RUNNING HEAD: Minority Students Committed to Scientific Research Careers

The Characteristics and Experiences of Minority Freshmen Committed to Biomedical and Behavioral Science Research Careers*

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Abstract

This study examines the characteristics and pre-college experiences of African American/Black, Latina/o, and American Indian students who demonstrate an interest in pursuing a major in a biomedical or behavioral science field as well as an interest in pursing a career in scientific research at college entry. Using data from the Cooperative Institutional Research Program (CIRP), the study explores factors that contribute to the career aspirations of racial/ethnic minority populations. Logistic regression analyses on a national sample of 71,000 students reveal that coursework and experiential learning in the sciences during high school as well as having a parent who is employed in a scientific field are important contributors to early interest in pursuing a scientific research career.

Introduction

Nearly half of the U.S. population will be from a non-white, racial/ethnic minority by 2050, and this impending demographic surge promises large increases in racial/ethnic minority high school graduates as early as 2015 (U.S. Census, 2005; Carnavale & Fry, 2000). Moreover, 90% of high school seniors expect to obtain some type of postsecondary education (Hurtado, Inkeles, Briggs & Rhee, 1997). National data on college freshmen reveal that more students are aspiring to postgraduate degrees, and student interest in biological science majors has nearly doubled in the last 15 years (Astin, Oseguera, Sax, & Korn, 2002).

Unfortunately, there is still much concern regarding the lack of access and support for minority research scientists, as scholars caution us that interest in research science careers has not kept pace with the demographic shifts taking place in this country (NSF, 2003). For example, longitudinal studies have found that students' interest in science tends to decrease over time (Ginorio, Brown, Henderson & Cook, 1993). This concern is especially salient for underrepresented minority students who often face additional non-academic stressors during college such as limited finances (Hu & St. John, 2001), perceptions of prejudice and discrimination (Hurtado & Carter, 1997; Nora, 2004; Nora & Cabrera, 1996), and campus climate issues, all of which can affect their retention and academic success (Hurtado, 1992; Grandy, 1998; Cabrera, Nora, Terenzini, Pascarella, & Hagedorn, 1999).

These next few years represent an important time to investigate how the demographic changes across the higher education landscape can result in diversification of scientific research occupations. The question is whether these demographic trends will translate into increased representation across a broad range of health science fields, especially areas that may lead to new research that affect large segments of the growing racial/ethnic communities. In light of an

increasingly diverse workforce, exploring the career aspirations of racial/ethnic minority populations is essential in predicting their subsequent participation in science research careers (Mau, 2003).

For over 30 years, the National Institutes of Health, the National Science Foundation, and private foundations have attempted to remedy the inequities of racial/ethnic representation across scientific research occupations through a variety of interventions that begin as early as middle school. This study examines the characteristics and pre-college experiences of underrepresented minority (URM) students who have an interest in the biomedical and behavioral sciences upon college entry and who may have early aspirations for research careers in these fields. In addition to high school grades and test scores, there are other key skills, dispositions and behaviors of African American/Black, Latina/o and American Indian (URM) students that can shape their interests in these fields. The intent of this study is to better understand the factors that correspond to these students' interests and future engagement in research fields, which are vital to the health and well-being of diverse communities. The findings may be used to support the development of existing and new interventions to enlarge and diversify the general pool of biomedical and behavioral science faculty and researchers in public and private organizations.

Literature Review

Research has shown that the number of years of science and math in high school, high school GPA, and SAT math scores are all positively correlated with choosing a science major (Maple & Stage, 1991; Ware & Lee, 1988). Yet even after controlling for these academic factors, URM students who begin work toward a science degree are more likely to switch into another field than are Asian and White students (NCES, 2000). A study by Grandy (1998),

focused on the reasons why capable minority students either persisted or left academic and career tracks in science and engineering, found that math and science achievement in high school was *not* a factor in minority students' persistence in the sciences during college, but that support from other minorities at their institution had an important effect on outcomes of science ambition and commitment to science during and after college. In fact, minority support proved to be the most influential factor affecting science ambition after sophomore year in college, indicating that fellow peers and faculty members from the same racial/ethnic backgrounds provided these students with advice and direction in the sciences.

The enrollment of URM students in health profession schools has declined since the 1980s and has failed to keep up with the growth of minority populations (Treisman & Surles, 2001; Sullivan Commission, 2004). Other research has found that URM students are often discouraged from considering careers in the biomedical fields because of their preconceived notions about scientists (Gardner, Mason, & Matyas, 1989; Porta, 2002). Also, minority students at all levels of college are even more underrepresented in science majors (Fouad, 1995 cited in Lindner, 2004), which has been attributed to poor academic preparation, lack of career planning, and negative perceptions of careers in the sciences (Fouad, 1995; Romo, 1998 cited in Lindner, 2004). Furthermore, URM students enrolled at selective college environments are less likely to persist as science majors if these environments engender stereotypes that devalue their expectations of succeeding in these majors (Bonous-Hammarth, 2000).

Previous research suggests that programmatic interventions including adequate academic, financial, and social support structures can have a tremendous impact on student persistence (Astin, 1993, Garcia, 1991; Nagda et al., 1998; Starke et al., 2001; St. John, 1990, 1991). For example, academic preparation that increases mathematical and analytical competencies, access

to motivated peer mentors also pursuing science-related careers, and positive interactions with faculty on research or independent projects all strengthen student interest in the sciences (Treisman, 1992; Bonous-Hammarth, 2000). Further, college environmental contexts shape student engagement depending on their representation on campus, sense of belonging, and the institutional climate for diversity (Hurtado et al., 1999). As students become aware of and more engaged in opportunities to further pursue their academic and vocational interests on campus, they become more integrated in the social fabric of their campus (Astin, 1984) and develop a common group identity (Gaertner & Dovidio, 2000) based on commitment to their college community or field of study.

Students naturally gravitate toward academic areas where they feel the greatest degree of self-efficacy before and during college. It is important to study early predispositions because students will seek opportunities that reinforce their strengths or initial interests and values. Although it has not been applied to career development, accentuation theory suggests that students enter colleges with predispositions that are accentuated over time as they select peer groups, activities, and are likely to select courses that reinforce these initial predispositions (Feldman & Newcomb, 1969). Recent studies are beginning to show this is the case with course selection that reinforces initial interests, interaction patterns with peers, and subsequent tendencies that may reinforce behavioral patterns and students' initial inclinations (Laird, Engberg, & Hurtado, 2005). In the sciences, such accentuation effects are likely to be powerful as those students who are interested in scientific careers and consider themselves strong in this area of study will select courses, peers and activities that will strengthen their initial inclinations. Thus, students' predispositions are likely to be accentuated over time and these also tend to accentuate group differences in interests, values, and behaviors. This may particularly be the case

for women and racial/ethnic minorities in the sciences where preparation and early reinforcement of interest in the sciences is important.

There still remain many unanswered questions regarding the nature and contexts of engagement among URM students that lead to high degree aspirations and to retention and preparation for biomedical and behavioral research careers. Since engagement is a key component of academic achievement, it is important to identify the general characteristics of incoming college students that correspond to their future engagement in research fields.

