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TESTING AN INTEGRATED SOCIAL-COGNITIVE CAREER THEORY MODEL AMONG STEM STUDENTS: MODEL FIT ACROSS GENDER AND RACE/ETHNICITY

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To my husband, Corey, for all of your support, encouragement, and love during this process.

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Abstract

The current study tested the full model of the Social Cognitive Career Theory (SCCT; Lent, Brown, & Hackett, 1994, 2000) using a longitudinal sample of 1,314 Native American, Asian, and White undergraduate students majoring in science, technology, engineering, and mathematics (STEM). A series of structural equation model analyses determined that the final model offered acceptable fit to the data both in the larger sample and in sub-samples of women, men, and a combined Asian and White sample. The final measurement model was invariant across Native Americans and a combined Asian and White sample, as well. The full SCCT model did not fit well in the Native American sample, suggesting the need to identify an alternative, better-fitting structural model. Exploratory analyses identified a satisfactory model with the addition of tribal identity and removal of learning experiences. Examination of path coefficients in the full sample and Native American structural model provide support for SCCT's main propositions, with some exceptions. Gender and racial/ethnic differences in key study variables were also identified. These findings extend research on SCCT to include a longitudinal test of the full SCCT model among an understudied student population and provide several avenues for revision/expansion of SCCT to be more compatible with students from culturally diverse background. Study limitations and directions for future research are discussed, and practical implications and suggestions for interventions are provided for increasing students' self-efficacy, outcome expectations, interest, and intentions to pursue a STEM major based on key findings.

Testing an Integrated Social-Cognitive Career Theory Model among STEM Students: Model Fit across Gender and Race/Ethnicity

Research on students' interest in, pursuit of, and attainment of a degree in science, technology, engineering, and mathematics (STEM) has been a consistent focus of vocational psychologists and the nation's educational research agenda (National Science Board, 2010). The U.S. Bureau of Labor Statistics (2014) has projected that there will be more than 9 million STEM jobs by 2022, and those with a degree in science or engineering fields have lower unemployment rates than the overall U.S. labor force, regardless of whether they continue in a Science and Engineering (S&E) occupation (National Science Foundation [NSF], 2019). STEM degree holders also receive higher median salaries than non-STEM degree holders, regardless of whether the occupation is in STEM or non-STEM (U.S. Department of Commerce, Economics & Statistics Administration, 2011).

Despite the benefits of obtaining a STEM degree, both for individual stability and national competitiveness, there has been consistent underrepresentation of women and racial/ethnic minority groups in obtaining STEM degrees and pursuing STEM occupations (Chen, 2013; NSF, 2019). While women have made strides in recent years, with half of all S&E bachelor's degrees awarded to women in 2016 (though proportions vary by specific field), they are still underrepresented in S&E graduate degrees and occupations (NSF). Individuals who identify as Black, Hispanic, and Native American are also consistently underrepresented in number of S&E degrees obtained, as well as in STEM occupations (NSF). In 2017, Blacks or African Americans represented 12% of the U.S. population ages 18-64, Hispanics or Latinos, 14%, and Native Americans 0.7% (U.S. Census Bureau, 2018). However, in 2016, underrepresented minority students received only 22% of all S&E bachelor's degrees and 9% of all S&E doctorate degrees. When looking at specific groups, the findings are even more stark. Hispanics or Latinos earned 13.5% of science and 10% of engineering bachelor's degrees; Black or African American students, 9% and 4%; and American Indians or Alaska Natives, 0.5% and 0.3%.

Among these underrepresented groups, Native Americans are the most understudied population. For example, in the NSF (2019) report, specific information on Native Americans in S&E fields and occupations is either omitted or combined with Native Hawaiians or Other Pacific Islanders due to insufficient sample size. While research on Native Americans in higher education is scarce, particularly in STEM, some information does exist. Native American students are the least likely to graduate high school and attend college among all racial/ethnic minorities, with rates of enrollment in post-secondary institutions staying roughly the same from 2000 to 2016 (de Brey et al., 2019). Those that do attend college are at substantial risk to drop out (de Brey et al.) and make up the smallest percentage of degree holders in STEM fields (NSF).

Not all racial/ethnic groups are underrepresented in STEM, however. Individuals who identify as Asian were awarded 9% of S&E bachelor's degrees in 2016 and made up 20% of those employed in STEM occupations in 2017 while only accounting for 5% of the population, indicating Asians may be overrepresented in STEM (NSF, 2019). Asians have maintained a consistent percentage of S&E degrees earned over the past 10 years and have the highest representation in STEM occupations of any racial/ethnic minority.

Given these disparities in representation in STEM fields, researchers have attempted to identify what factors influence whether individuals choose to major in STEM, whether they eventually obtain a STEM degree, and whether they then pursue a STEM career. The main framework for this research is the Social Cognitive Career Theory (SCCT; Lent, Brown, & Hackett, 1994, 2000), which is predicated off of Bandura's (1986) social cognitive theory that one's behaviors are the result of interactions between personal factors and the environment. Specifically, SCCT posits that various person inputs (e.g., goal orientation) and background factors (e.g., number of math classes taken in high school) influence one's learning experiences, which in turn influence one's self-efficacy and outcome expectations in STEM. Self-efficacy and outcome expectations then predict one's interest in a STEM field. Interests in STEM then lead to specific goals (e.g., to obtain a STEM bachelor's degree), which in turn lead to specific actions (e.g., graduating with a STEM bachelor's degree). Various supports (e.g., faculty encouragement of a STEM career) and barriers (e.g., financial constraints) are predicted to influence a person's interest, goals, and actions, as well as an individual's self-efficacy and outcome expectations. Figure 1 provides an overall illustration of the SCCT model and hypothesized relationships.

Overall, research findings indicate robust support for SCCT model predictions among STEM college student samples (engineering, Lent, Sheu, et al., 2008; Lent et al., 2013; computer sciences, Lent et al., 2011; mixed STEM majors, Lent et al., 2005). Additionally, tests of the SCCT model across gender and various racial/ethnic groups have also supported the utility of the SCCT model (Florres, Navarro, Lee, Addae, et al., 2014; Inda, Rodríguez, & Peña, 2013; Lent et al., 2018). However, many tests of the SCCT model involve cross-sectional samples (Lent et al., 2001; Lent, Brown, Schmidt, et al., 2003) or longitudinal samples of specific segments of the model, such as the interests-choice components (Lent, Sheu, et al., 2008). Comparisons across race/ethnicity often incorporate all underrepresented groups together (Lent, Sheu, et al., 2008; Lent et al., 2013) or only compare White students to one other racial/ethnic group (Latinx students, Florres, Navarro, Lee, Addae, et al.), failing to capture potential unique differences across racial/ethnic groups. Given these limitations, the present study takes a broad approach to conceptualizing SCCT and STEM, seeking to longitudinally test the entire model in a sample of STEM undergraduate students (see Figure 2 for the present study's hypothesized model). Model fit is also assessed across gender and race/ethnicity for three distinct student groups—White, Asian, and Native American students in STEM. Taken together, this study represents the first known longitudinal test of the entire SCCT model, as well as the first known test of the SCCT model among Native American undergraduate STEM students.

The Social-Cognitive Career Theory Framework and STEM

Given the magnitude of research conducted in relation to SCCT, reviewing the entirety of the literature as it relates to STEM is beyond the scope of the current study. For this reason, the review is organized into the various components of the SCCT model (see Figure 1) starting with the most distal antecedents and working through to the current outcomes of interest. Table 1 provides a summary of the variables selected for the present study. These variables form the basis for discussion of current findings, focusing primarily on undergraduate samples of STEM students. However, given the dearth of research focused on Native American students, literature from non-STEM samples, as well as high school and middle school samples, is incorporated where necessary. It should also be noted that, while many of the variables discussed in this review are measured with college students (i.e., roughly the 18–24-year-old demographic), they are theorized and demonstrated to develop over the course of students' lifespan beginning in early childhood.

Person Inputs

One of the distinctive characteristics of SCCT is the explicit inclusion of person inputs within the theory. Lent and colleagues' (1994, 2000) original conception of person inputs in

SCCT heavily focuses on gender and race/ethnicity, as these factors are argued to have a profound psychological and social impact on individuals. However, broadly defined, person inputs refer to non-cognitive factors (e.g., predispositions such as personality traits) that may influence self-efficacy and outcome expectations through their impact on learning experiences (Lent et al., 1994). Person inputs are conceptually distinct from background and contextual factors because they deal with person-centered, internal factors, rather than environmental influences. Among the plethora of person-inputs that can be considered in SCCT, two appear particularly critical for continuing in a STEM degree—goal orientation and implicit theories of math and science ability.

Goal orientation. Goal orientation refers to an individual's motivations, actions, and evaluations in reference to obtaining specific goals in achievement settings (Dweck, 1986). Within the literature, two main types of goal orientation have been identified—learning goal orientation (LGO; sometimes called intrinsic or mastery goal orientation) and performance goal orientation (PGO; sometimes called extrinsic goal orientation) (Dweck; Dweck & Leggett, 1988; Elliott & Dweck, 1988). Individuals with a LGO are motivated to accomplish goals to demonstrate learning and mastery of the goal, whereas individuals with a performance goal orientation are motivated by a desire to demonstrate their ability or performance to others (Ames, 1992; Dweck, 1986). PGO has been further broken down into approach (PGO-P; sometimes called prove) and avoid (PGO-A) orientations, with meta-analytic findings supporting this distinction (Payne, Youngcourt, & Beaubien, 2007).

These orientations are related to differential achievement, both in classroom and work settings (Chyung, Moll, & Berg, 2010; Janssen & Van Yperen, 2004). Specifically, individuals with high-LGO are more likely to pursue challenging goals, master new skills, and persist in overcoming obstacles (Meece, Anderman, & Anderman, 2006; Payne et al., 2007). Those with high-PGOs, however, are more likely to pursue goals they can perform well, exhibit helplessness when confronted with failure, and impair their own performance (Elliott & Dweck, 1988).

In relation to the SCCT model, goal orientation has been most closely linked with overall learning, performance, and self-efficacy. Higher-LGO among first-year engineering students significantly predicted their end-of-semester performance in an e-learning environment (Chyung et al., 2010). Graduate students in physics and chemistry with high LGO for going to graduate school were found to report greater productivity in graduate school and their subsequent careers as measured by total publications and grant funding (Hazari, Potvin, Tai, & Almarode, 2010). Among undergraduate samples, LGO has been positively linked with self-efficacy, both generally (Phillips & Gully, 1997; Porter, 2005) and in terms of domain-specific self-efficacy (e.g., career decision self-efficacy; Garcia, Restubog, Toledano, Tolentino, & Rafferty, 2012). Meta-analytic findings also support learning orientation as predictive of higher specific self-efficacy, though the sample consists of a mix of educational and employee studies (Payne et al., 2007).

In contrast, PGO has been found to have mixed results. Among studies that conceptualize goal orientation as LGO versus PGO, individuals with higher PGO have reported significantly negative relationships with self-efficacy (Phillips & Gully, 1997), though this has been found to depend on levels of task performance (Porter, 2005). However, Payne and colleagues' (2007) meta-analysis of goal orientation studies, which conceptualized PGO as PGO-P and PGO-A, found no relationship between PGO-P and specific self-efficacy. This finding was consistent across the majority of outcome variables examined. PGO-A, however, was found to lead to significant decreases in specific self-efficacy, as well as other proximal and distal outcome variables. Thus, depending on how PGO is conceptualized, its relationship to self-efficacy may be null or negative.

