**Literature Review**

**Q. What percentage of U.S. 15-year-olds is interested in pursuing a career in science by demographics (gender, race/ethnicity, ESCS quarters, and immigrant status) and a school level variable (school location) How does that change when looking at specific fields in science?**

PISA 2015 suggests that 38% of U.S. 15-year-old students is interested are interested in pursuing a science-related career and this value is much higher than the OECD average of 24.5%. However, there are clear disparities among different demographic groups. Boys and girls, and students from advantaged and disadvantaged backgrounds often differ in the ways they engage with science and envisage themselves working in science-related occupations (PISA 2015 Results in Focus, 5). For example, in the United States, 33% of boys responded that they were interested in science-related career while 43% of girls reported they were. This gender-related differences in science engagement and career expectations appear more related to disparities in what boys and girls think they are proficient at and is good for them, than to differences in what they actually can do. Stereotypes about scientists and work in science-related occupations (computer science is a “masculine” field and biology a “feminine” field) can discourage some students from engaging further with science (6).

Moreover, PISA 2015 suggests that in more than 40 countries and economies, socio-economic status and an immigrant background are associated with significant differences in pursuing a career in science. After accounting for students’ performance in the science assessment, disadvantaged students remain significantly less likely than their advantaged peers to see themselves pursuing a career in science (PISA 2015 Results in Focus, 6 ).

PISA Results on Focus, OECD, 2018. [Available at <https://www.oecd.org/pisa/pisa-2015-results-in-focus.pdf>]

**Q. What have current scholars said about how different demographic groups have different career expectations?**

In their study “Cultural Context of Career Choice: Meta-Analysis of Race/Ethnicity Difference “, Fouad and Byars-Winston argued that work is cultural construction and therefore, the meaning of work, the value placed on it, and the expectations about who should perform what types of work reflect the society in which work is organized (223). They examined race/ethnicity related to career choice variables. Race or ethnicity does not seem to contribute much to differences in career aspirations or decision-making attitudes (see also Byars & McCubbin, 2001; Fouad & Brown, 2000). There are, however, differences among racial/ethnic groups in perceptions of career opportunities and barriers. These significant differences are consistent with the sociopolitical context within which many visible racial/ethnic minorities work and live (230).

Fouad, Nadya A., and Byars-Winston, Angela M., “Cultural Context of Career Choice: Meta-Analysis of Race/Ethnicity Differences .”, vol. 55, Mar. 2005.

<https://www.ncda.org/aws/NCDA/asset_manager/get_file/10334>

In “Gender and the Career Choice Process: The Role of Biased Self‐Assessments”, Correll examined how cultural beliefs about gender differentially inﬂuence the early career-relevant decisions of men and women on the hypothesis that cultural beliefs about gender are argued to bias individuals’ perceptions of their competence at various career-relevant tasks, controlling for actual ability. He also argued that individuals then act on gender-differentiated perceptions when making career decisions, cultural beliefs about gender channel men and women in substantially different career directions. The hypotheses were evaluated by considering how gendered beliefs about mathematics impact individuals’ assessments of their own mathematical competence, which, in turn, leads to gender differences in decisions to persist on a path toward a career in science, math, or engineering (2). t. His analysis suggests that there is a large gap between the number of males and females who elected a quantitative college major. Compared with only 4% of females, 12% of males have majors in engineering, mathematics, or the physical sciences.

Correll, Shelly J., “Gender and the Career Choice Process: The Role of Biased Self‐Assessments” *Chicago Journal*, 2014.

<https://sociology.stanford.edu/sites/default/files/publications/gender_and_the_career_choice_process-_the_role_of_biased_self-assessments.pdf>

**Q. How have science careers increased in importance?**

The U.S. Department of Education’s study “Science, Technology, Engineering and Math: Education for Global Leadership argues that The United States has become a global leader mainly due to the genius and hard work of its scientists, engineers and innovators. However, STEM positions have recently been threatened as comparatively few American students pursue expertise in those fields and by an inadequate pipeline of teachers skilled in those subjects. The number of high school students who are interested in pursuing science-related careers has failed to catch up the increasing needs of STEM professionals. For example, only 16 percent of American high school seniors are proficient in mathematics and interested in a STEM career. Even among those who do go on to pursue a college major in the STEM fields, only about half choose to work in a related career. The United States is falling behind internationally, ranking 25th in mathematics and 17th in science among industrialized nations. In our competitive global economy, this situation is unacceptable.

“Science, Technology, Engineering, and Math: Education for Global Leadership.” Department of Education. [Available at <https://www.ed.gov/sites/default/files/stem-overview.pdf> ]

The demand for skilled workers in science, technology, engineering, and math (STEM) is closely linked to global competitiveness.  Therefore, inspiring students to solve problems in the frontiers of alternative energy, climate change, nanotechnology and space exploration while promoting STEM careers is a key aspect in career development. For example, Friedman (2008) suggests that energy technologies (ET) can solve worldwide environmental issues and create the economic stimulus needed to rebuild America. Yet, the lack of gender and ethnic diversity of students entering STEM educational programs and career fields present additional challenges. Using creativity and innovation to address these challenges is critical to providing career development.

Traurig, Angela., and Feller, Rich., “Preparing Students for STEM Careers”, December, 2008.

<https://www.ncda.org/aws/NCDA/page_template/show_detail/6234?model_name=news_article>

**Q. Are students’ career expectations in science predictive of actual career choices and outcomes?**

Young adolescents who expected to have a career in science were more likely to graduate from college with a science degree, emphasizing the importance of early encouragement (Tai, Liu, Maltese, and Fan). Their study “Planning Early for Careers in Science” used nationally representative longitudinal data to investigate whether science related career expectations of early adolescent students predicted the concentrations of their baccalaureate degrees earned years later. Specifically, we asked whether eighth-grade students (approximately age 13) who reported that they expected to enter a science-related career by age 30 obtained baccalaureate degrees in science-related fields at higher rates than students who did not have this expectation

Tai, Robert H., Liu, Christine Qi., Maltese, Adam V., Maltese, and Fan, Xitao., “Planning Early for Careers in Science” *Educationforum*.

<http://128.32.86.250/rea/bayareastudy/pdf/science_magazine_article.pdf>

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Analysis of Race/Ethnicity Differences .”, vol. 55, Mar. 2005.

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Education. [Available at <https://www.ed.gov/sites/default/files/stem-overview.pdf> ]

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