Theoretical Framework

The theoretical framework guiding this study was adapted from Bandura's (1977, 1985) Social Learning Theory (SLT), which is concerned with how social values and roles are acquired by an individual (Johnson, Swartz, & Martin, 1995). In particular, SLT posits that an individual's personality is shaped by unique learning experiences, experiences often developed from interactions with the environment. According to Bandura, "humans come from few inborn patterns…people must develop their basic capabilities over an extended period, and they must continue to master new competencies to fulfill changing demands throughout their lifespan" (pg. 85, 1985). Further, there are central processes that act to either increase or inhibit the likelihood that an individual will perform a behavior. SLT is useful for this study since we are interested in how high school experiences such as exposure to summer research programs and course selection influence subsequent major choice and research scientist career aspirations. SLT also suggests that interactions and observations with other people dictate beliefs, values, and expectations that then determine how an event will be perceived and this subsequently serves to guide future actions. Bandura asserts that all three of these elements (i.e. behavior, cognition,

and environment) must be understood together rather than in isolation. Bandura's (1985) SLT has been applied in the study of career development for American Indian students (Johnson, Swartz, & Martin, 1995) since it simultaneously takes into account students' access to resources and exposure to lived experiences that shape career choice. Given its applicability to one of the groups of interest in our study, we feel it is warranted to extend this theory to evaluate major and career choice for African American/Black and Latina/o students as well. Bandura's SLT theory framed the approach and development of the analytical models for this study.

Method

Data source and sample. Data were derived from the Cooperative Institutional Research Program's (CIRP) annual Freshman Survey, a national survey of college students conducted at the Higher Education Research Institute (HERI). The Freshman Survey covers a wide range of student characteristics: parental income and education, ethnicity, and other demographic items; financial aid; secondary school achievement and activities; educational and career plans; and values, attitudes, beliefs and self-concept. All institutions that have entering freshman classes and responded to the U.S. Department of Education's (DOE) Higher Education General Information Survey were invited to participate in the 2004 Freshman Survey. For the purposes of this survey, the population has been defined as all institutions of higher education admitting first-time freshmen and granting a baccalaureate-level degree or higher listed in the Opening Fall Enrollment (OFE) files of the U.S. Department of Education's Higher Education General Information Survey (HEGIS, since 1986 known as IPEDS – Integrated Postsecondary Education Data System). The institutions identified as part of the national population were divided into 26 stratification groups based on institutional race (predominantly White vs. predominantly Black),

type (four-year college, university), control (public, private nonsectarian, Roman Catholic, and other religious) and the "selectivity level" of the institution. Additional details are available in the 2004 annual report of *The American Freshman* (Sax, Hurtado, Lindholm, Korn, & Mahoney, 2004) and *Aspiring Scientists* (Hurtado, et al., 2006). The sample included 70,249 freshmen who had initial intentions to major in fields related to the biomedical or behavioral sciences[1], with URM students constituting roughly 20 percent of this population. Of these subset of freshmen, 4,234 indicated a desire to pursue a research scientist career[2] and 580 were URM students.

Key variables. The outcome variable for this study is a scientific research career aspiration, which was constructed by assessing students' response on an item that asked about intentions to pursue a variety of careers that included the choice of a research scientist career. Given the national scope as well as the variety of pre-college and pre-test measures assessed by the CIRP Freshman survey data, it makes for a useful dataset with which to explore key factors that influence students' aspirations and interests in the science fields under investigation. The decision to employ an aspiration measure as an outcome allows for important assertions to be made about what factors might affect students' interests in the biomedical and behavioral science fields, both as courses of study and as potential career paths.

As previously mentioned, the selection of independent variables was guided primarily by Bandura's (1977, 1985) social learning theory as well as prior research on factors affecting students' aspirations. High school experiences such as exposure to summer research programs and course selection were included in our model. Given the central tenets of SLT, our study of

[1] Of these 70,249 biomedical and behavioral science students, 37% reported they were biological science majors, 32% were pre-professional science majors, 25% were behavioral science majors, and 6% reported they were chemistry majors.

[2] Of these 4,234 students who indicated an interest in a research scientist career, 75% were biological science majors, 19% were chemistry majors, 3% were behavioral science majors, and 3% were pre-professional science majors.

research career choice also incorporated high school activities, interactions with peers, perceptions of cognitive abilities, goals and expectations, and high school characteristics. In addition to the theoretical framework that guided this study, researchers continue to suggest further contextual items to consider in the career choice of multicultural groups, including racial and cultural identity, self-efficacy, social status, and gender (Betz & Fitzgerald, 1995; Bingham & Ward, 1996; Hartung, 2002; Osipow & Littlejohn, 1995). As such, this study also incorporated students' background characteristics, citizenship status, and time management skills (see Table 1). More importantly, due to the cross-sectional nature of the dataset, we organized these input measures for our multivariate analyses based on their saliency in potentially influencing students' interests in the sciences. We first account for students' background characteristics and pre-college behaviors, then we account for more affective measures such as self-efficacy and goals/expectations, and finally we control for sources of financial support in the first year of college.

[Place Table 1 about here]

Analyses. Initial analyses include cross-tabulations and bi-variate correlations, which were employed to identify the factors associated with aspiring biomedical and behavioral science majors interested in a scientific research career. Logistic regression analyses were conducted on the overall sample of students entering four-year colleges in 2004 from all racial/ethnic groups who initially intended to major in the biomedical and behavioral sciences. Our goal was to examine the student characteristics and experiences that may uniquely contribute to early aspirations for a scientific research career. Because of the projected growth of the URM population and their continued under-representation in scientific fields, these analyses were also conducted separately using each respective URM group. It is necessary to disaggregate the

regression results by each respective group in order to highlight key factors that contribute to URM students' interests in the biomedical and behavioral science research careers, a key feature of the present study. Further, multivariate logistic regression is appropriate for the present analyses due to the dichotomous nature of the outcome measure under investigation. In total, four different regression models are presented and discussed in the present study, including one model on the overall sample to detect racial differences, and subsequently three models that focus on URM students specifically.

Missing data analysis revealed a small range of missing data (less than 1% to 10%) across all variables in the model. In order to maintain statistical power and to ensure strong model specifications, missing values for all continuous variables were replaced using the EM algorithm. The EM algorithm represents a general method for obtaining maximum likelihood (ML) estimates when a small proportion of the data are missing (McLachlan & Krishnan as cited in Allison, 2001).