Within the SCCT framework, predispositions such as goal orientation are predicted to impact self-efficacy and outcome expectations via their relation to learning experiences. Learning experiences in the current study is framed in terms of Holland's (1997) vocational interest theory, which classifies occupational domains into six areas of interest—Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (RIASEC). Several studies examining SCCT variables have classified learning experiences this way (e.g., Schaub & Tokar, 2005; Sheu et al., 2010; Williams & Subich, 2006). However, the author was unable to find any studies examining the relationship between GO and learning experiences in the expected direction. One study conducted by Johnson and Beehr (2014) examined the mediating role of GO between realistic, investigative, and enterprising interests and continuing education (CE) pursuits of healthcare professionals. They found significant positive correlations between LGO (termed mastery GO in their study) and all six RIASEC domains, as well as significant positive mediation between the investigative and enterprising domains and CE (Johnson & Beehr).

While not testing the relationship between GO and learning experiences in the expected direction, given the generally positive relationships between LGO and RIASEC domains, there is evidence to suggest LGO would be positively related to all types of learning experiences. Additionally, LGO's positive relationship with self-efficacy offers further support for a positive relationship between LGO and learning experiences as conceptualized in SCCT. Indeed, studies have found that LGO is related to use of more expansive learning strategies and deeper processing of academic tasks (Meece et al., 2006; Payne et al., 2007; Sins, van Joolingen, Savelsbergh, & van Hout-Wolters, 2008). Therefore, the following relationship is hypothesized:

Hypothesis 1: LGO will be positively related to learning experiences.

However, the relationship between PGO-P and PGO-A with learning experiences is likely to be more nuanced. Individuals with a PGO-A are more motivated to avoid failure by setting lower goals and avoiding challenging experiences that may promote positive learning experiences. Given the negative relationship between PGO-A and self-efficacy, as well as learning strategies, it is likely a similar relationship holds for learning experiences (Payne et al., 2007). Johnson and Beehr's (2014) findings support this conclusion, with all RIASEC domains except artistic interests negatively related to PGO-A, though only realistic, investigative, and enterprising were significantly correlated. In contrast, individuals with a PGO-P are more likely to pursue goals that they know they can do well, and which showcase their abilities to others. Research on PGO-P has been mixed, however, finding negative relationships with self-efficacy when PGO as a singular construct is examined but null relationships when separated into PGO-P and PGO-A. Given these findings, the following hypothesis and research question are put forth:

Hypothesis 2: PGO-A will be negatively related to learning experiences. (Path 2, Fig. 2)

Research Question 1: Does PGO-P influence learning experiences within the SCCT framework? (Path 2, Fig. 2)

Implicit theories of math and science ability. The implicit theories of intelligence framework, developed by Dweck and colleagues (Dweck, 2000; Dweck & Leggett, 1988; Dweck & Sorich, 1999; Henderson & Dweck, 1990), hypothesizes that individuals' performance and persistence in certain fields can be explained by their beliefs about intelligence. Individuals with a fixed view of intelligence (also called entity beliefs) view themselves as having a certain level of aptitude in a domain that cannot be changed through effort. On the other end of the spectrum, individuals with a malleable view of intelligence (also called incremental beliefs) recognize the role of aptitude in their abilities but subscribe to the idea that their aptitude in a certain domain can be improved through increased effort. Importantly, these beliefs are held independently of whether a person performs objectively well in a certain domain.

Among students, implicit theories have been found to predict performance and persistence in various academic domains. Specifically, holding fixed versus malleable beliefs influences students' motivation, learning, and achievement outcomes. Students with fixed beliefs are more likely to pursue tasks and domains that showcase their ability and give up in the face of setbacks, whereas those with malleable beliefs tend to have higher achievement outcomes across transition periods (e.g., middle school to high school, high school to college) and greater perseverance in the face of challenges (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewksi, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003; Yeager & Dweck, 2012).

Implicit theories have also been examined within STEM fields, particularly in math and science classes, as ability beliefs and interests in these courses at younger ages is predictive of entering a STEM field later on in students' education (Perez-Felkner, Nix, & Thomas, 2017; Seo, Shen, & Alfaro, 2019). Research has found that students with more malleable beliefs about intelligence, particularly in terms of math or science, perform better in these courses and drop out of classes at lower rates (Good et al., 2003; Paunesku, Yeager, Romero, & Walton, 2012; Yeager & Dweck, 2012). Fixed beliefs have also been associated with lower self-efficacy and interest in these subjects, whereas malleable beliefs are associated with higher self-efficacy and learning goals (Baird, Scott, Dearing, & Hamill, 2009). While no study (to the author's knowledge) has explicitly examined these beliefs as they relate to learning experiences as conceptualized in the present study, given the links between ability beliefs, self-efficacy, and general academic performance, the following is hypothesized:

Hypothesis 3: More malleable beliefs of math and science ability will be positively related to learning experiences. (Path 2, Fig. 2)

Hypothesis 4: More fixed beliefs of math and science ability will be negatively related to learning experiences. (Path 2, Fig. 2)

Background and Contextual Factors

The second main set of variables theorized by Lent and colleagues (1994, 2000) to influence self-efficacy and outcome expectations through learning experiences are labeled background and contextual factors. Whereas person inputs focus on characteristics internal to the individual, background and contextual factors refer to environmental influences beginning in early childhood that can impact key aspects of the SCCT model. In their discussion of these potential background variables, Lent et al. (1994) explicitly identify cultural and gender socialization and norms as potential key processes that can constrain the development of interests in certain occupations or career fields. Specifically, tribal identity for Native American students may serve as a culturally-relevant background influence on learning experiences. Additionally, as the present study focuses on individuals in STEM, consideration of previous math and science education and their influence on students' learning experiences, outcome expectations, and self-efficacy is warranted.

Tribal identity. A key set of variables in Native American research, particularly when examining academic achievement, involves Native students' tribal identity—the development and adoption of a sense of self that is integrally connected to American Indian communities and cultures (Oetting & Beauvais, 1991; Rumbaugh Whitesell, Mitchell, Spicer, & The Voices of Indian Teens Project Team, 2009). Broadly, this concept involves Native Americans' sense of involvement and connection with their tribe, as well as knowledge of tribal language, history, and traditions (Clifford, 2007). Tribal identity exists on a continuum, from those Native Americans who have strong tribal identities to those who may have strong non-tribal identities (Brayboy, 2005). Historically, Indigenous peoples have resided in a myriad of areas including Native lands, federal reservations, state reservations, urban areas, and rural communities (Shotton, 2020), with recent trends indicating Native Americans mainly reside in areas outside of reservations or Native lands (National Urban Indian Family Coalition [NUIFC], 2008; U.S. Bureau of the Census, 2010). Regardless of their location, many Native Americans still maintain strong connections to their tribe (Kulis, Robbins, Baker, Denetsosie, & Deschine Parkhurst, 2016; Shotton, 2020), suggesting that strong tribal identity is present among Native Americans in a variety of settings.

Research generally supports the notion that tribal identity is beneficial for Native Americans. Specifically, a strong connection to and understanding of one's tribal traditions is associated with better educational outcomes (Kulis et al., 2016; Huffman, 2001; Shea et al., 2019; Whitbeck, Hoyt, Stubben, & LaFromboise, 2001; Whitbeck, Walls, & Hartshorn, 2014), enhanced well-being (Shea et al.), decreased risk of suicide (Pettingell et al., 2008), and decreased risk of, as well as improved treatment for, substance abuse (Donnovan et al., 2015; Gone & Calf Looking, 2011; Gray & Nye, 2001; Herman-Stahl, Spender, & Duncan, 2003; Lowe, Liang, Riggs, & Henson, 2012). Even when not directly related to these issues, strong tribal connections have been identified as a crucial support system for Native American students (Bass & Harrington, 2014; Waterman, 2012).

However, this strong tribal connection is not without its difficulties, particularly in pursuing higher education. While some studies have linked tribal identity to more positive educational outcomes, findings from other studies indicate no effects of strong tribal identity on educational outcomes (Powers, 2005; Rumbaugh Whitesell et al., 2009). Waterman (2012) found that the systems and structures of higher educational institutions served as a barrier for Native American students with strong tribal connections, as institutional systems and supports were not set up that complemented and/or encouraged Native students' tribal connections. These conflicts required Native students to practice homegoing behaviors as a way to maintain their tribal connections, and the lack of support on campus was seen as a barrier to their persistence in higher education (Waterman). Waterman's findings highlight that education settings, particularly higher education, often serve as a source of culture shock for Native American students (Gloria & Kurpius, 2001; Tate & Schwartz, 1993), given the values of tribal culture are more collectivist and the values of predominantly white university culture focus more on the individual (Huffman, 2003). Therefore, navigating these environments while maintaining a strong tribal identity can lead students to struggle to adapt to university culture and persist, particularly if institutional supports are not offered (Brayboy, Solyom, & Castagno, 2015; Dodd, Garcia, Meccage, & Nelson, 1995; Waterman).

This disconnect becomes even more pronounced when examining Native Americans and their (lack of) pursuit of STEM degrees. STEM fields are already subject to negative stereotypes from students starting in elementary school (Andre, Whigham, Hendrickson, & Chambers, 1999) and these negative attitudes and stereotypes may increase with age (Barmby, Kind, & Jones, 2008), hindering interest in STEM areas as viable career options (Osborne, Simon, & Collins, 2003; Painter, Tretter, Jones, & Kubasko, 2006). Native American students in particular are more likely to struggle in STEM majors due to the disconnect between their own cultural values and those espoused by STEM fields (Smith et al., 2014; Williams & Shipley, 2018). Research on Native students in higher education generally (Brayboy, Castagno, & Solyom, 2014; Guillory &

Wolverton, 2008; Kirkness & Barnhardt, 1991; Shotton, 2018), as well as research specific to STEM (Smith et al.; Windchief & Brown, 2017), has found that key motivators for Native students include the principle of reciprocity and the desire to give back to one's community, both of which are foundational in tribal values and identity (Kirkness & Barnhardt; Lee, 2009; Shotton, 2020). Reciprocity refers to the idea that institutions of higher education and those who attend them (i.e., faculty, students, staff, etc.) can build more human/interpersonal connections in which learning is a two-way process, rather than the traditional form of a faculty member imparting knowledge on students who passively receive it (Kirkness & Barnhardt). Giving back to one's community refers to the idea that Native students are more likely to pursue educational and career goals that are likely to improve their community, not just those that satisfy individual needs (Lee, 2009). Reciprocity, in particular, may be crucial for the way Native students view institutions and specific degree fields (Brayboy et al., 2014, 2015), as a lack of reciprocity in interpersonal and learning interactions signals that the institution or field is not open to different views and requires conformity from students to a specific worldview.

Both quantitative and qualitative studies highlight the key roles of reciprocity and giving back in Native students' educational outcomes within STEM. Smith and colleagues found that Native American students pursuing a STEM degree were more likely to endorse communal values, had higher communal goal endorsement than their White STEM student counterparts, and that these higher communal values were associated with greater belonging uncertainty, low motivation, and perceived poor performance in their major one semester later. Native students often attributed this belonging uncertainty to the disparity between their own desire to give back to their tribal communities and the emphasis in STEM learning environments of focusing on individual learning and improvement (Smith et al.). They also expressed a stronger desire to persist in STEM if efforts were made to embrace Native American perspectives and allow for more give-and-take when teaching curriculum. Williams and Shipley found that among Native students, the observance of cultural taboos was linked to an unwillingness to major in science if doing so would violate those taboos for almost 40% of respondents. Taboos were defined as "a strong cultural warning or prohibition against an action, such that violating a taboo is an act of serious aberrance which can result in feelings of guilt or shame and/or direct or indirect social sanction" (Williams & Shipley, p. 2). Two-thirds of Native student respondents, however, expressed a willingness to take more science classes if the class was more respectful of these kinds of cultural taboos (Williams & Shipley). These findings emphasize that Native students' tribal identity and cultural values are deeply embedded in Native students' choices for pursuing higher education and STEM, and that institutions that attempt to foster reciprocity rather than conformity are more likely to engage with Native students and help set them up for success (Windchief & Brown, 2017).

