and BINGO provided both actual and vicarious experiences with math and science. In addition, each group experienced actual success through winning at BINGO. Regarding pathway 2, and in addition to directly addressing supports in the LIFE game, encouragement and support from the HOPE team is an intentional and pervasive aspect of the intervention. Students are encouraged to be active throughout the experience and consistently rewarded for doing so (e.g. “high fives” and verbal recognition). Both perceived successes and failures are responded to in kind to emphasize effort and engagement.

Hypothesis 2 was supported by the data: there was a demonstrated increase in reported math and science self-efficacy from time 1 to time 2. As previously stated, although the above-mentioned activities are consistent with the types of activities linked to an increase in self-efficacy, this link cannot be concluded based on the chosen methods of analyses. However, there is an accounting of 48.7% of the variance for this domain, which is a moderate relationship. Regarding pathway 1, Ali et al. (in press) and Navarro et al. (2007), for example, found support for the positive relationship between past experiences and self-efficacy. Likewise, Lent et al. (2001) found a moderate, positive correlation ($r = .62$) between perceived supports and self-efficacy, supporting pathway 2. In addition to the increase being the result of the posited SCCT pathways, the variance in math and science self-efficacy could be the result of outside math and science instruction during the normal school day. Given that actual ability has been found to be positively related to self-efficacy (e.g. Nauta & Epperson, 2003, Piquart et al., 2003, and O’Brien et al., 1999), this could account for the observed increase.

Second, SCCT posits that self-efficacy can be impacted by emotional state. The pre-test is the first interaction between the students and team members. As such, there is anxiety and confusion in reaction to both the novelty of the situation and having to report personal information on a survey. Students frequently expressed confusion with both the survey items and purpose and the purpose of our being there (e.g. asking why are we there, asking how to respond to certain items). Conversely, at the time of the post-test, students have some familiarity with the team and the survey. In addition, they reported having positive feelings associated with Project HOPE and team members (e.g. reporting the thing they like most as being facilitators, not having anything to report for things they liked least). Given this dramatic shift in state, it is possible that the observed increase was the result of an increase in positive feelings.

In addition, there was a significant increase in scores on both the Health Science Self-Efficacy Scale (HSSSES) and the Math-Science Outcome Expectancy Scale (MSOES), but not on the Math Self-Efficacy Scale (MSSSES). This could be the result of there being explicit and overt experiences within the areas of health science (e.g. investigating careers) and math and science outcomes (e.g. LIFE game) and no obvious opportunities to practice math skills (e.g. performing math operations). Consequently, impact on the corresponding areas of self-efficacy could be reflective of this salience discrepancy (e.g. having more content led to greater effects). This discrepancy could have also led to students easily recalling previous HOPE experiences and relating them to the items on the first 2 measures and having a more difficult time recalling experiences that would inform responses related to math self-efficacy.

Healthcare Career Interest

The third hypothesis stated that there would be a demonstrated increase in healthcare career interest levels. Although there was a consistent and continuous focus on healthcare careers, there was no demonstrated support for hypothesis 3. According to Gottfredson (1981), by eighth grade, adolescents are in stage 3 of 4 of circumscription.

This means that, for various reasons (e.g. perceived lack of parental support, inconsistent fit with person-variables), the participants in this study may have already foreclosed on the field of healthcare which, according to Lent & Brown (1996), could be reversed through processes beyond the scope of the current intervention. . Another possibility is that the chosen measure did not measure the true objective of Project HOPE, to increase interest in the field of healthcare.

The Career Considerations Scale (CCS) assesses interest in 20 specific careers. Although an overwhelming majority of the careers are within the healthcare field (17), this is still a fairly limited selection when compared to the breadth of the field. As a result, one possible explanation for the lack of significance in the data could be that the measure was inadequate given the design of Project HOPE. It is possible that there was an increased interest in the field of healthcare as a whole or in specific jobs that were mentioned during the intervention but not listed on the measure. Similarly, there is a possibility that students were prevented from developing an interest in several careers on the CCS due to a lack of inclusion during the intervention.

Another possibility points to an additional limitation of the measure. Based on its design, any demonstrated decrease in interest on the measure would lead to a rejection of hypothesis 2. There are several Project HOPE activities that are inconsistent with this idea: 1) Module 2: Healthcare Career Fair (and SDS); 2) Module 4: Job Fair/BINGO; and 3) the fieldtrip (Modules 3 and 5 don't have an explicit focus on healthcare). These activities require the student to consider where they would fit within the healthcare field based on personal interests and preferences and/or focus on a limited number of presented healthcare occupations. This increase in focus as a result of the previously mentioned activities could lead to a demonstrated decrease in interest on the CCS due to a lack of exploration of careers outside of the students identified scope of interest. These activities could also lead to a perceived decrease in interest resulting from gained knowledge (e.g. elimination of a career based on required tasks or environment) and/or

an increased interest in fewer careers (e.g. elimination of several careers in favor of a highly desirable select few). While these outcomes are consistent with the HOPE objective, they could result in a student reporting less interest in some careers and no change in others on the CCS post-intervention. This potential error in measure selection will be revisited in the discussion of limitations.

Implications for SCCT

The current study aimed to add to SCCT literature by exploring theory-related variables and pathways in a rural city using an under-researched population, middle school adolescents. Of particular interest was the subset of Latino adolescents. The findings were mostly consistent with previous SCCT research with other populations (e.g. college students, high school students). The current study provides support for the hypothesized pathways for math and science self-efficacy, interest and outcome expectation development for White (majority) and Latino (minority) adolescents. As such, the effect of SCCT-consistent program inputs (e.g. education and experience regarding supports and barriers, math and science outcomes) on self-efficacy, interests and outcome expectations should be further researched with this and other URM populations.