Results

The descriptive results reveal that URM students enter college with higher scores on factors strongly associated with aspirations for a research scientist career, as compared with their White and Asian peers. For all students, having high degree aspirations, reporting a strong drive to achieve, spending more hours studying in high school, and attending college to prepare for graduate school are significant positive correlates with intending to select a scientific research career. On most of these measures, URMs' mean responses exceed those of their White and Asian peers, and they also indicate less likelihood of changing their majors (see Table 2). Lower high school GPAs and an expectation to work full-time during college may partially explain why

these initial dispositions are not being converted to retention and graduation in these fields. These descriptive results suggest that URM students may need greater academic, programmatic and financial support than currently offered to encourage their continued aspirations in the sciences. Given the literature on gender differences in the sciences, specifically research that reports that women continue to be underrepresented in the sciences (Hanson, 1996; Sonnert, 1995), we briefly highlight descriptive trends by racial/ethnic group and gender in order to provide a more complete portrait of the students in this sample. Interestingly, within each racial/ethnic group, females reported higher high school grade averages, drive to achieve and hours spent studying. Males reported higher self-ratings on academic ability while both genders were equally likely to report aspirations for a Ph.D. as well as similar likelihood that they would change majors. Initial accounts point to the potential success of women (including women of color) in scientific majors given these early academic standings. A comprehensive review of each of the multivariate regression models allows for greater exploration of these initial, descriptive trends considering that women and students of color continue to be underrepresented in scientific fields (Leslie, McLure, & Oaxaca, 1998; Maple & Stage, 1991).

[Place Table 2 about here]

Multivariate Regression Results

This section highlights the results of the multivariate analyses, which focuses on students' intentions to choose a scientific research career path. That is, among only those students who plan to major in a biomedical, behavioral, or health pre-professional science, what characterizes students who further aspire to a scientific research career?

Aspiration to a Scientific Research Career: Overall Sample. The following multivariate regressions utilize only those students who report that they intend to major in a biomedical,

behavioral, or other health pre-professional major (see Table 3). Male students, compared to female students, appear more likely to aspire to a scientific research career at the beginning of their college careers but only until students' major choice of biological science is controlled. The reason for this is that there is a small positive correlation between men and their aspiration to major in the biological science. Men are more likely to select math/science college majors because they perceive themselves to be better prepared at math/science (Leslie, McLure, & Oaxaca, 1998). Once college major is controlled, men are no more likely to aspire to a scientific research career than women. On the other hand, lower income science majors (as compared to higher income science majors) are less likely to aspire to a scientific research career and students who are native English speakers are more likely to aspire to a scientific research career. In regards to ethnicity, African Americans and Asians are less likely to aspire to a scientific research career as compared to Caucasians (after all controls are introduced in the equations). There are, however, no significant differences between Latinos, American Indians, and Native Hawaiian/Pacific Islanders relative to their Caucasian peers. Why the racial difference is unclear. Further research is needed to better understand how students arrive at their career aspirations. While high school grades do not predict the likelihood that students will aspire to a scientific research career during their first year in college, there is a positive effect of standardized test scores (i.e., SAT composite). Perhaps students who are best prepared for standardized exams are also most likely to aspire to success in a challenging research career that also requires high levels of performance. Another strong positive predictor of scientific career aspirations is having a parent who is in the health profession or is a research scientist. A central tenet of the theory guiding this study is that students learn behaviors by exposure to others.

Having a family member in the field enables a student to view a scientific profession as a viable option.

[Place Table 3 about here]

In examining high school activities of science majors, students who take more years of biological sciences in high school and spend more hours per week studying or doing homework increase their odds of aspiring to a research scientist career; factors which will likely aid in the pursuit of scientific research. More time engaged in studying and pursuing science study likely leads students to feel prepared for a career in science and we know from past research that students naturally gravitate to areas where they feel most competent (Maple & Stage, 1991). Two additional high school activities that increase the likelihood of aspiring to a research scientist career include participating in a health science program as well as participating in a summer research program. These findings suggest that these programs may in fact foster an interest in and preparation for a scientific research career by enabling students to more deeply understand what scientific research might entail. However, engaging in hospital work or other health education actually decreases students' likelihood of aspiring to a research career. This finding provides support for SLT in that these aspirations are shaped by the unique learning experiences provided by such experiential learning—students are not exposed to research but rather the daily hands-on experience of the work of physicians and other medical personnel. This finding also suggests that mere exposure to health careers does not guarantee knowledge and interest in a scientific research career. Perhaps these students are already committed to becoming practicing health physicians or health professionals instead of researchers, and indeed our descriptive results show that of all of the students who indicated they performed hospital work, 50% aspire to a career as a physician while only 4% aspire to research science careers. To attract more

students to the field, educators might identify ways to expose students performing hospital work to science-related research careers beyond a focus on the medical profession.

As cognition is one area central to the SLT framework utilized by the present study, we evaluated students' self-assessments of their cognition by including a number of self-efficacy measures and find that higher self-ratings on academic ability increased the likelihood of aspiring to a research career. However, biomedical or behavioral science majors who rate their mathematical ability and drive to achieve high are less likely to aspire to a research scientist career. Perhaps students with high mathematical and drive to achieve self-ratings view other health careers as their viable option. Evaluating the mean for drive to achieve does suggest that those students with higher self-ratings on drive to achieve appear to be interested in careers in medicine (4.36 for physician aspirants and 4.15 for research scientist aspirants on a scale of 1-5 with 1=lowest 10% and 5=highest 10%). More interventions to educate science students about careers beyond medicine may go a long way in attracting the "best" students to the research profession.

Students' goals and expectations were also evaluated in this model. Not surprising, we find that the strongest positive indicators of scientific career aspirations for freshman students include majoring in chemistry or the biomedical sciences (as compared to pre-professional majors), as well as reporting that making a contribution to scientific research is an important personal goal for them. Again, this speaks to the savvy nature of students to pursue a major that complements their initial interests. Essentially, students are choosing majors that they likely feel can help them realize their personal goals. Interestingly, those students who are more likely to change major field are less likely to aspire to a scientific research career, however, greater agreement that one will change career choice results in increased likelihood that a student will

aspire to a scientific research career. What this suggests is that students are initially interested in scientific research but may be unaware of career options in research. This has implications for how we expose and bring attention to scientific research careers. We may be losing students to other fields during college simply because they are unsure of career options and lack knowledge about what exactly a career in scientific research might entail. Another finding that points to potential loss of talent concerns students' need to work. Those students who report a greater likelihood that they will work full-time in college are less likely to aspire to a research career. Working full-time does not enable a student to attend the many hours of lab activities that are required to be successful in a research career. Coupled with this is the fact that students who aspire to be well-off financially also do not aspire to a research scientist career. Perhaps they find other careers in science, such as being a physician, more lucrative. Financial considerations appear to be influential factors in career choice. Perhaps students understand that a career in science will require long lab hours and training which would necessarily conflict with the need to work. Finally, students who aspire to master's and doctorate degrees are more likely than those aspiring to a "bachelor's degree or less" to aspire to a research scientist career, and those students who aspire to a medical degree are far less likely to aspire to a research scientist career. This is a logical finding as science careers often necessitate graduate training and research careers often require the Ph.D. compared to the M.D., and very few students may be aware of the M.D./Ph.D. option until much later in their college education.