Tribal identity is an extremely important part of Native American student learning experiences, though the exact nature of how tribal identity influences these experiences remains unclear. In general, the literature identifies a complex interplay between Native students' own tribal identities and the willingness or unwillingness of institutions of higher education to provide learning and growth opportunities in ways that are compatible with and respectful of Native values and experiences. While many studies have indicated the benefits of tribal identity to Native American well-being generally, its role in relation to educational outcomes appears more complex, with qualitative and some quantitative studies supporting the role of tribal identity in students' pursuit of a college degree and STEM major. However, other studies have found no effect of tribal identity, or found that its impact on educational outcomes is through influences on intervening variables such as motivation and support. Given the complexity of these relationships, the following research question is posed:

Research Question 2: How does tribal identity influence learning experiences within the SCCT framework? (Path 3, Fig. 2)

Previous math and science experiences. Individual preparation in math and science during middle and high school has been identified as a critical factor in developing students' learning experiences, self-efficacy, and later interests in STEM, particularly mathematics (Shoffner & Dockery, 2015; DeThomas, 2017). Given the criticality of mathematics preparation, in particular, scholars have recommended that interventions in middle school and high school target students' skill development in math and science, as this enables students to pursue more advanced coursework (Valla & Williams, 2012) and helps develop self-efficacy through positive experiences (Navarro et al., 2007). In fact, this may be the best way to develop self-efficacy within the SCCT framework, as personal success in mathematics and sciences was found to be the most powerful source of self-efficacy in a sample of high school students (Lopez & Lent, 1992). DeThomas found a similar trend among sophomore college STEM students, with those placed in higher-ability mathematics classes in middle and high school reporting significantly higher levels of mathematics self-efficacy.

In addition to influencing students' self-efficacy, the number of mathematics and science courses taken in high school has been linked to students' interest in, intention to pursue, and actual pursuit of a STEM degree or career. Specifically, middle school students interested in pursuing a STEM career have been found to take more advanced coursework in high school to gain more STEM-related experience (Shoffner, Newsome, Barrio Minton, & Wachter Morris, 2015; Tyson, Lee, Borman, & Hanson, 2007), identify their direct instruction in science as a significant predictor of interest in pursuing STEM (Quinn & Lyons, 2011), and are more likely to eventually work in STEM fields, such as life science, physical science, and engineering occupations (Tai, Liu, Maltese, & Fan, 2006). Among high school students, Wang (2013) found that greater exposure to math and science courses was the strongest predictor of students' intentions to major in STEM in college, even when taking into account math achievement and math self-efficacy. Greater exposure also had the strongest indirect effect on actual entry into a STEM major through its influence on intention to major in STEM (Wang).

While the preceding studies have generally focused on the number of courses taken, researchers have also examined the specific mathematics and science courses students take in high school, with findings indicating that specific courses are more likely to lead to pursuit and attainment of a STEM degree. Tyson et al. (2007) found that, among longitudinal data from Florida high school students, those that took courses above Algebra II in mathematics and Chemistry I in science were significantly more likely to graduate with a STEM degree. Those odds increased substantially for students who completed the highest-level math (i.e., Calculus) and science (i.e., Chemistry II or Physics II) courses available. More recent findings confirm the critical role of these courses, as students majoring in engineering in college were significantly more likely to be retained one academic year later if they had taken at least Precalculus in high school (Van Dyken, 2017). Bottia, Stearns, Mickelson, Moller, and Parker (2015) found that completion of a physics course in high school was strongly, positively related to majoring in a STEM field. Among a nationwide sample of students from two- and four-year colleges, Sadler, Sonnert, Hazari and Tai (2014) found that students who completed a course in calculus, physics, or a second year of chemistry reported significantly higher interest in a future STEM career, even after controlling for parental education, race, and community SES.

Clearly, exposure to math and science courses in high school, particularly advanced courses, influences key aspects of the SCCT model. Within the context of the current study, it is likely that completion of a higher number of courses in mathematics and science in high school will lead to more positive learning experiences. However, consistent with most other person input and background variables examined in the present study, no study has been conducted examining the role of previous math and science courses in predicting learning experiences under the RIASEC framework. Given the strong positive relationships of high school science and mathematics courses with self-efficacy, interests, intentions, and choice actions in the SCCT model, as well as the lack of research on these courses' relationship with specific RIASEC variables, the following hypothesis and research question are posed:

Hypothesis 5: Completion of more high school a) mathematics courses and b) science courses will be positively related to learning experiences. (Path 3, Fig. 2)

Research Question 3: Does completion of more high school mathematics or science courses differentially predict specific types of learning experiences? (Path 3, Fig. 2)

While the studies discussed so far have indicated the role of prior math and science courses in students' STEM and SCCT-related outcomes, this relationship becomes more complicated when examining gender and racial/ethnic differences. Specifically, while women are as likely to complete advanced courses in mathematics and science, they are less likely to complete the highest-level courses in these areas and less likely to pursue a STEM degree (Trusty, 2002; Tyson et al., 2007), though this may be compensated for by encouraging participation in specific high school courses such as physics (Bottia et al., 2015). Racial and ethnic minorities are also less likely to take advanced courses, potentially due to a lack of preparation both prior to and during high school (Betz, 2007; Tyson et al.; Zeng & Poelzer, 2016). However, among those URMs who have taken more advanced course, Tyson and colleagues found they were just as likely to pursue a STEM degree as White students.

Exposure to these courses has also been shown in some studies to have less benefits for underrepresented minorities than other high school learning experiences (Bottia et al.; Wang, 2013). Specifically, Wang found that multiple-groups analysis of White, Asian, and URM samples identified models with significantly better fit when parameter estimates for relationships from math and science exposure to intention to major in STEM were allowed to vary, with the URM group having the lowest standardized relationship between these two variables. In contrast, Bottia and colleagues found that proportion of honors STEM-related classes taken and number of years of biology courses taken was significantly related to intent to major in STEM for a White student subsample but was not significantly related to intent to major in STEM for an African American student subsample. Given these conflicting findings, both for gender and race/ethnicity comparisons, the following research questions are posed:

Research Question 4: Does the relationship between high school a) mathematics and b) sciences courses taken and learning experiences differ by gender?

Research Question 5: Does the relationship between high school a) mathematics and b) sciences courses taken and learning experiences differ by race/ethnicity?

Learning Experiences

The next section of the SCCT model involves learning experiences. As originally conceptualized by Lent and colleagues (1994), learning experiences consisted of Bandura's (1986) sources of self-efficacy—performance accomplishments, vicarious learning, verbal persuasion, and emotional arousal. Learning experiences were hypothesized to be related to both self-efficacy and outcome expectations, with performance accomplishment learning experiences hypothesized as the strongest predictor of self-efficacy (Bandura; Lent). Studies examining math/science self-efficacy and outcomes expectations among high school students (Garriott et al., 2014; Lopez & Lent, 1992), STEM undergraduate students (Byars-Winston & Rogers, 2019), and combined STEM/non-STEM undergraduate student samples (Dickinson, Abrams, & Tokar, 2017) support these proposed relationships. Recent meta-analyses also support the critical role of performance accomplishment learning experiences in predicting self-efficacy and outcome expectations for both STEM (Sheu et al., 2018) and combined STEM/non-STEM student samples (Byars-Winston, Diestelmann, Savoy, & Hoyt, 2017).

While some researchers continue to operate under Lent and colleagues' (1994) original conceptualization of learning experiences, others have sought to expand our understanding of learning experiences. More recently, Schaub (2004) and Schaub and Tokar (2005) broadened the application of learning experiences across Holland's (1997) vocational interest domains, also known as RIASEC (realistic, investigative, artistic, social, enterprising, and conventional), resulting in the Learning Experiences Questionnaire (LEQ). They argue that much of SCCT research has been focused on the domains of mathematics and science (more recently, STEM), leaving out critical components relevant to other degrees and occupations. By incorporating Holland's themes into SCCT learning experiences, a more appropriate comparison of domain-relevant sociocognitive variables, person inputs and background factors, as well as distal and proximal supports and barriers can be assessed.

Studies utilizing the LEQ within the SCCT framework have generally assessed learning experiences as they relate to self-efficacy, outcome expectations, and other sociocognitive variables within each relevant occupational domain. For example, Schaub and Tokar (2005) tested six separate relevant SCCT models, one for each RIASEC domain, among a sample of college students. All models fit the data well, and learning experiences in each RIASEC domain were strongly, positively predictive of self-efficacy in each model. Relationships with outcome expectations were considerably smaller, with only Realistic and Social domain models indicating a significant, positive direct effect. However, for all models except the Realistic domain, learning experiences was significantly predictive of outcome expectations through the mediational effect of self-efficacy, with four of the five models indicating full mediation.

Similar relationships among learning experiences, self-efficacy, and outcome expectations have been found in other studies utilizing the LEQ. Garriott, Flores, and Martens (2013) tested an SCCT model of learning experiences related to math/science self-efficacy, outcome expectations, interests, goals, supports and barriers among a sample of high school students. Utilizing only the Investigative scale of the LEQ, they found significant positive relationships between learning experiences and self-efficacy, as well as learning experiences and outcome expectations in their structural model. The relationship with self-efficacy was significantly stronger than the relationship with outcome expectations. Thompson and Dahling (2012) found similar results for five of the six RIASEC domain learning experiences and their relation to domain-specific self-efficacy and outcome expectations among a sample of college students. The Artistic domain was not tested in the structural model, as it had poor measurement model fit. Among the remaining structural models, all relationships from learning experiences to self-efficacy were significantly stronger than relationships from learning experiences to outcome expectations. Ludwikowski, Armstrong, and Lannin (2018), testing a modified SCCT model including gender, expressiveness, instrumentality, learning experiences, self-efficacy, and interests among a sample of undergraduate students, also found support for a strong positive relationship between learning experiences and self-efficacy in all six RIASEC models.

Importantly, the realistic, artistic, and conventional models indicated improved model fit including a direct path from learning experiences to interests. These relationships were significant and positive for all three models, but substantially smaller than the relationship between learning experiences and self-efficacy.

Other studies examining the relationship between learning experiences, self-efficacy, and outcome expectations have evidenced similar results, though the LEQ learning experiences represent Bandura's (1986) and Lent and colleagues' (1994) original conceptualization. Garriott et al. (2014) found that Investigative performance accomplishments and vicarious influence were the only two learning experiences with significant positive relationships to math/science self-efficacy, and performance accomplishments was the only learning experience with a significant positive relationship to outcome expectations. Given these findings, in a later study with Mexican-American high school students, Garriott, Raque-Bogdan, Zoma, Mackie-Hernandez, and Lavin (2017) utilized only the Investigative performance accomplishments subscale of the LEQ in a test of the SCCT. Among their findings, performance accomplishments were strongly positively related to math/science self-efficacy.

Not all studies of learning experiences replicate this same pattern, though. Williams and Subich (2006) examined gender differences in learning experiences within each RIASEC domain for undergraduate students. Across gender-specific regression analyses for self-efficacy and gender-specific hierarchical regression analyses to examine the comparative predictive influence of learning experiences and self-efficacy on outcome expectations, the set of four learning experience variables significantly predicted both self-efficacy and outcome expectations, though their relationships with self-efficacy were generally much stronger than outcome expectations. However, performance accomplishments had the most consistent and strongest prediction of self-efficacy across all RIASEC domains for both men and women. Physiological arousal was also strongly predictive of self-efficacy across all six domains for women and all domains except artistic and enterprising for men.