The lack of an ethnicity/time interaction is also promising. Research on supports and barriers has demonstrated a negative relationship between both academic performance and career goals and perceived barriers and a positive relationship between perceived supports and the former (e.g. Kenny et al., 2003, Kenny et al., 2007). Relatedly, barriers have been demonstrated to exist at a disproportionate rate for URMs (e.g. Kenny et al., 2006) even within the same educational system. The equal gains of URM and White middle school students in the current study demonstrated post-intervention supports the need for more research on moderating factors for the impact of perceived barriers on self-efficacy, interest and outcome expectancy development. Similarly, further research is needed on the lasting effects of the demonstrated gains on

later career-related variables (e.g. high school math and science performance, career goals, education attainment). This finding was also supported by a more recent study (Ali & Menke, in press) in which Latino students reported significantly higher perceptions of Likelihood of Encountering Barriers ($p = .014$) and significantly higher Vocational Skills Self-Efficacy ($p = .041$). However, there were no significant mean differences between Latino and White students in perceptions of Difficulty Overcoming Barriers, Career Decision Outcome Expectations, and Career Aspirations. Overall, the current study supports the need for more research on the utility of SCCT in the areas of career intervention development and mitigating the effects of perceived barriers to education and subsequent career acquisition for students in rural areas regardless of their ethnic background.

Another interesting implication for SCCT resulted from unstructured feedback. As previously mentioned, there were some spontaneous utterances during the LIFE game that offered some insight into what some of the students prioritized during the game. The hyper-focus on money could be a communication of a particularly salient value for this population. This supports the claim of SCCT that there is a direct relationship between outcome expectancies and interest development, also supported by Fouad and Smith (1996). As such, more research is needed to explore the level of importance of this variable and the prevalence and strength of its relationship to interest development with this and similar populations (e.g. age, ethnicity).

Implications for Developing Healthcare Career Interventions

The obvious shortcoming of the current intervention was the lack of demonstrated increased interest in healthcare careers. Based on research that links domain interest to career interest (e.g. Fouad, 1995, Stroup & Thacker, 2007), the demonstration of a significant increase in math and science interest should have been reflected in the performance on healthcare career interest. The lack of support for healthcare career-interest development could be the result of either poor career-interest measurement or a

true lack of overall effectiveness for Project HOPE, or both. First, as previously discussed, the CCS has a limited demonstration of healthcare career interest. The current study highlights the importance of having consistency between the construct being measured and the tool chosen to measure the construct. With accurate assessments in place, true effectiveness (or lack thereof), can confidently be concluded.

The existence of a true lack of effectiveness of the current intervention is possible. Here, a discussion of several possible is considered. First, there could have been a poor established link between math and science and healthcare careers during the intervention. Of the 5 modules, only 2 explicitly refer to math and science (modules 3 and 4) and during the LIFE game (module 3) the link between these areas and money appeared to be more prevalent. As math and science are important to the pursuance of healthcare careers, these areas should be more salient and pervasive in healthcare career interventions. Second, the previously reviewed interventions (referring to Chapter 1) were all more intensive than Project HOPE. Some interventions involved multiple classes and subjects, some spanned the entire academic year, and some allowed, even expected, students to participate multiple years. By only delivering Project HOPE to eighth grade students for a total of 6 days, the effects are potentially limited in both duration and intensity. Third, there were 2 modules (2 and 5) that made no explicit reference to healthcare. This was an oversight that potentially interfered with the delivery of the overall message, the importance of healthcare. Lastly, Project HOPE relied solely on facilitators to motivate participants to consider a career in healthcare. As such, relevant sources of support (e.g. parents, teachers) are omitted from the program. Consequently, if there were competing ideas presented by any or all of these more important, consistently present sources, Project HOPE material would not have been able to compete.

Limitations

In addition to the limitations of the current study discussed earlier in this chapter including those resulting from design, the findings of the current study should be interpreted considering the following limitations. First, there were different facilitators for each class (e.g. Monday's class, Tuesday's class). Consequently, there was no control for facilitator impact or style across the classes. This variability could have led to a variability of experience for participants. Second, there was variability in student participation. Due to a lack of external pressure to engage (e.g. mandatory participation, grades), students controlled the amount of effort they put forth solely based on person-level variables. Additionally, students were also occasionally absent from school, and thus Project HOPE, and were unable to make up missed modules. Third, due to resource limitations, it was impossible for students to visit every site during the field trip, resulting in another source of variability of experience. Lastly, there were participants for whom Spanish was the preferred language. This resulted in not only a variable experience, but possible exclusion from the data analysis due to comprehension difficulties.

Future Research

The remaining recommendations are to inform healthcare career intervention development, implementation, and theory-based evaluation. First, while there has been research regarding the effects of supports and barriers on career attainment, more research is needed on the effects of addressing population-specific barriers, and related supports, during healthcare career interventions (e.g. lack of visible role models, racism). Second, although there is much to be gained from quantitative research, qualitative research with this population can have unexpected benefits. As observed in the current study, adolescents frequently provide insight into their thought processes (e.g. decision-making) when their responses were not constrained by quantitative methods.

The current study supports both researchers and clinicians utilizing SCCT grounded healthcare career interventions with an under-researched population. Support

for SCCT pathways for increasing self-efficacy and interest was demonstrated with a sample of rural middle school students, over a third of which self-identified as Latino. Results from the current study support the need for further SCCT and career interest development research with URMs.

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