Aspiration to a Scientific Research Career: Underrepresented Minority Sample. Because we are mainly interested in how background characteristics, high school activities, self-efficacy, and goals/expectations affect underrepresented minority students in the biomedical and behavioral sciences, we conducted three separate analyses on these individual groups, that is, African

American/Black, Latina/o, and American Indian/Alaskan Native students (see Tables 4 through 6). There are similarities and differences between the three groups studied, although further research is warranted to test for significant differences across these groups. We find that for all three groups, there are no gender differences with respect to scientific career aspirations. In terms of English language speakers, there are no differences between the American Indian students and the Latino students and aspiration to a scientific career but we find that Black students for whom English is their native language are more likely to aspire to a research career. Higher standardized test scores increase the likelihood of aspiring to a research career for all three groups, yet high school grade differences only appear among the American Indian group. In fact, American Indian science majors with lower grades are more likely to aspire to a career in scientific research than their science peers with higher high school grades. Again this finding should be interpreted with caution as the overall grade average mean for all American Indian students is 6.07 while the mean for American Indian science students is significantly higher (6.37). In other words, what this finding suggests is that the really high achieving American Indian students are not choosing a scientific research career but that the ones who do nonetheless still have solid academic credentials. In terms of coursework completed, we find no differences between years of coursework completed and aspiration to a scientific research career except for Latino students, where Latino students who have taken more years of biological science are more likely to aspire to a research scientist career. Students likely feel more prepared to handle a career in scientific research if they have taken more courses in high school. Research on science preparation in high school is mixed for URM students. Grandy (1998) found that academic preparation in the sciences in high school was not a factor in retention in the science fields during college while Maple and Stage (1991) and Leslie, McLure, and Oaxaca (1998) found that

science preparation in high school did influence later achievement within the sciences. For Latino students, having a parent who is in a health profession or a research scientist also increases the likelihood of aspiring to a career as a research scientist. This reinforces the tenets of social learning theory that suggest that exposure to certain professions enables the student to view those professions as a viable option to pursue. As witnessed with the overall group, engaging in hospital work reduces the likelihood of Latino and Black students' aspirations for a research career. Again, those students who perform hospital work are likely interested in careers in medicine. Among the students who performed hospital work prior to college, 50% of African American, 51% of Latino, and 46% of American Indian/Alaskan Native students aspire to a career as a physician, whereas only 2%, 3%, and 5%, respectively, aspire to a research science career. Apparently, hospital work is not translating into higher aspirations for a scientific research career. As suggested earlier, perhaps innovative ways can be identified and infused into hospital work that expand students' notions of the biomedical and behavioral science to careers in research. An encouraging finding is that engaging in a health science research program (for Latino students) or a summer research program (for Black students) substantially increases the likelihood of aspiring to a research career. Clearly, exposure to these programs is having a positive effect on aspirations for scientific research careers, allowing students to gain greater insight into the lives and work of research scientists.

[Place Table 4 about here]

Turning to results on student self-efficacy, we see that for the African American science population, self-efficacy measures do not increase (or decrease) the odds of aspiring to a research career. For the Latino students, higher ratings on math abilities decrease the odds of aspiring to a research career. Put another way, lower math self-ratings of science majors increases the

likelihood of aspiring to a research career. It is unclear why lower math self-ratings would lead to aspiring to a challenging career such as research scientist. Perhaps those students who are attracted to such careers are evaluating themselves in the context of other science majors (who they may view as intellectually competitive) and hence may be one reason we see this seemingly counterintuitive finding. Among the American Indian science population, higher self-efficacy in academic ability and time management skills increases the likelihood of aspiring to a career in scientific research.

[Place Table 5 about here]

Many similarities are seen across groups when examining students' goals and expectations. Generally, African American, Latino, and American Indian students pursing a major in either the biomedical science or chemistry field are more likely than students interested in a pre-professional field to aspire to a career in scientific research. Moreover, aspiring to a behavioral science major decreases the likelihood of pursing a scientific research career. These findings suggest that students who begin with a major in psychology may be even less aware of behavioral science research careers as an option. Clearly, this is an area that deserves more exploration since there is a need for research scientists in both biomedical and behavioral science fields. One of the strongest indicators of scientific research as a career is agreement with the goal of making a scientific contribution to research. It follows then that these students recognize that a way to make their aspiration into a reality is to pursue a career in scientific research, that is, they engage in behaviors that complement that desire. This finding reinforces SLT that posits that students need to view themselves as competent in order to pursue a challenging career. Logically, interest in pursuing a master's degree (versus bachelor's or less) among Latinos and Blacks and interest in a doctorate degree (versus a bachelor's or less) among Blacks increases the

odds of aspiring to a scientific research career. This finding seems intuitive since contributing to research often requires a graduate education. Among all three groups, aspiring to a medical degree decreases the likelihood of a research career. Clearly these students already feel that their long-term plans are to be practicing physicians and not researchers. An interesting finding for the Latino students is that those who report greater likelihood that they will change their career choice are also likely to aspire to a career in scientific research. That is, students begin with this aspiration but enter with doubts that they will continue to pursue it. This finding suggests that institutional intervention is needed to encourage and sustain student interest in a research career over time during college. Among American Indian students, best guesses that the student will change majors decreases the odds of pursuing a scientific research career. Clearly there is initial interest in the sciences but even before exposure to the courses and field, students anticipate changing fields which, in turn, decreases the chances that they will pursue a research career. In fact, American Indian students who enter with an interest in science and aspire to scientific research appear to do so with conviction, thus, the likelihood of not changing majors increases the chances of scientific research pursuit. For the American Indian population, another place where potential research aspirants may be lost is the financial aspect. American Indian students who report the need to work full-time are less likely to pursue a scientific research career. Related to the financial aspect, a variable that was important for all three groups is the extent to which students report the desire to be well-off financially. Among all three groups, greater agreement to be financially well-off lowers the likelihood of pursuing a career in scientific research among science students. It may be that these URM science students pursue careers such as physicians because they believe them to be more lucrative. Exposing students to the reality

that they can still make a comfortable living in scientific research should be an important policy/programmatic effort.

[Place Table 6 about here]

Discussion and Conclusion

According to Social Learning Theory (SLT), those elements of pre-college experience that provide instrumental, associative and direct learning experiences (Brown, Brooks, & Associates, 1984) contribute to positive reinforcement of student aspirations. Participation in a summer health science research program is a direct learning experience that allows students to build students' skills and behaviors that make becoming a scientist in the health fields a reality for them. The modeling behavior of parents, particularly providing valuable knowledge about the nature of work in these fields can also be reinforcing so long as student achievement is mutually reinforcing. Further, the general population may not have knowledge of research careers as viable options for students interested in the sciences and as such do not encourage the research route. This coincides with and extends the accentuating processes of choice of courses, peers, and experiences that extend into the college years. It is important to note that the increased likelihood of URM interest in these fields, as well as finding ways to sustain this interest, is the long-term objective of this work.

The results also point to the reality that students are making choices about professions based on the lucrativeness of the profession. Findings also pointed to the fact that students who work more hours during high school and who expect to work full-time during college are less likely to major in the biomedical or behavioral sciences. As a result, we may be losing valuable talent due to students' financial concerns. As we move forward with this research, it would be

helpful to identify if students are deciding against majors in science because having to engage in long hours of lab/study time is competing with work demands and their need for financial support. Alleviating students' financial concerns may be an important step in the retention of aspiring scientists.