Traditionally, STEM fields have been categorized as occupations that align with Realistic and Investigative interests (Krapp & Prenzel, 2011). Indeed, several studies examining learning experiences within the SCCT framework for STEM-related activities and interests make this distinction when selecting RIASEC domains (e.g., Flores, Navarro, Lee, & Luna, 2014; Garriott et al., 2013; Garriott et al., 2014; Garriott, Raque-Bogdan et al., 2017). While scholars have begun to examine all RIASEC domains as they relate to STEM (Dierks, Höffler, & Parchmann, 2014; Su et al., 2009), and studies have supported this expanded view of STEM-related learning experiences in college and middle school samples (Babarović, Dević, & Burušić, 2018; Dierks, Höffler, Blankenburg, Peters, & Parchmann, 2016), these studies utilized measures of learning experiences that were tailored to STEM activities in each domain. The current study utilized the more global LEQ as an assessment of learning experiences, and therefore only examined Realistic and Investigative domains.

Taken collectively, these findings provide support for the predictive relationship of learning experiences with self-efficacy and outcome expectations as conceptualized in the SCCT framework, as well as a potential direct relationship with interests. Therefore, the following relationships are hypothesized:

Hypothesis 6: Learning experiences will be positively related to self-efficacy. (Path 4, Fig. 2)

Hypothesis 7: Learning experiences will be positively related to outcome expectations. (Path 6, Fig. 2)

Hypothesis 8: The relationship between learning experiences and outcome expectations will be mediated through self-efficacy.

Studies exploring the role of gender in RIASEC interests have shown consistent differences in boys and girls, as well as men and women. Starting in middle school, boys generally report significantly higher interests in the Realistic and Investigative domains than girls, and girls report significantly higher interests in the Social and Artistic domains than boys (Babarović et al., 2018; Lapan, Adams, Turner, & Hinkelman, 2000; Ludwikowski et al., 2018; Su et al., 2009), though specific studies do not always match this exact pattern (e.g., Babarović et al. found no difference in Investigative interests). Even when examining specific interest domains within the STEM context, similar gender difference patterns have been found (Dierks et al., 2016). These findings extend to reported learning experiences (Flores, Navarro, Lee, & Luna, 2014; Thompson & Dahling, 2012; Tokar, Buchanan, Subich, Hall, & Williams, 2012; Tokar, Thompson, Plaufcan, & Williams, 2007; Williams & Subich, 2006), with gender differences in a given domain-specific learning experience leading to related differences in self-efficacy and outcome expectations for that domain (Flores, Navarro, Lee, & Luna; Williams & Subich). Given the strong support for gender differences in RIASEC domain variables, as well as their subsequent relationships with self-efficacy and outcome expectations, the following relationships are hypothesized:

Hypothesis 9: Men will report significantly higher levels of Realistic and Investigative learning experiences than women.

Hypothesis 10: The strength of the relationship between a) learning experiences and self-efficacy and b) learning experiences and outcome expectations will vary based on gender.

While a large number of studies have examined and documented gender differences in RIASEC interests and learning experiences between men and women, less research has examined the role of race/ethnicity in these variables. Byars-Winston et al. (2017) found significant differences in the meta-analytic correlations of two pairs of sources of self-efficacy as STEM sample composition became more non-White. Specifically, the relationship between performance accomplishments and vicarious learning, as well as the relationship between vicarious learning and social persuasion, decreased as the sample became more non-White. However, as noted by the authors, none of the relationships between the sources of self-efficacy and self-efficacy were significantly different, suggesting race/ethnicity was not a consistent predictor of the effect sizes of these relationships. Flores, Navarro, Lee, and Luna (2014) reported similar findings among a sample of predominantly Latino/a undergraduate engineering students, with no significant racial/ethnic differences in Realistic-related and Investigative-related learning experiences, self-efficacy, or outcome expectations at their initial timepoint. Multiple-groups analyses indicated significant ethnic differences in specific autoregressive relationships (i.e., same variable across timepoints), but no significant differences in learning experiences and their relationships with self-efficacy or outcome expectations.

Contrary to these findings, Dickinson and colleagues (2017) found substantial differences in relationships between learning experiences, self-efficacy, and outcomes expectations among a sample of African American college students based on RIASEC domain. Using structural equation modeling to test a model of learning experiences, self-efficacy, outcome expectations, and career interests for each RIASEC domain, they found that performance accomplishments significantly predicted self-efficacy for the realistic, artistic, social, and enterprising models, but only significantly predicted outcome expectations for the investigative, social, enterprising, and conventional models. Importantly, all significant relationships with self-efficacy were positive, but all relationships with outcome expectations were negative, which is contrary to other studies examining these relationships (e.g., Garriott et al., 2013; Garriott et al., 2014; Thompson & Dahling, 2012). Vicarious learning only significantly, negatively predicted self-efficacy for the investigative model, though the realistic (negative), investigative (positive), and social (positive) models evidenced significant relationships with outcome expectations. Verbal persuasion was also significantly, positively related to self-efficacy in the artistic, social, and enterprising models, but significantly and positively related to outcome expectations in the realistic and enterprising models. Overall, these results provide evidence that learning experiences may differentially impact self-efficacy and outcome expectations within an African American sample.

Unfortunately, to the author's knowledge, there is no known study investigating racial/ethnic differences in learning experiences as classified in the current study for Native American or Asian American participants. However, limited evidence provides mixed findings in terms of racial/ethnic differences in learning experiences and their predictive relationships with self-efficacy and outcome expectations among other racial/ethnic samples. Given these contrary findings and the lack of evidence for racial/ethnic groups examined in this study, the following research questions are posed:

Research Question 6: Are there racial/ethnic differences in STEM students' learning experiences?

Research Question 7: Are there racial/ethnic differences in the relationship between a) learning experiences and self-efficacy and b) learning experiences and outcome expectations?

Self-Efficacy and Outcome Expectations

Self-efficacy and outcome expectations represent the core components of the SCCT framework. Self-efficacy refers to an individual's belief that they are capable in a given domain (e.g., academic self-efficacy), whereas outcome expectations refer to an individual's belief that engaging in certain actions will lead to beneficial or detrimental outcomes (Lent et al., 1994, 2000). Both self-efficacy and outcome expectations are predicted to positively influence an individual's interests, goals, and actions in SCCT. Self-efficacy is also predicted to positively influence outcome expectations. These core predictions are often referred to as the interest, choice, and performance models in SCCT, which together represent the critical components of the SCCT framework.

There have been a plethora of studies testing these models, with findings generally supporting the predicted relationships in middle school (Fouad & Smith, 1996; Turner & Lapan, 2002), high school (Garriott et al., 2013; Garriott et al., 2014; Turner, Joeng, Sims, Dade, & Reid, 2019), and college student samples (Byars-Winston & Fouad, 2008; Byars-Winston & Rogers, 2019; Lent et al., 2005; Lent et al., 2013). Support for these relationships has also been found in diverse student samples, including comparisons of White and non-White college students (Flores, Navarro, Lee, Addae, et al., 2014; Herrera & Hurtado, 2011; Lent et al., 2005; Lent et al., 2013; Navarro, Flores, Lee, & Gonzalez, 2014), comparisons of diverse non-White college students (Byars-Winston, Estrada, Howard, Davis, and Zalapa, 2010; Byars-Winston & Rogers), and homogenous samples of African American (Dickinson et al., 2017; Scheuermann, Tokar, & Hall, 2014; Waller, 2006) and Latino/a (Garriott, Raque-Bogdan et al., 2017; Gonzalez, 2012) students. Studies examining gender, both within and across race/ethnicity, have also found support for the role of self-efficacy and outcome expectations in determining students' interests, goals, and actions (Byars-Winston & Rogers; Flores, Navarro, Lee, Addae, et al., 2014; Inda, Rodríguez, & Peña, 2013; Navarro et al.).

These findings also extend to STEM student samples, as many of the college student samples discussed in the preceding paragraph focused on STEM. In addition to these studies, support for the role of self-efficacy and outcome expectations in students' interests, goals, and actions has been identified for specific STEM areas. Specifically, samples of engineering students (Lent et al., 2015; Lent et al., 2008; Lent, Sheu, Gloster, & Wilkins, 2010), biological and life sciences students (Byars-Winston et al., 2010), and computer science students (Lent, Lopez, Lopez, & Sheu, 2008; Lent, Lopez, Sheu, & Lopez, 2011) have generally supported SCCT predictions of these relationships. A recent meta-analysis of 30 years of SCCT studies using STEM samples further supports these proposed relationships, as well as the general fit of the SCCT model across gender and race/ethnicity (Lent et al., 2018). Overall, these findings provide strong support for the role of self-efficacy and outcome expectations in developing students' interests, intentions, and eventual actions in relation to STEM. Therefore, the following relationships are hypothesized:

Hypothesis 11: Self-efficacy will positively predict a) outcome expectations, b) interests in STEM, c) intentions to major in STEM, and d) persistence in a STEM major. (Paths 7, 8, 9, & 10, Fig. 2)

Hypothesis 12: Outcome expectations will positively predict a) interests in STEM, b) intentions to major in STEM, and c) persistence in a STEM major. (Paths 11, 12, & 13, Fig. 2)

Regardless of the general support for these relationships, studies examining self-efficacy and outcome expectations have identified gender and racial/ethnic differences in these variables.

Studies over the course of 30 years have evidenced consistent differences in self-efficacy across gender, with girls and women reporting lower levels of math and science self-efficacy compared to boys and men in racially diverse samples (Britner, 2008; Byars-Winston & Fouad, 2008; Gainor & Lent, 1998; Inda et al., 2013; Kiran & Sungur, 2012; Navarro et al., 2007; Tellhed, Bäckström, & Björklund, 2017; Wilson, Bates, Scott, Painter, & Shaffer, 2015), even when both genders had similar levels of math and science aptitude (Hackett & Betz, 1989; Hardin & Longhurst, 2016; MacPhee, Farro, & Canetto, 2013; OECD, 2015; Watson, Rubie-Davies, & Meissel, 2019). However, Wilson and colleagues found that gender differences in academic self-efficacy disappeared when examining men and women in STEM disciplines, except for chemistry, computer science, and engineering, which evidenced significantly lower levels of academic self-efficacy among women.

Gender differences in outcome expectations have indicated mixed results, though far fewer studies have focused on outcome expectations than self-efficacy. For example, some studies have found no differences in outcome expectations among ethnically diverse STEM samples (Byars-Winston & Rogers, 2019; Gushue, 2006; Hardin & Longhurst, 2016; Lent et al., 2005; Lent et al., 2008), whereas other studies have found women have significantly higher outcome expectations than men (Lent et al., 2010). Deacon (2011) found significant gender differences among adolescents in mathematics outcome expectations, with girls reporting higher outcome expectations for math generativity and math relational outcome expectations, but no significant difference for math social cognitive outcome expectations.

Results have been mixed in terms of gender differences in self-efficacy and outcome expectations and their relationships with interests, intentions, and actions. Lent et al. (2018), in a meta-analytic comparison of SCCT's integrated choice and interest models across genders, reported that the standardized path coefficient from self-efficacy to outcome expectations was significantly higher for women ($\beta = 0.40$) than men ($\beta = 0.33$), though this relationship was not considered practically significant as the difference was less than 0.10. Byars-Winston and Rogers (2019) also found differences in the relationship between self-efficacy and outcome expectations among comparisons of Black and Hispanic men and women, though they found a non-significant, negative relationship for Hispanic men, whereas all other groups had significant, positive relationships. Importantly, both studies did not find significant differences in relationships from self-efficacy and outcome expectations to interests or choice goals across groups. However, other studies have found support for gender differences in self-efficacy predicting lower interest in STEM careers among women in an international (Tellhed et al., 2017) and STEM college student sample (Hardin & Longhurst, 2016). Tellhed and colleagues also found outcome expectations differentially predicts interests across gender, with lower outcome expectations in women leading to lower interests in STEM majors.