By identifying the pre-college characteristics and experiences that determine student aspiration, achievement, and retention in the fields of biomedical and behavioral science, educators can gain new knowledge that will help to guide their recruitment and retention efforts of URM students in these fields. These general findings will be extended to examine informal and structured opportunities for engagement that can expand the pool of URM students pursing research careers in the biomedical and behavioral sciences. Minority-targeted academic and research training program officers may use this information to better understand the conditions under which these students learn best. Future research efforts that build upon this study will continue to direct the development of pedagogical practices and innovative programs that aim to engage URM students' interests in research careers in the biomedical and behavioral sciences during college.

Future Work

One of the limitations of this work is that we are only evaluating aspirations at one time point. Our future research pursuits will utilize data collected at the end of the first college year to better understand the effects of summer preparation programs and high school coursework among other high school experiences on subsequent experiences and behaviors in the actual major. With first year data, we will be in a better position to evaluate how expectation and aspirations held in high school do or do not get realized in the first year of college. That is, we

will continue to follow the same cohort of students to determine college experiences that are providing the instrumental, associative and direct learning experiences that actually serve to strengthen (and not thwart) aspirations. If we are committed to developing more minority research scientists, we need a better understanding of the manner in which URM students gain experience in scientific majors and knowledge about research careers in college.

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Table 1. Description of Items/Variables Used in the Regression Analysis

Variable Name	Variable Type	Scale Range
Dependent Variable		
Intention to pursue a career in scientific research	Categorical Variable	1 = no, 2=yes
Background Characteristics		
Gender	Dichotomous	1 = male, 2 = female
White/Caucasian (referent group)	Dummy-coded	1 = not marked, 2 = marked
Asian American/Asian	Dummy-coded	1 = not marked, 2 = marked
Black	Dummy-coded	1 = not marked, 2 = marked
Latino/a	Dummy-coded	1 = not marked, 2 = marked
American Indian/Alaskan Native	Dummy-coded	1 = not marked, 2 = marked
Native Hawaiian/Pacific Islander	Dummy-coded	1 = not marked, 2 = marked
U.S. Citizen	Dummy-coded	1 = no, 2 = yes
English as a native language	Dummy-coded	1 = no, 2 = yes
Mother's education	Single-item, categorical	1 = grammar or less, 2 = some HS, 3 = HS graduate, 4 = postsecondary, 5 = some college, 6 = college graduate, 7 = some graduate school, 8 = graduate degree
Parent(s) has a science career	Dummy-coded	1 = non-science career, 2 = science career
Parental Income	Single-item, categorical	1 = < $10,000 to 14 = $250,000+
Concern about ability to finance college education	Single-item, categorical	1 = none, 2 = some, 3 = major
High School GPA	Single-item, categorical	1 = D to 8 = A or A+
SAT composite	Single-item, continuous	Combined math and verbal SAT score or converted ACT score (400-1600 scale).
High School Activities		
Private independent (referent group)	Dummy-coded	1 = no, 2 = yes
Public high school	Dummy-coded	1 = no, 2 = yes
Public magnet high school	Dummy-coded	1 = no, 2 = yes
Private religious/parochial	Dummy-coded	1 = no, 2 = yes
Years studied in high school: Mathematics	Single-item, categorical	1 = none to 7 = 5+ years
Years studied in high school: Physical science	Single-item, categorical	1 = none to 7 = 5+ years
Years studied in high school: Biological science	Single-item, categorical	1 = none to 7 = 5+ years
Years studied in high school: Computer science	Single-item, categorical	1 = none to 7 = 5+ years
Hours per week: Studying/ homework	Single-item, categorical	1 = none to 8 = over 20
Acts in past year: Studied with	Single-item, categorical	1 = not at all, 2 = occasionally, 3 =

other students		frequently
Acts in past year: Tutored another student	Single-item, categorical	1 = not at all, 2 = occasionally, 3 = frequently
Hours per week: Talking with teachers outside of class	Single-item, categorical	1 = none to 8 = over 20
Civic activities in high school: Hospital work	Dummy-coded	1 = not marked, 2 = marked
Civic activities in high school: Other health education	Dummy-coded	1 = not marked, 2 = marked
Participation in: A summer research program	Dummy-coded	1 = no, 2 = yes
Participation in: A health science research program at a university	Dummy-coded	1 = no, 2 = yes
Hours per week: Working (for pay)	Single-item, categorical	1 = none to 8 = over 20

Self-efficacy

Self ratings:		
Self confidence (intellectual)	Single-item, categorical	1 = lowest 10% to 5 = highest 10%
Academic ability	Single-item, categorical	1 = lowest 10% to 5 = highest 10%
Mathematical ability	Single-item, categorical	1 = lowest 10% to 5 = highest 10%
Writing ability	Single-item, categorical	1 = lowest 10% to 5 = highest 10%
Computer skills	Single-item, categorical	1 = lowest 10% to 5 = highest 10%
Drive to achieve	Single-item, categorical	1 = lowest 10% to 5 = highest 10%
Time management	Single-item, categorical	1 = lowest 10% to 5 = highest 10%

Goals/expectations

Majoring in a pre-professional science degree (referent group)	Dummy-coded	1 = no, 2 = yes
Majoring in a biomedical science	Dummy-coded	1 = no, 2 = yes
Majoring in a behavioral science	Dummy-coded	1 = no, 2 = yes
Majoring in a chemical science	Dummy-coded	1 = no, 2 = yes
Best guess for future act: Change major field	Single-item, categorical	1 = no chance to 4 = very good chance
Best guess for future act: Change career choice	Single-item, categorical	1 = no chance to 4 = very good chance
Reason for attending this college: to prepare for graduate school	Single-item, categorical	1 = not important, 2 = somewhat important, 3 = very important
Degree aspiration:		
Bachelor's or lower (referent group)	Dummy-coded	1 = no, 2 = yes
Master's/non-science pre-Professional (Master's, Law, or Divinity)	Dummy-coded	1 = no, 2 = yes
MD/DO/DDS/DVM	Dummy-coded	1 = no, 2 = yes
PhD or EdD	Dummy-coded	1 = no, 2 = yes
Personal importance: being	Single-item, categorical	1 = not important, 2 = somewhat

very well off financially		important, 3 = very important, 4 = essential
Best guess for future act: Work full-time while attending college	Single-item, categorical	1 = no chance to 4 = very good chance
Intention to Make a Contribution to Scientific Research*	Scaled index, 4 items	1 = not important to 4 = essential
Sources of Financial Support		
Aid: Family Resources	Single-item, categorical	1=none to 6=10,000 plus
Aid: Aid which need not be repaid	Single-item, categorical	1=none to 6=10,000 plus
Aid: Aid which need be repaid	Single-item, categorical	1=none to 6=10,000 plus

*Scaled index, Alpha =.71. Comprised of Importance of: obtaining recognition from my colleagues for contributions to my special field (.78), making a theoretical contribution to science (.74), becoming an authority in my field (.72), and working to find a cure to a health problem (.70).