Consistent gender differences in self-efficacy indicate the potential for these relationships to differ in comparisons of men and women. In contrast, studies on gender differences in outcome expectations are lacking and offer inconclusive results. Studies examining self-efficacy and outcome expectations' subsequent effects on interests, intentions, and actions are also mixed. Given the available literature, the following hypotheses and research questions are posed:

Hypothesis 13: Women will report significantly lower levels of self-efficacy than men.

Research Question 8: Do men and women significantly differ in their levels of outcome expectations?

Research Question 9: Does gender differentially influence the relationships among self-efficacy, outcome expectations, interests, intentions, and persistence?

Racial/ethnic differences in self-efficacy produce more mixed results than comparisons of gender. For example, though not specifically examining race/ethnicity, Lent and colleagues (2005, 2008, 2011) found that engineering and computer science students at historically Black universities reported significantly higher levels of self-efficacy than students attending predominantly White universities. This indicates that there may be institutional and environmental factors impacting students' self-efficacy in STEM, particularly for underrepresented racial/ethnic groups. As these samples combined diverse racial/ethnic groups, however, these findings should be interpreted with caution. In contrast, Gwilliam and Betz (2001) found no significant differences in math or science-related self-efficacy between Black and White undergraduate students. Lauver and Jones (1991), in a study examining American Indian, Hispanic, and White rural high school students, found that both American Indian and Hispanic students reported lower levels of self-efficacy than White students across a wide variety of occupations, particularly medicine-related fields.

Studies of racial/ethnic differences in self-efficacy among STEM student samples produces even more mixed findings. In one of two studies directly examining self-efficacy differences among racial/ethnic groups in STEM, Wilson and colleagues (2015) reported significantly higher levels of general self-efficacy for African American STEM students than White STEM students. Conversely, there were no significant differences when examining academic self-efficacy. Similarly, no significant differences were found between White and Hispanic STEM students or White and Native American STEM students on academic self-efficacy. However, the sample sizes for these underrepresented racial/ethnic groups were all below 10, meaning these findings should be interpreted with caution and may be spurious. The only significant difference found was between Asian and White male and female STEM students, both of which had larger sample sizes than other ethnic groups. Specifically, Asian STEM students reported significantly lower academic self-efficacy than their White counterparts. In contrast, MacPhee and colleagues (2013) found no differences in academic self-efficacy between minority and low SES White STEM students but did find that low SES minority STEM students reported significantly lower academic self-efficacy than the other two groups.

Examination of racial/ethnic differences in outcome expectations has been just as scarce. Lent and colleagues (2005, 2008, 2011) found STEM students at historically Black universities reported significantly higher outcome expectations than students at predominantly White universities. As these samples included diverse racial/ethnic groups, however, these findings should be interpreted with caution as specific racial/ethnic differences could not be identified. Byars-Winston and Rogers (2019), however, found no racial/ethnic differences in reported outcome expectations for Black and Hispanic STEM students who attended the Annual Biomedical Research Conference for Minority Students. No other studies could be found that examined racial/ethnic differences in outcome expectations.

In terms of racial/ethnic differences in self-efficacy and outcome expectations and their relations with interests, intentions, and persistence, studies have generally found no difference in model fit for these relationships across ethnic groups (Byars-Winston & Rogers, 2019; Flores, Navarro, Lee, Addae, et al., 2014; MacPhee et al., 2013; Lent et al., 2005, 2008, 2010, 2013, 2015). However, Lent and colleagues' (2018) meta-analysis of STEM studies within the SCCT framework offers support for differences between majority and minority samples in terms of these relationships, though the direction of these differences is not consistent. Specifically, the relationships between self-efficacy and outcome expectations and self-efficacy and interests were stronger for the minority sample (β = 0.29, β = 0.45 respectively) than the majority sample (β = 0.20, β = 0.38 respectively), though these results were not considered practically significant. In contrast, the relationship between self-efficacy and intentions (choice goals in this study) was significantly (but not practically) stronger for the majority sample (β = 0.12) than the minority sample (β = 0.07). Practically and statistically significant differences were also found between outcome expectations and interests and outcome expectations and intentions. Specifically, the relationship between outcome expectations and interests was stronger for majority (β = 0.42) than minority (β = 0.28) samples, whereas the relationship between outcome expectations and choice goals was stronger for the minority (β = 0.37) than majority (β = 0.14) samples.

Studies on racial/ethnic differences for both self-efficacy and outcome expectations are lacking and offer inconclusive results. The role of racial/ethnic differences in self-efficacy and outcome expectations' subsequent effects on interests, intentions, and actions are also mixed. Given these contradictory findings, the following research questions are posed:

Research Question 10: Does race/ethnicity influence self-efficacy?

Research Question 11: Does race/ethnicity influence outcome expectations?

Research Question 12: Does race/ethnicity differentially influence the relationships among self-efficacy, outcome expectations, interests, intentions, and persistence?

Interests, Intentions, and Actions

Interests, intentions, and actions in the SCCT framework are the main outcome variables of the overall model, as well as the main outcomes in research examining SCCT. Specific studies vary widely in the scope of how these variables are defined, ranging from broad conceptions of these variables to very narrow definitions. Given the focus in the present study on STEM majors, the literature examined here focuses specifically on STEM-related interests, intentions, and actions.

Beginning with interests, a number of studies have focused on the relationship between interests in STEM and reported intentions to pursue a STEM degree or career. Studies have found significant, positive relationships between interests and goals in racially/ethnically diverse high school (Garriott et al., 2013; Garriott, Hultgren, & Frazier, 2017; Turner et al., 2019) and college student samples (Byars-Winston & Fouad, 2008; Dutta et al., 2015; Lent et al., 2001; Lent, Brown, Schmidt et al., 2003; Lent, Lopez, & Bieschke, 1993), including a meta-analysis of the general SCCT model (Sheu et al., 2010) and a large-scale meta-analysis of over 30 years of SCCT research in STEM (Lent et al., 2018). Importantly, this relationship has been found to hold in STEM student sample comparisons of various racial/ethnic groups (Lent et al., 2005, 2011, 2018) and across genders (Inda et al., 2013; Lent et al., 2005, 2011, 2018). However, some studies have failed to replicate this finding (e.g., Flores, Navarro, Lee, Addae, et al., 2014; Garriott, Raque-Bogdan et al., 2017; Navarro et al., 2014) and others have found support for this relationship in specific STEM fields but not others (e.g., engineering but not biological sciences; Byars-Winston et al., 2010).

Interests have also been linked to actual persistence in a STEM major or career, though the number of studies examining persistence is substantially smaller. This is partially because operationalizing persistence can be difficult (Lent & Brown, 2006), so several studies purporting to examine persistence measure intended persistence (e.g., Lent et al., 2008, 2013; Navarro et al., 2014) rather than the actual choice actions of students. The relationship between interests and persistence was originally proposed to be mediated by choice goals (i.e., intentions; Lent et al., 1994, 2000), with most studies supporting this finding (Lent, Brown, Schmidt et al., 2003; Lent et al., 2018; Turner et al., 2019). Some studies have found direct relationships between interests and persistence, however. Borget and Gilroy (1994) found a direct, positive relationship between college women's interest in math/science-based careers and their actual career choice decisions.

Though their study did not model the SCCT, Luzzo, Hasper, Albert, Bibby, and Martinelli, Jr. (1999) found a strong positive correlation between students' interests in math/science careers and their selection of a math/science-related major when testing an intervention to increase students' self-efficacy, outcome expectations, interests, goals, and actions. Buday, Stake, and Peterson (2012) found similar relationships between men and women's motivation to pursue science and their actual career choice 10 years later, though the correlation for men was substantially higher than for women. Unfortunately, given the paucity of literature on interests and persistence, comparisons of this relationship in the SCCT model across gender and race/ethnicity have not been conducted. Lent and colleagues (2018) even note this limitation in their meta-analysis of the SCCT model in STEM samples, as they had to conduct a supplementary analysis on the relationship of proposed constructs to persistence given the substantially smaller number of studies examining this construct.

Finally, studies have also examined the relationship between intentions and persistence. Results from these studies have consistently identified strong, positive links between students' STEM intentions and their actual STEM choices (Bottia et al., 2015; Fouad, Singh, Cappaert, Chang, & Wan, 2016; Lent, Brown, Schmidt et al., 2003; Lent et al., 2018; Wang, 2013), with expectations of entering a STEM-related career as early as 8th grade significantly predicting students' likelihood of obtaining a STEM baccalaureate degree (Tai et al., 2006). In a longitudinal examination of adolescents' STEM interests and actual STEM attainment across cohort and gender, intentions to major in STEM as high school seniors was the single strongest predictor of attainment of a STEM bachelor's degree across cohorts, even after controlling for a plethora of demographic, background, attitudinal, and academic variables (Burge, 2013). Wang (2013) found the strength of this relationship was equivalent across multiple-groups comparisons of White, Asian, and underrepresented minority students transitioning from high school to college, suggesting this aspect of SCCT holds for different racial/ethnic groups.

The bulk of the literature reviewed supports the proposed relationships among interest, intentions, and persistence in the SCCT framework. These findings are generally supported across gender and race/ethnicity comparisons, though no studies have compared the relationship between interests and persistence across these groups. Given the preponderance of evidence in support of the strong, positive relationships among these variables, the following is hypothesized:

Hypothesis 14: Interest in STEM will be positively related to a) intentions to major in STEM and b) persistence towards a STEM degree. (Path 14, Fig. 2)

Hypothesis 15: The relationship between interest in STEM and persistence towards a STEM degree will be mediated by intentions to major in STEM.

Hypothesis 16: Intentions to major in STEM will be positively related to persistence towards a STEM degree. (Path 15, Fig. 2)

As with many of the variables examined so far, gender and racial/ethnic differences exist in STEM interests, intentions to pursue a STEM major or career, and actual attainment of a STEM degree or career. Beginning in middle school, girls and women in the general population have expressed significantly lower interests in STEM than boys and men (Babarović et al., 2018; Burge, 2013; Deacon, 2011; Hsieh, Liu, & Simpkins, 2019; Song, Kim, & Bong, 2019; Tellhed et al., 2017; Watt, Bucich, & Dacosta, 2019), resulting in lower intentions of pursuing a STEM degree or career and lower degree attainment (Makarova, Aeschlimann, & Herzog, 2019; Sahin, Ekmekci, & Waxman, 2018; Whalen & Shelley, 2010). Even when controlling for STEM interests, women have been found to have significantly lower attainment of a STEM degree than men (Burge, 2013).

However, when examining STEM-specific samples, findings are more nuanced. Some studies have found men and women do not differ in their reported STEM interests (Flores, Navarro, Lee, Addae, et al., 2014; Lent et al., 2005, 2008, 2018), whereas others continue to find gender differences in STEM interests (Lent et al., 2011; Su & Rounds, 2015; Hardin & Longhurst, 2016). Longitudinal studies and meta-analyses have indicated that men and women have different interest profiles that explain gender gaps in specific STEM fields (Ertl & Hartmann, 2019), with women reporting higher interests in people-oriented occupations (e.g., medicine) and men reporting higher interests in things-oriented occupations (e.g., engineering) (Eccles & Wang, 2016; Su & Rounds).

Reporting from the NSF (2019) supports the idea of gender differences in STEM degree attainment and STEM career pursuit based on specific STEM fields. While women represent roughly half of all S&E bachelor's degrees in 2016, degree attainment at higher levels is highly disparate based on STEM field. Over the past two decades, the percentage of women receiving master's degrees in mathematics and statistics has been stagnant. Women awarded doctoral degrees in these fields, which had seen increases from 1997-2006, declined to 28% in 2016 (NSF). Women's lowest degree shares in 2016 were in computer sciences and engineering. Among scientists and engineers, men were more likely than women to work in an S&E occupation in 2017. However, women were more likely than men to work in an S&E-related occupation, which includes health occupations. The net result is that female scientists and engineers were more likely than male scientists and engineers to work in a non-S&E occupation (48% versus 42%).