Table 2. Means and standard deviations of selected measures* in the regression models

		White/Caucasian			Asian American/Asian			Black/African American			Latina/o			American Indian/Alaskan Native		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
		(N=15,479)	(N=31,150)	(N=46,629)	(N=3,434)	(N=5,489)	(N=8,923)	(N=1,659)	(N=5,282)	(N=6,941)	(N=1,559)	(N=3,866)	(N=5,425)	(N=435)	(N=1,104)	(N=1,539)
Average high school grade	Mean	6.64	6.87	6.79	6.71	6.97	6.87	5.67	6.01	5.93	6.25	6.46	6.40	6.25	6.41	6.37
	SD	1.38	1.23	1.29	1.29	1.13	1.20	1.66	1.56	1.59	1.50	1.37	1.42	1.59	1.53	1.54
Aspiration: PhD or EdD	Mean	1.29	1.28	1.28	1.28	1.28	1.28	1.34	1.34	1.34	1.30	1.32	1.32	1.31	1.31	1.31
	SD	0.46	0.45	0.45	0.45	0.45	0.45	0.47	0.47	0.47	0.46	0.47	0.47	0.46	0.46	0.46
Self-rating: Drive to achieve	Mean	4.04	4.16	4.12	4.03	4.14	4.10	4.22	4.32	4.30	4.12	4.20	4.18	4.11	4.20	4.18
	SD	0.87	0.78	0.81	0.87	0.80	0.83	0.82	0.75	0.77	0.86	0.77	0.80	0.88	0.78	0.81
Self-rating: Academic ability	Mean	4.20	4.02	4.08	4.18	4.03	4.09	3.98	3.85	3.88	4.00	3.83	3.88	4.13	3.94	3.99
	SD	0.67	0.67	0.68	0.68	0.69	0.69	0.69	0.69	0.69	0.69	0.68	0.69	0.69	0.65	0.67
Hours per week: Studying or homework	Mean	4.07	4.64	4.45	4.79	5.32	5.12	4.14	4.37	4.31	4.26	4.64	4.53	3.96	4.43	4.30
	SD	1.54	1.50	1.54	1.71	1.61	1.67	1.54	1.53	1.53	1.58	1.50	1.54	1.51	1.50	1.52
Reason for attending college: To prepare for graduate/prof school	Mean	2.69	2.76	2.74	2.79	2.86	2.83	2.76	2.87	2.85	2.75	2.86	2.83	2.71	2.82	2.79
	SD	0.58	0.51	0.54	0.49	0.40	0.43	0.53	0.38	0.43	0.52	0.39	0.43	0.54	0.46	0.49
Best guess for future act: Change major field	Mean	2.46	2.47	2.47	2.44	2.47	2.46	2.27	2.19	2.21	2.37	2.37	2.37	2.28	2.29	2.29
	SD	0.84	0.86	0.85	0.86	0.87	0.87	0.91	0.89	0.90	0.86	0.85	0.85	0.86	0.91	0.90
Best guess for future act: Work full-time while attending college	Mean	1.85	1.93	1.91	1.87	1.88	1.87	1.99	2.05	2.04	2.01	2.12	2.09	2.01	2.11	2.09
	SD	0.83	0.88	0.86	0.83	0.85	0.84	0.92	0.96	0.95	0.87	0.93	0.92	0.88	0.94	0.92

*See Table 1 for for item scaling

Table 3: Summary of Regression Results for All Biomedical/Behavioral Science Major Students who Indicated a Scientific Research Career Aspiration at the Start of Freshman Year (N=50,552)

	Block 1 Odds ratio	Block 2 Odds ratio	Block 3 Odds ratio	Block 4 Odds ratio	Block 5 Odds ratio
1 Background Characteristics (df= 14; Nagelkerke R^2=.071; p<.001)					
Gender: Female	0.807 ***	0.818 ***	0.885 **	1.056	1.057
Asian American/Asian	0.496 ***	0.521 ***	0.522 ***	0.632 ***	0.632 ***
African American/Black	0.678 ***	0.650 ***	0.635 ***	0.666 ***	0.669 ***
Latino/a	0.869	0.881	0.883	0.980	0.983
American Indian/Alaskan Native	1.188	1.175	1.163	1.141	1.148
Native Hawaiin/Pacific Islander	0.672 *	0.689	0.690	0.668	0.668
U.S. Citizen	0.687 ***	0.790 *	0.808 *	0.892	0.888
Native English speaker	1.239 **	1.221 *	1.235 *	1.364 **	1.360 **
Mother's education	0.989	0.986	0.987	0.989	0.988
Parent(s) has science career	1.442 ***	1.417 ***	1.411 ***	1.461 ***	1.461 ***
Parental income	0.939 ***	0.945 ***	0.946 ***	0.959 ***	0.957 ***
Concern about financing college	1.057	1.070 *	1.077 *	1.075 *	1.064
High School GPA	1.021	0.996	0.986	0.988	0.988
SAT composite	1.004 ***	1.003 ***	1.003 ***	1.003 ***	1.003 ***
2 High School Activities (df= 30; Nagelkerke R^2=.097; p<.001)					
Public high school (vs. private independent)		1.328 ***	1.301 **	1.107	1.108
Public magnet high school (vs. private independent)		1.037	1.020	0.911	0.912
Private religious/parochial (vs. private independent)		1.047	1.037	0.996	0.994
Years studied: Mathematics		0.994	0.973	0.999	0.998
Years studied: Physical science		1.096 ***	1.094 ***	1.025	1.025
Years studied: Biological science		1.146 ***	1.148 ***	1.087 ***	1.087 ***
Years studied: Computer science		1.001	0.995	1.010	1.010
Hours per week: Studying or homework		1.076 ***	1.091 ***	1.059 ***	1.059 ***
Acts in past year: Tutored another student		1.020	1.009	0.940	0.941
Acts in past year: Studied with other students		0.899 **	0.904 **	0.910 **	0.909 **
Hours per week: Talking with teacher outside class		1.018	1.018	0.985	0.985
Civic activities in high school: Hospital work		0.441 ***	0.445 ***	0.517 ***	0.516 ***
Civic activities in high school: Other health education		0.698 ***	0.696 ***	0.699 **	0.699 **
Participated in: A summer research program		1.637 ***	1.639 ***	1.299 ***	1.300 ***
Participated in: A health science research program at university		1.153	1.146	1.245 *	1.247 *
Hours per week: Working for pay		0.973 ***	0.974 ***	0.989	0.989
3 Self-Efficacy (df= 37; Nagelkerke R^2=.100; p<.001)					
Self-rating: Academic ability			1.144 **	1.108 *	1.110 *
Self-rating: Computer skills			1.033	1.049	1.049
Self-rating: Drive to achieve			0.933 **	0.909 **	0.909 **
Self-rating: Mathematical ability			1.057 *	0.932 *	0.932 *
Self-rating: Self-confidence (intellectual)			1.070 *	1.020	1.020
Self-rating: Time Management			0.945 *	0.958	0.958
Self-rating: Writing Ability			0.930 **	0.970	0.970
4 Goals/Expectations (df= 49; Nagelkerke R^2=.344; p<.001)					
Majoring in biological science (vs. pre-professional science)				3.674 ***	3.673 ***
Majoring in behavioral science (vs. pre-professional science)				0.188 ***	0.188 ***
Majoring in chemical science (vs. pre-professional science)				5.352 ***	5.351 ***
Best guess for future act: Change major field				0.718 ***	0.718 ***
Best guess for future act: Change career choice				1.336 ***	1.335 ***
Best guess for future act: Work full-time while attending college				0.945 *	0.946 *
Reason for attending this college: To prepare for graduate/prof school				0.769 ***	0.769 ***
Personal importance: Being very well off financially				0.661 ***	0.660 ***
Scientific orientation factor				2.028 ***	2.028 ***
Master's/non-science pre-professional (vs. BA or less)				1.841 ***	1.840 ***
MD/DO/DDS/DVM (vs. BA or less)				0.213 ***	0.213 ***
PhD/EdD (vs. BA or less)				1.723 ***	1.723 ***
5 Sources of Financial Support (df= 52; Nagelkerke R^2=.344; p<.001)					
Source of aid: Family resources					1.012
Source of aid: Aid which need not be repaid					1.002
Source of aid: Aid which must be repaid					1.012

***p<.001; **p<.01; *p<.05

Table 4: Summary of Regression Results for Black Biomedical/Behavioral Science Major Students who Indicated a Scientific Research Career Aspiration at the Start of Freshman Year (N=4,878)

	Block 1 Odds ratio	Block 2 Odds ratio	Block 3 Odds ratio	Block 4 Odds ratio	Block 5 Odds ratio
1 Background Characteristics (df= 9; Nagelkerke R^2=.057; p<.001)					
Gender: Female	0.640 *	0.686 *	0.681 *	0.878	0.878
U.S. Citizen	0.556	0.597	0.593	0.695	0.703
Native English speaker	2.445	2.234	2.202	3.265 *	3.239 *
Mother's education	0.986	0.972	0.969	0.944	0.947
Parent(s) has science career	1.671	1.647	1.659	1.463	1.450
Parental income	0.987	0.998	0.998	1.014	1.028
Concern about financing college	1.037	1.059	1.053	1.051	1.083
High School GPA	1.117	1.094	1.098	1.073	1.054
SAT composite	1.003 ***	1.003 ***	1.003 ***	1.003 ***	1.003 ***
2 High School Activities (df= 25; Nagelkerke R^2=.096; p<.001)					
Public high school (vs. private independent)		1.192	1.215	1.020	1.056
Public magnet high school (vs. private independent)		0.725	0.744	0.606	0.609
Private religious/parochial (vs. private independent)		0.837	0.840	0.805	0.838
Years studied: Mathematics		1.162	1.180	1.246	1.234
Years studied: Physical science		0.986	0.987	0.968	0.972
Years studied: Biological science		1.113	1.110	1.116	1.111
Years studied: Computer science		0.997	0.996	0.968	0.968
Hours per week: Studying or homework		1.031	1.031	0.987	0.985
Acts in past year: Tutored another student		0.918	0.937	0.820	0.828
Acts in past year: Studied with other students		0.836	0.846	0.837	0.838
Hours per week: Talking with teacher outside class		1.054	1.056	1.043	1.037
Civic activities in high school: Hospital work		0.507 **	0.519 **	0.505 **	0.504 **
Civic activities in high school: Other health education		0.474	0.484	0.464	0.460
Participated in: A summer research program		2.564 ***	2.564 ***	2.541 ***	2.504 ***
Participated in: A health science research program at university		1.107	1.115	0.959	0.958
Hours per week: Working for pay		0.985	0.989	1.015	1.016
3 Self-Efficacy (df= 32; Nagelkerke R^2=.100; p<.001)					
Self-rating: Academic ability			1.179	1.155	1.166
Self-rating: Computer skills			0.970	0.953	0.954
Self-rating: Drive to achieve			0.827	0.826	0.818
Self-rating: Mathematical ability			0.951	0.863	0.869
Self-rating: Self-confidence (intellectual)			0.903	0.891	0.876
Self-rating: Time Management			1.070	1.096	1.108
Self-rating: Writing Ability			1.071	1.113	1.103
4 Goals/Expectations (df= 44; Nagelkerke R^2=.281; p<.001)					
Majoring in biological science (vs. pre-professional science)				4.264 ***	4.231 ***
Majoring in behavioral science (vs. pre-professional science)				0.310 **	0.305 **
Majoring in chemical science (vs. pre-professional science)				7.753 ***	7.537 ***
Best guess for future act: Change major field				0.895	0.880
Best guess for future act: Change career choice				1.277	1.290
Best guess for future act: Work full-time while attending college				1.004	1.017
Reason for attending this college: To prepare for graduate/prof school				0.812	0.801
Personal importance: Being very well off financially				0.720 **	0.717 **
Scientific orientation factor				1.837 ***	1.851 ***
Master's/non-science pre-professional (vs. BA or less)				2.575 **	2.577 **
MD/DO/DDS/DVM (vs. BA or less)				0.388 **	0.374 **
PhD/EdD (vs. BA or less)				1.817 *	1.790 *
5 Sources of Financial Support (df= 47; Nagelkerke R^2=.283; p<.001)					
Source of aid: Family resources					0.999
Source of aid: Aid which need not be repaid					1.112
Source of aid: Aid which must be repaid					0.990

***p<.001; **p<.01; *p<.05

Table 5: Summary of Regression Results for Latina/o Biomedical/Behavioral Science Major Students who Indicated a Scientific Research Career Aspiration at the Start of Freshman Year (N=3,896)