Gender differences in interests, intention, and attainment of a STEM degree or career have also been shown to differ based on ethnicity. For example, African American women have been found to have equal or greater interests in STEM and intentions to major in science-related fields than non-Hispanic White women (Hanson, 2004, 2008). Asian and African American college graduates have also been found to have roughly equal gender representation in STEM degrees, whereas Hispanic and non-Hispanic White graduates are majority male (Hill, Corbett, & Rose, 2010). These findings indicate the potential for complex interactions of race and gender on STEM interests, intentions, and persistence.

Overall racial/ethnic differences in these variables have also been examined, with mixed findings. Some studies comparing historically Black universities and predominantly White universities have found no significant differences in STEM interests (Lent et al., 2008, 2010, 2011) whereas others have found interests are significantly higher at historically Black universities (Lent et al., 2005). Comparable levels of interest have also been found in comparisons of White and Latinx (Flores, Navarro, Lee, Addae, et al., 2014; Navarro et al., 2014) and White and combined underrepresented minority college students' interests in STEM (Lent et al., 2013), though again both samples consisted of students enrolled in STEM. Comparisons of Native American and White middle school students have found similar levels of interest in pursuing careers requiring a 4-year college degree, though the study examined occupational interests from the RIASEC perspective rather than interests in STEM (Turner & Lapan, 2003).

While racial/ethnic differences in interests may not be as notable, racial/ethnic differences in intentions and persistence have been found. In both elementary/middle school and high school samples, Asian Americans were found to have significantly higher intentions to major in STEM and majored in STEM at greater levels than other racial/ethnic groups. DeWitt et al. (2011) found Asian 10-14-year-old students in a longitudinal study reported significantly higher aspirations in science than Black and White students, though Black and White students did not differ from one another. Similarly, Asian students had more positive attitudes towards science than White students, though Black students did not significantly differ from either group. Interestingly, students did not significantly differ in their interest in science outside of school.

Among a sample of ethnically diverse 9th grade students, Hispanic students were half as likely to declare a STEM major in college compared to Asian students, though Black and White students did not significantly differ in STEM choice from Asian students (Sahin et al., 2018). Bottia and colleagues (2015) found more complex findings in terms of intention and declaration, however. Among a large sample of high school graduates in North Carolina, they found that students who were Black and Latino/a reported significantly higher intentions to major in STEM than White students, though comparisons of Asian and American Indian students to Whites did not differ. However, when declaring an actual STEM major, Black and Hispanic students did not significantly differ from White students in their odds of declaring a STEM major. Asian students were 1.1 times more likely to declare a STEM major in Biology and 0.5 times more likely to declare a STEM major in physical science, engineering, or mathematics than White students. American Indian students were also 0.5 times more likely to not declare any major and 0.7 times more likely to declare a biology major than White students. Moakler Jr. and Kim (2014) found no difference between African American and Hispanic students in comparison to White and

Asian American first-time freshmen students in their choice of a STEM major, though the authors did not assess whether students retained their chosen major upon graduation.

Reporting from the NSF (2019) also indicates racial/ethnic disparities in obtaining a job in a STEM field. Compared with other racial and ethnic groups, Asian scientists and engineers and White scientists and engineers were more likely to work in S&E or S&E-related occupations, with over half of Asians and Whites working in these occupations in 2017. When looking specifically at S&E occupations, Whites (65%) and Asians (20%) made up 85% of all individuals in these occupations. In comparison, underrepresented minorities comprised 15% of all S&E occupations in 2017 (NSF, 2019).

Clearly, women and underrepresented minorities still experience disparities in attainment of specific STEM degrees and a STEM-related career. However, the extent to which these differences may be due to differences in interest in STEM and intentions to pursue a STEM degree or career is questionable. Findings are mixed, though more consensus exists in the general population for females expressing less interest in STEM than males from a young age. These differences, however, may disappear in STEM-specific samples or morph into selection of specific kinds of STEM degrees and careers that more closely align with sex differences in occupational interests. Racial/Ethnic differences in these variables also present mixed findings, though Asian students appear to demonstrate consistently higher interests and aspirations for STEM degrees and careers. Again, there is a severe lack of research on Native American students in these studies, with only two studies examining Native American differences and only one of those specific to STEM. Given this mix of findings and the focus in the present study on college students in STEM majors, the following research questions are posed:

Research Question 13: Are there gender differences in students' a) interest in STEM, b) intentions to major in STEM, and c) persistence in a STEM major?

Research Question 14: Does gender differentially influence the relationship between a) STEM interests and STEM intentions, b) STEM interests and persistence, and c) STEM intentions and persistence?

Research Question 15: Are there racial/ethnic differences in students' a) interest in STEM, b) intentions to major in STEM, and c) persistence in a STEM major?

Research Question 16: Does race/ethnicity differentially influence the relationship between a) STEM interests and STEM intentions, b) STEM interests and persistence, and c) STEM intentions and persistence?

Supports and Barriers

Supports and barriers represents a broad category of contextual factors within the SCCT framework. A key distinction between background/contextual factors and proximal supports and barriers is that background factors are theorized to influence more distal components of the SCCT model, such as learning experiences, whereas supports and barriers are factors that have direct impacts on more proximal choice goals and actions (Lent et al., 2000). Lent and colleagues (1998, 2000; 2006) have generally classified supports into four categories—social support and encouragement, instrumental assistance, access to role models or mentors, and financial resources—and barriers into four categories—social or family influences, financial constraints, instructional barriers, and gender and race discrimination. They note that supports and barriers can be related to pursuing a degree in a specific field (e.g., mathematics) or pursuing a career in a specific field (e.g., medicine). Supports and barriers, while related to one another, are also theorized to be distinct constructs (Lent et al., 1994, 2000). Studies examining supports and barriers have generally followed this conceptualization of these variables (Lent et al., 2001; Lent, Brown, Schmidt et al., 2003; Navarro et al., 2014), though modifications have been made based on specific samples (e.g., engineering; Lent, Brown, Nota, & Soresi, 2003) and other researchers have developed their own measures of supports and barriers related to specific domains of interest (e.g., math and science: Fouad et al., 2010).

Regardless of the measure used, studies examining supports and barriers have generally found support for relationships with sociocognitive variables, though not always as predicted in the original SCCT framework. Lent and colleagues (1994, 2000) posited that supports and barriers would have direct relationships with choice goals (i.e., intentions) and choice actions (i.e., persistence), as well as moderating effects on the relationships between interests to choice goals and choice goals to actions. While some studies have found significant direct relationships with choice goals and choice actions (Dahling & Thompson, 2010; Hall, Nishina, & Lewis, 2017; Inda et al., 2013; Lent et al, 2001; Lent et al., 2010), others have found no significant predictive relationship between supports and goals (Lent, Brown, Schmidt et al., 2003; Lent et al., 2013; Navarro et al., 2014), supports and actions (Lent, Brown, Schmidt et al., 2003; Lent, Brown, Nota, & Soresi, 2003), barriers and goals (Byars-Winston & Fouad, 2008; Garriott, Hultgren, & Frazier, 2017; Hall et al.; Lent, Brown, Schmidt et al., 2003) and barriers and actions (Lent, Brown, Schmidt et al., 2003; Lent, Brown, Nota, & Soresi, 2003). A multitude of studies have also found support for positive, indirect relationships between supports and interests via self-efficacy and outcome expectations, as well as indirect effects of barriers on interests via self-efficacy and outcome expectations. These modified relationships have been found in samples of racially and ethnically diverse high school (Garriott, Hultgren, & Frazier, 2017; Lent, Brown, Nota, & Soresi, 2003; Turner et al., 2019) and college student samples (Byars-Winston

& Fouad; Inda et al.; Lent et al., 2001; Lent, Brown, Schmidt et al., 2003; Lent et al., 2011; Lent et al., 2015). Meta-analytic findings have also supported these relationships (Lent et al., 2018; Sheu et al., 2010).

Tests of the general SCCT model have found relationships between supports, barriers, and other SCCT variables hold across gender (Inda et al., 2013; Lent et al., 2005; Lent et al., 2011; Lent et al., 2013; Navarro et al., 2014), across comparisons of historically Black and predominantly White universities (Lent et al., 2005; Lent et al., 2011), across comparisons of White and minority samples (Lent et al., 2011; Lent et al., 2013; Navarro et al.), and across comparisons of specific racial/ethnic groups (Hall et al., 2017). Meta-analyses have found support for these relationships across specific occupational interest profiles for which study sample sizes were sufficient to make comparisons (i.e., Realistic, Investigative, Enterprising; Sheu et al., 2010) and across 30 years of STEM research (Lent et al., 2018).

However, individual studies have also found conflicting results. For example, Inda and colleagues (2013) found significant direct relationships from contextual supports and barriers to students' academic intentions, but in Lent and colleagues' (2013) study the relationship between environmental supports and intended persistence was not significant. Likewise, Lent and colleagues (2005) found a significant direct path to major choice goals for social barriers but not social supports, whereas a later study conducted by Lent and colleagues (2011) found significant direct paths for both social supports and barriers to major choice goals. Therefore, while tests of the SCCT model that incorporate supports and barriers have received support across a number of comparisons, the specific relationships found do not always hold across all studies.

The bulk of the literature indicates supports and barriers are linked to crucial aspects of the SCCT model. Specifically, mediated relationships between supports and barriers to interests via self-efficacy represents a critical component of the model. These mediated relationships are often found to be stronger than direct links between supports and barriers and choice goals or choice actions. Given these findings, the following relationships are hypothesized:

Hypothesis 17: Proximal supports will have moderate, positive relationships with students a) intentions to major in STEM and b) persistence in STEM. (Paths 19 & 20, Fig. 2)

Hypothesis 18: Proximal barriers will have moderate, negative relationships with students a) intentions to major in STEM and b) persistence in STEM. (Paths 21 & 22, Fig. 2)

Hypothesis 19: The relationship between a) proximal supports and interests and b) proximal barriers and interests will be mediated by self-efficacy. (Paths 17 & 18, Fig. 2)

Hypothesis 20: Proximal supports will be moderately, negatively correlated with proximal barriers. (Path 16, Fig. 2)

While studies have generally found support for the role of proximal supports and barriers in students' interests, choice goals, and choice actions, as with other components of the SCCT model there have been documented gender and racial/ethnic differences in students' perceptions of supports and barriers and their experiences with supports and barriers. Qualitative studies on women's experiences in STEM have found gendered pathways that force women to navigate their female identity in a male-dominated field, with social and institutional barriers such as gender stereotypes and expectations of academic exceptionalism negatively impacting self-efficacy, interests, and career choices (Carlone & Johnson, 2007; Castro, 2018; Marco-Bujosa, Joy, & Sorrentino, 2020). These barriers have also been identified in case studies of adolescent African American girls interested in pursuing science (Brickhouse, Lowery, & Schultz, 2000).

Quantitative studies on supports and barriers, however, have produced mixed results. Some studies have found that women report significantly greater barriers than men (Byars-Winston & Fouad, 2008; Höhne & Zander, 2019), whereas other studies have found the opposite relationship (Inda et al., 2013; Lent et al., 2005; Peña-Calvo, Inda-Caro, Rodríguez-Menéndez, & Fernández-García, 2016). Similarly, women have reported significantly greater supports than men in some studies (Hoferichter & Raufelder, 2019; Inda et al.; Lent et al., 2005; Lent et al., 2011; Peña-Calvo et al.), whereas other studies have found the opposite relationship (Byars-Winston & Fouad; Ing, 2014; Grossman & Porche, 2014). Studies have also reported no significant gender differences in supports (Fouad et al., 2010; Garriott et al., 2014; Hardin & Longhurst, 2016; Lent et al., 2010) or barriers (Fouad et al.; Hardin & Longhurst, 2016; Lent et al., 2010; Lent et al., 2011), though differences have been found in the specific supports and barriers identified by each gender. For example, Fouad and colleagues found that boys and girls in middle school, high school, and college differed in the specific barriers and supports they viewed as most critical in math and science, but no differences existed in overall reported supports and barriers by gender.