	Block 1 Odds ratio	Block 2 Odds ratio	Block 3 Odds ratio	Block 4 Odds ratio	Block 5 Odds ratio
1 Background Characteristics (df= 9; Nagelkerke R^2=.068; p<.001)					
Gender: Female	0.922	0.964	0.929	1.010	1.000
U.S. Citizen	0.776	0.930	0.933	1.184	1.171
Native English speaker	0.877	0.838	0.825	0.788	0.780
Mother's education	1.028	1.022	1.020	1.020	1.017
Parent(s) has science career	2.868 ***	2.880 ***	2.899 ***	2.352 **	2.366 **
Parental income	0.954	0.954	0.954	0.984	0.966
Concern about financing college	1.190	1.183	1.165	1.318	1.266
High School GPA	1.065	1.054	1.050	1.070	1.077
SAT composite	1.004 ***	1.003 ***	1.004 ***	1.003 ***	1.003 ***
2 High School Activities (df= 25; Nagelkerke R^2=.116; p<.001)					
Public high school (vs. private independent)		1.062	1.083	1.031	1.037
Public magnet high school (vs. private independent)		0.662	0.656	0.657	0.689
Private religious/parochial (vs. private independent)		0.933	0.935	0.968	0.953
Years studied: Mathematics		0.892	0.924	0.862	0.863
Years studied: Physical science		1.044	1.042	1.004	1.007
Years studied: Biological science		1.397 ***	1.387 ***	1.307 **	1.301 **
Years studied: Computer science		1.035	1.038	1.052	1.056
Hours per week: Studying or homework		1.020	1.011	1.026	1.024
Acts in past year: Tutored another student		1.102	1.106	0.982	0.986
Acts in past year: Studied with other students		1.075	1.060	0.902	0.902
Hours per week: Talking with teacher outside class		1.018	1.013	1.018	1.018
Civic activities in high school: Hospital work		0.366 ***	0.360 ***	0.453 **	0.449 **
Civic activities in high school: Other health education		0.585	0.568	0.522	0.527
Participated in: A summer research program		1.279	1.275	0.995	0.998
Participated in: A health science research program at university		1.827 *	1.818 *	2.038 *	2.007 *
Hours per week: Working for pay		0.965	0.964	0.990	0.989
3 Self-Efficacy (df= 32; Nagelkerke R^2=.119; p<.001)					
Self-rating: Academic ability			1.036	0.994	0.994
Self-rating: Computer skills			1.004	0.990	0.988
Self-rating: Drive to achieve			1.100	0.992	0.998
Self-rating: Mathematical ability			0.837	0.741 **	0.744 **
Self-rating: Self-confidence (intellectual)			1.026	1.015	1.007
Self-rating: Time Management			1.042	1.012	1.009
Self-rating: Writing Ability			0.960	0.976	0.978
4 Goals/Expectations (df= 44; Nagelkerke R^2=.334; p<.001)					
Majoring in biological science (vs. pre-professional science)				2.961 ***	2.949 ***
Majoring in behavioral science (vs. pre-professional science)				0.296 **	0.296 **
Majoring in chemical science (vs. pre-professional science)				6.225 ***	6.178 ***
Best guess for future act: Change major field				0.766	0.762
Best guess for future act: Change career choice				1.366 *	1.364 *
Best guess for future act: Work full-time while attending college				0.841	0.841
Reason for attending this college: To prepare for graduate/prof school				0.855	0.862
Personal importance: Being very well off financially				0.551 ***	0.550 ***
Scientific orientation factor				2.329 ***	2.333 ***
Master's/non-science pre-professional (vs. BA or less)				1.934 *	1.902 *
MD/DO/DDS/DVM (vs. BA or less)				0.261 ***	0.262 ***
PhD/EdD (vs. BA or less)				1.549	1.545
5 Sources of Financial Support (df= 47; Nagelkerke R^2=.335; p<.001)					
Source of aid: Family resources					1.047
Source of aid: Aid which need not be repaid					0.979
Source of aid: Aid which must be repaid					1.054

***p<.001; **p<.01; *p<.05

Table 6: Summary of Regression Results for American Indian/Alaskan Native Biomedical/Behavioral Science Major Students who Indicated a Scientific Research Career Aspiration at the Start of Freshman Year (N=1,144)

	Block 1 Odds ratio	Block 2 Odds ratio	Block 3 Odds ratio	Block 4 Odds ratio	Block 5 Odds ratio
1 Background Characteristics (df= 9; Nagelkerke R^2=.138; p<.001)					
Gender: Female	0.952	0.990	1.040	2.000	1.954
U.S. Citizen	0.036 **	0.015 **	0.013 **	0.010 **	0.009 **
Native English speaker	#	#	#	#	#
Mother's education	0.976	0.983	0.986	0.973	0.967
Parent(s) has science career	0.612	0.575	0.535	0.505	0.502
Parental income	0.956	0.951	0.961	0.964	0.975
Concern about financing college	1.051	1.039	1.148	0.947	0.876
High School GPA	0.909	0.846	0.768 *	0.683 **	0.683 **
SAT composite	1.006 ***	1.005 ***	1.005 ***	1.005 ***	1.005 ***
2 High School Activities (df= 25; Nagelkerke R^2=.189; p<.001)					
Public high school (vs. private independent)		2.324	2.687	1.864	1.898
Public magnet high school (vs. private independent)		1.315	1.343	1.094	1.187
Private religious/parochial (vs. private independent)		2.592	3.117	2.096	2.188
Years studied: Mathematics		1.327	1.274	1.398	1.421
Years studied: Physical science		1.036	1.004	0.853	0.851
Years studied: Biological science		1.310 *	1.296 *	1.106	1.113
Years studied: Computer science		1.073	1.109	1.183	1.171
Hours per week: Studying or homework		1.143	1.124	1.177	1.183
Acts in past year: Tutored another student		1.360	1.249	1.111	1.134
Acts in past year: Studied with other students		0.762	0.720	0.805	0.795
Hours per week: Talking with teacher outside class		0.816	0.830	0.891	0.894
Civic activities in high school: Hospital work		0.435	0.440	0.465	0.454
Civic activities in high school: Other health education		0.653	0.618	0.795	0.785
Participated in: A summer research program		0.876	0.832	0.538	0.588
Participated in: A health science research program at university		2.418	2.506	2.170	2.128
Hours per week: Working for pay		0.955	0.944	0.928	0.922
3 Self-Efficacy (df= 32; Nagelkerke R^2=.214; p<.001)					
Self-rating: Academic ability			1.598	2.481 **	2.563 **
Self-rating: Computer skills			0.899	0.976	0.962
Self-rating: Drive to achieve			0.912	0.790	0.773
Self-rating: Mathematical ability			1.053	0.947	0.919
Self-rating: Self-confidence (intellectual)			0.994	0.959	0.971
Self-rating: Time Management			1.431 *	1.643 **	1.644 **
Self-rating: Writing Ability			0.781	0.700	0.711
4 Goals/Expectations (df= 44; Nagelkerke R^2=.463; p<.001)					
Majoring in biological science (vs. pre-professional science)				4.441 ***	4.419 ***
Majoring in behavioral science (vs. pre-professional science)				0.266 *	0.257 *
Majoring in chemical science (vs. pre-professional science)				13.064 ***	13.004 ***
Best guess for future act: Change major field				0.625 *	0.639 *
Best guess for future act: Change career choice				1.510	1.498
Best guess for future act: Work full-time while attending college				1.422 *	1.430 *
Reason for attending this college: To prepare for graduate/prof school				0.781	0.765
Personal importance: Being very well off financially				0.685 *	0.682 *
Scientific orientation factor				2.002 ***	2.004 ***
Master's/non-science pre-professional (vs. BA or less)				0.738	0.736
MD/DO/DDS/DVM (vs. BA or less)				0.212 **	0.208 **
PhD/EdD (vs. BA or less)				1.555	1.501
5 Sources of Financial Support (df= 47; Nagelkerke R^2=.465; p<.001)					
Source of aid: Family resources					0.963
Source of aid: Aid which need not be repaid					1.003
Source of aid: Aid which must be repaid					1.097

***p<.001; **p<.01; *p<.05

Due to small cell sizes with the American Indian sample, the coefficients for native english speaker is not significant and uninterpretable, as such it is not reported.