Qualitative studies on students from various racial/ethnic backgrounds have also found supports and barriers to their persistence in STEM. Across studies, issues of microaggressions, racial stigma, stereotypes, racism, and negative interactions hindered students' interest and success in STEM (Castro, 2018; Hurtado et al., 2009; Malone & Barabino, 2008; Strayhorn, 2010). Castro, in her examination of Asian American female doctoral students, found that stereotypes of Asians in STEM fields as well as stereotypes of women in STEM fields were critical barriers participants faced in continuing in their programs. Parental expectations also acted as an environmental support and barrier for these students.

Qualitative studies of Native American students have found that racism is a significant barrier to persistence in higher education in general (Castagno, 2005; Fryburg, Markus, Oyserman, & Stone, 2008; Jackson, Smith, & Hill, 2003; Shotton, 2017), along with lack of information about careers, financial difficulties, and feelings of isolation while adjusting to life on campus (Hoffmann, Jackson, & Smith, 2005; Hoover & Jacobs, 1992; Smith et al., 2014). Reported greater career barriers among a sample of Native American college students also negatively influenced their career outcome expectations (Thompson, 2013). In relation to STEM, the worldview of science as taught at universities—particularly predominantly White institutions—may be extremely dissonant to Native American worldviews and thus create institutional and instructional barriers to pursuing STEM (Aikenhead, 1998, 2001; Aikenhead & Ogawa, 2007; Bang, Medin, & Atran, 2007; Cobern & Aikenhead, 1998; Williams & Shipley, 2018). Laubach, Crofford, and Marek (2012) examined Native American students' perceptions of scientists through content analysis of drawings and written explanations of who a scientist is and what they do. They found that, in general, Native American students did not see themselves as scientists, though students who did not practice cultural traditions at home had the most stereotypical views of scientists.

Unique supports have also been identified in racial/ethnic qualitative studies. For example, Castro (2018) found that Asian American females' parental and familial ties served as key supports in pursuing their undergraduate and doctoral degrees in STEM. Other studies with diverse samples have identified underrepresented minority faculty serving as mentors, recognition of accomplishments from faculty, and support from peers and their broader cultural community as key mechanisms allowing students to persist in STEM (Malone & Barabino, 2008; Mitchell, 2011; Strayhorn, 2010). The role of cultural connection and support is especially salient for Native American students, as these have been linked to persistence in qualitative and quantitative studies (Delap, 2020; Lopez, 2018; Shotton, Oosahwe, & Cintrón, 2007; Shea et al., 2019; Smith et al., 2014; Tachine, Cabrera, & Yellow Bird, 2016; Waterman, 2012).

Even with the identification of these unique supports and barriers, quantitative studies often fail to find differences in supports and barriers among racial/ethnic groups, though this may be because studies testing the SCCT model often do not test for racial or ethnic differences (e.g., Lent et al., 2005). Turner and Lapan (2003) found that Native American and White middle school students reported similar levels of parental support. Herrera and Hurtado (2011) found no significant differences between a combined White and Asian STEM student sample versus a combined African American, Latino/a, and Native American STEM student sample in supports and barriers, though specific supports and barriers differed among samples in their utility for students' senior year interest in a STEM-related career. Some exceptions have been found, with students at historically Black colleges reporting significantly greater supports than students at predominantly White universities (Lent et al., 2005; Lent et al., 2010), suggesting there may be institutional and environmental factors affecting the supports students encounter as well as those they perceive. Neither study found significant differences in terms of barriers, however. In contrast, Grossman and Porche (2014) found that Black, Latino/a, and multi-racial high school students reported significantly lower odds of support for African Americans and Latinos/as in science than did White students.

Across gender and race/ethnicity, students report experiencing unique supports and barriers to their interest in and continuance in STEM. However, while women and people of color may experience unique supports and barriers, findings are mixed on the degree to which supports and barriers collectively differ across gender and race/ethnicity. Additionally, it is unclear whether these differences result in differential impacts on other critical sociocognitive variables. Given these ambiguities, the following research questions are posed:

Research Question 17: Are there gender differences in students' perceived supports and barriers?

Research Question 18: Do gender differences in students' perceived supports and barriers influence their relationships with a) self-efficacy, b) intentions to major in STEM and c) persistence in STEM?

Research Question 19: Are there racial/ethnic differences in students' perceived supports and barriers?

Research Question 20: Do racial/ethnic differences in students' perceived supports and barriers influence their relationships with a) self-efficacy, b) intentions to major in STEM and c) persistence in STEM?

The Present Study

As demonstrated, numerous studies have found support for the general SCCT model in STEM fields (engineering, Lent et al., 2008; Lent et al., 2013; computer sciences, Lent et al., 2011; mixed STEM majors, Lent et al., 2005), including a meta-analysis of the SCCT model from 30 years of research (Lent et al., 2018). The SCCT model has also been found to hold for diverse groups, including comparisons of men and women STEM student samples (Inda et al., 2013; Lent et al., 2013), White and underrepresented group STEM student samples (Lent et al., 2008; 2013; Navarro et al., 2014), and even among limited studies examining the intersectionality of gender and race/ethnicity in STEM student samples (Byars-Winston & Rogers, 2019; Lent et al., 2018). Despite this consensus in model fit, gender and racial/ethnic differences have been observed in critical SCCT variables, as well as the strength of predicted relationships among certain groups.

While the literature on SCCT, STEM, and underrepresented groups is robust, it is far from complete. Studies are mainly conducted using cross-sectional student samples pursuing a specific STEM degree (e.g., engineering). Attempts to test the model among diverse groups has mainly been limited to White, Black, and/or Latinx students (e.g., Byars-Winston & Rogers, 2019; Flores, Navarro, Lee, Addae, et al., 2014; Lent et al., 2005). Other studies combine racial/ethnic minorities into a single category to obtain a sufficient sample with which to test specific propositions of the SCCT model. Studies also tend to test specific portions of the SCCT model (c.f., Lent et al., 2018), such as the interest-choice segmental model, rather than the overall model, providing an incomplete picture of how the various components of SCCT function collectively. Outcome measures (i.e., actions in the SCCT framework) also tend to be self-report data of students' intentions to pursue a STEM major and are therefore not based on students' actual progress towards degree.

Given these limitations, the present study seeks to fill these critical gaps by examining the expanded SCCT model (see Figure 2 for a graphical representation) among STEM students from multiple degree fields. Specifically, the fit of the SCCT model among a longitudinal sample of White, Asian, and Native American men and women was examined, as well as whether potentially relevant variables unique to Native American students improved model fit or were predictive of Native American student experiences in STEM. Native Americans are the most understudied population in STEM, as well as higher education, and more research is needed to fully understand the challenges Native American students face in entering, pursuing, and obtaining a STEM degree. Additionally, focusing on specific racial/ethnic minority groups rather than examining them in combination allows for examination of unique differences among these groups that may impact the overall fit of the SCCT model. For example, Native Americans have a unique relationship with the U.S. government, as Tribal Nations maintain sovereign status, meaning Indigenous peoples are citizens of Tribal Nations that may have a unique government-to-government relationship with the United States based on their status as federally recognized tribes (Brayboy, 2005; Shotton, 2020). This liminality of Native peoples, as Brayboy (2005) refers to it, highlights their status as both a unique racial/ethnic group *and* a legal/political group. That is, Native American citizenship and tribal sovereignty place Native peoples in a unique space because their experiences are not just reflective of their culture and tradition, but their status as members of a self-governing nation with potentially unique ties and agreements with the U.S. federal government (Brayboy, 2005).Due to this liminality, Native American students encounter unique supports and barriers to pursuing higher education that other racial/ethnic groups do not because of the duality of Native peoples as both a racial and legal/political group. Failing to capture these differences and account for them in the SCCT model may result in less-than-optimal findings, potentially translating to less successful approaches to increase representation in STEM.

Method

Participants and Procedures

Participants were 1,314 Native American, Asian, and White undergraduate students (56.8% women; 41.2% Native American) majoring in STEM (see Table 2 for full sample characteristics) who participated in a longitudinal student achievement study from Spring 2014 to Spring 2019. Due to small sample size, individuals who chose “other” or did not report their gender were excluded from gender-based analyses. Students of other racial or ethnic backgrounds (i.e., Black or African American, Hispanic, Pacific Islander) were not included due to insufficient sample size.

The main study is a multiple-cohort, online survey study that investigated Native American students' interest, persistence, and success in STEM fields. Based on their consistent representation in STEM fields, Asian students and White students were selected as the comparison groups. Eligible students were invited to participate in an online survey. Following the initial survey, students were continuously invited to subsequent surveys. Each survey took about 30 to 45 minutes to complete. Participants were compensated with a $20 gift card for every survey that they completed. The survey utilized measures that are outlined in the SCCT framework, including background/contextual affordance variables, learning experiences, interest in STEM fields, intention to major in a STEM field, etc.

The data collection process started in the spring semester of 2014 and ended in the spring semester of 2019. Although repeated measures were assessed on an annual basis, the survey was launched every semester such that some participants started in the spring semester while others started in the fall semester. With the exception of the Spring 2017 – Spring 2018 semesters of data collection, new participants were invited to complete the survey during every data collection period. In other words, participants could start the initial survey at any given semester between Spring 2014 and Fall 2016 and were continuously invited to subsequent surveys until Spring 2017, when data collection was restricted due to funding limitations. Broader data collection efforts resumed in Fall 2018 upon receipt of further funding, with every effort made to re-recruit participants from previous cohorts, as well as inviting new participants to participate. The study consisted of a total of 8 cohorts as defined by the semester that they started the survey (see Table 3).

Measures

For ease of organization, measures are presented in the same order as the proposed SCCT framework for the current study (see Figure 2). Model testing variables are presented first, followed by each component in the SCCT framework. Given the use of these measures in a unique context and measure modifications to fit the larger research effort, all measures except model testing variables were subjected to exploratory factor analyses (EFAs) using full information maximum likelihood (FIML) and a robust estimator (MLR) to account for non-normal, missing data. Internal reliability coefficients, descriptive statistics, and variable sample sizes based on final factor analytic results are summarized in Table 4.

Model testing variables.

Gender and race/ethnicity. Gender and race/ethnicity were assessed in the initial survey sent to participants. Participants reported their gender with a single item, with options for "male", "female", and "other". Race/ethnicity was reported from a single check-all-that-apply item, with options for "Black or African-American", "Asian", "White", "Native American or Alaska Native", "Native Hawaiian or Other Pacific Islander", and "Hispanic or Latino". Given the underrepresentation of Native American students in research, a broad definition of race/ethnicity was used to classify students into racial/ethnic groups for the present study. Specifically, students who indicated they were Native American, regardless of other selected responses, were classified as Native American. Similarly, students who indicated they were Asian (provided they did not also select Native American) were classified as Asian, regardless of other selected responses. A more restrictive classification was given for White students, however, as they make up the majority of undergraduate students at the focal university. To be classified as White, a participant had to select White and no other response. While students from other racial/ethnic groups also responded to the survey, they were not the focal groups for the broader research effort and had insufficient sample sizes to be included in analyses.

Person inputs.

Goal orientation. Goal orientation was measured using a modified version of VandeWalle's (1997) Goal Orientation for Work scales. The original scale consists of 13 items assessing three goal orientations—learning (5 items), prove (4 items), and avoid (4 items). Items were modified to replace "work" with "school" or "academic", depending on the context of the item. Sample items include *I am willing to select a challenging assignment that I can learn a lot from* (Learning), *I try to figure out what it takes to prove my ability to others at school* (Prove), and *I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others* (Avoid). Factor analytic results indicated one item should be dropped due to poor loading on any factor, with the final 3-factor solution of learning (5 items), prove (3 items), and avoid (4 items) fitting the data well. Participants rated items on a 7-point Likert scale (1 = Strongly Disagree, 7 = Strongly Agree), with higher scores indicating greater identification with the goal orientation subdimension.

Implicit theories of math. Implicit theories of math ability were measured using a modified version of Dweck's (1999) 8-item measure of implicit theories of intelligence. Similar to Chen and Usher (2013), the measure was modified to reflect "math ability" instead of general intelligence, resulting in an 8-item measure assessing math. While studies generally conceptualize implicit theories as a unidimensional construct (Chen & Usher; Lin, Lee, Snyder, 2018; Tarbetsky, Collie, & Martin, 2016), results from the factor analysis indicated a 2-factor solution—fixed belief and malleable belief—fit the scale best, so items were separated out into fixed beliefs (4 items) and malleable beliefs (4 items). Participants rated the items using a 6-point

Likert scale (1 = Strongly Disagree, 6 = Strongly Agree). Sample items include *You can learn new things, but you can't really change your basic math ability* (fixed belief) and *No matter how much math ability you have, you can always change it quite a bit* (malleable belief). Higher scores on the subscales indicate stronger belief that math ability is fixed or malleable.

Background or contextual factors.

Previous math and science courses. Previous math and science courses were measured with check-all-that-apply items. Participants were asked to select all of the math classes that they have taken from a list of eight classes—Pre-Algebra, Algebra, Geometry, Trigonometry/Algebra II, Pre-Calculus, Calculus I, Calculus II, and Statistics. Similarly, participants were asked to select all of the science classes that they have taken from a list of five classes—Biology, Chemistry, Physics, Environmental Science, and Computer Science. Higher numbers of classes taken indicate that participants have greater exposure to math or science in high school.

Tribal identity. Native American participants received additional questions assessing their participation in their tribe and tribal activities. Questions were generated by the research team asking participants about their connection (3 items) and involvement (2 items) in their tribe, as well as their knowledge of tribal history and tradition (1 item) and tribal language (3 items). Sample items include *How would you rate your involvement in your Native American culture?* (involvement), *How would you rate your connection to Native American culture?* (connection), *How well do you understand your tribal history and traditions?* (history and tradition), and *How well do you understand any tribal languages?* (language). Factor analytic results indicated four items needed to be dropped due to poor loadings and poor representation of a second factor, resulting in a 1-factor solution with 5 items. Participants rated each set of questions using the relevant 4-point Likert scale, with higher scores indicating greater tribal identity.

Learning experiences. Learning experiences were measured with the Learning Experience Questionnaire (LEQ; Schaub, 2004; Schaub & Tokar, 2005). For the present study, only Realistic and Investigative subscales were used, as these have been most heavily linked to STEM occupations. The LEQ is a multidimensional scale that assesses the extent to which individuals are exposed to and competent with activities that are specific to Holland's (1997) RIASEC occupational themes. Each occupational theme consists of 20 items that assess the extent to which participants were exposed to, have past accomplishments in, or have negative experiences with RIASEC-oriented activities. However, in addition to assessing Holland's RIASEC domains, the LEQ was also designed to assess Bandura's (1986) sources of self-efficacy—performance accomplishments, vicarious learning, verbal persuasion, and emotional arousal. Therefore, each 20-item scale could be further broken down into 5-item subscales of sources of self-efficacy for the RIASEC domain (e.g., Realistic performance accomplishments, vicarious learning, verbal persuasion, and emotional arousal).

Given the multidimensional nature of the scale, an initial EFA of all 40 items did not yield a viable, easily interpretable solution. Therefore, EFAs were conducted separately on the Realistic and Investigative scales. For the Realistic scale, a 2-factor solution with 11 items was the most appropriate. One factor (Demonstrated Abilities) consists of 6 items measuring a combination of performance accomplishment and verbal persuasion items, whereas the second factor matches the original 5-item emotional arousal subscale (reverse-scored). Similarly, the EFA for the Investigative scale indicated a 2-factor solution with 8 items was most appropriate. One factor (Learning Influences) consists of 5 items measuring a combination of vicarious learning and verbal persuasion items focused on influential figures in investigative learning experiences, whereas the second factor was a shortened 3-item version of the original emotional arousal subscale (reverse-scored). Participants rated the items using a 6-point Likert scale (1 = Strongly Disagree, 6 = Strongly Agree). Higher scores on Demonstrated Abilities or Learning Influences indicate higher learning experiences, whereas higher scores on the emotional arousal subscales indicate lower levels of emotional arousal in the relevant domain.

Self-efficacy.

Math self-efficacy. A modified version of Usher and Pajares' (2009) Sources of Middle School Mathematics Self-Efficacy Scale was used to measure math self-efficacy. The original scale consists of 24 items assessing four sources of self-efficacy—mastery experience (6 items), vicarious experience (6 items), social persuasions (6 items), and physiological state (6 items). For the present study, vicarious experience items were excluded as the original scale was only tested on middle school students and may not accurately reflect vicarious experiences of college students. Factor analytic results indicated a 3-factor solution was best, with 2 items dropped from the original scale due to high cross-loadings. The final scale consisted of mastery experience (5 items), social persuasions (5 items), and physiological states (6 items, reverse-scored). Participants rated the extent to which statements were true or false for them using a 6-point Likert scale (1 = Definitely False, 6 = Definitely True). Higher scores indicate greater math self-efficacy in the relevant domain.

Science self-efficacy. A modified version of Usher and Pajares' (2009) Sources of Middle School Mathematics Self-Efficacy Scale (as described above) was used to measure science self-efficacy. Items were changed to refer to "science" instead of "math", and instructions listed science as referring to biology, chemistry, Earth science, geology, and computer science. Factor analytic results indicated a 3-factor solution was best, with 1 item dropped from the original scale due to high cross-loadings. The final scale consisted of mastery experience (5 items), social persuasions (6 items), and physiological states (6 items, reverse-scored). Participants rated the extent to which statements were true or false for them using a 6-point Likert scale (1 = Definitely False, 6 = Definitely True). Higher scores indicate greater science self-efficacy in the relevant domain.

Outcome expectations. Outcome expectations were measured using a modified version of Byars-Winston et al.'s (2010) 18-item Outcome Expectations scale, which was originally adapted from Lent et al. (2001). Negatively worded items were removed for the present study, resulting in a 12-item scale. As the current study was interested in assessing outcome expectations for individuals majoring in STEM, participants were instructed to indicate the extent to which "graduating with a bachelor's degree with a major **<u>in a science, technology, engineering, or mathematics field</u>**" would allow them to meet certain financial, career, and other expectations. Sample items include *receive a good job offer* and *increase my sense of self-worth*. Two additional items were added based on the goals of the current study—*help the community that I grew up in* and *help the community where I will be living in the future*. Factor analytic results of the revised 14-item scale indicated a 2-factor solution was best, with 1 item dropped due to high cross-loadings and 2 items dropped that represented a poorly covered third factor. The final scale consisted of internal (6 items) and external (5 items) outcome expectations rated on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree), with higher scores indicating more positive internal and external outcome expectations.

Interests.

Research interests. Research interests were assessed with a modified version of Bishop and Bieschke's (1994) Interest in Research Questionnaire. The original 16-item scale was modified to address undergraduate students, as the original scale was utilized for graduate and postdoctoral samples (Bieschke, Bishop, & Herbert, 1995; Bishop & Bieschke, 1998). Six items were also removed as they were deemed inappropriate for undergraduate students. The resulting 10-item scale was factor analyzed and indicated a 1-factor solution was most appropriate. Three items were removed due to high cross-loadings and loading on a poorly represented factor (i.e., two items or less). The final 7-item scale asked participants to rate the extent to which they were interested in a list of research-related activities on a 5-point Likert scale (1 = Very Uninterested, 5 = Very Interested), with higher scores indicating greater research interest.

STEM interests. Interest in STEM was assessed using Lent et al.'s (2001) interest in science and math measure. The 8-item scale asks participants to rate the extent that they are interested in science or math subjects (e.g., *Statistics* and *Chemistry*) on a 5-point Likert scale (1 = Strongly Dislike, 5 = Strongly Like). Factor analytic results of the interest in STEM subjects scale indicated a 1-factor solution fit best. Two items were dropped due to low factor loadings. The remaining 6-item scale was averaged, with higher scores indicating greater interest in STEM subjects.

Intention to major in STEM. Participants' intentions to major in STEM were assessed using a modified version of Lent et al.'s (2003) educational goals measure. While the original scale focused on engineering, items were modified to reflect "science/technology/engineering/math" as the focus. The extent to which participants agreed with three items (e.g., *I intend to major in a science/technology/engineering/math field.*) was assessed using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). Higher scores were indicative of a stronger intention to major in STEM fields.

Persistence in STEM degree. Persistence was calculated based on students' academic records data. For those students who gave their permission, information was obtained on the number of credit hours completed at OU and the number of semesters a student could have been enrolled at OU since the student's most recently admitted term. Semester enrollment consisted of spring, summer, and fall enrollment at the university. The resulting number was calculated by dividing the number of credit hours completed by the number of possible semesters enrolled, either from admittance to graduation or from admittance to 6 years or 18 semesters post-admittance for all individuals who had not yet graduated. Higher numbers are indicative of greater persistence towards a STEM degree.

Perceived supports. Perceived support for pursuing a STEM major was assessed using Lent et al.'s (2001) 15-item supports subscale from the Perceived Contextual Supports and Barriers to the Pursuit of Math- and Science-Related Educational Options measure, which includes four sources of support—social support and encouragement, instrumental assistance, access to role models or mentors, and financial resources. Instructions from the original scale were modified such that participants were asked to assume they were majoring in a STEM-related college major. This was primarily done because the broader data collection effort of which this study was a part included undergraduates pursuing both STEM and non-STEM degrees. However, for the current study, only STEM majors were included.

Factor analytic results indicated a 2-factor solution was the best fit, with 2 items dropped for high cross-loadings, 2 items dropped for poor representation of an initial third factor, and one item dropped for a high residual covariance with another item in the scale. The final scale consisted of instrumental and social supports (6 items) and financial resources (4 items). Participants rated the extent to which they would experience various supports on a 5-point Likert scale (1 = Not at All Likely, 5 = Extremely Likely). Scores were averaged, with higher scores indicating stronger positive expectations relative to the pursuit of a STEM major.

Perceived barriers. Perceived barriers for pursuing a STEM major were assessed using Lent et al.'s (2001) 21-item barriers subscale from the Perceived Contextual Supports and Barriers to the Pursuit of Math- and Science-Related Educational Options measure, which includes four sources of barriers—social or family influences, financial constraints, instructional barriers, and gender and race discrimination. Instructions from the original scale were modified such that participants were asked to assume they were majoring in a STEM-related college major. This was primarily done because the broader data collection effort of which this study was a part included undergraduates pursuing both STEM and non-STEM degrees. However, for the current study, only STEM majors were included.

Factor analytic results indicated a 2-factor solution was the best fit, with 7 items dropped for high cross-loadings and 4 items dropped for poor representation of an initial third and fourth factor. The final 10-item scale consisted of social and family influences (7 items) and financial constraints (3 items). Participants rated the extent to which they would experience various barriers on a 5-point Likert scale (1 = Not at All Likely, 5 = Extremely Likely). Scores were averaged, with higher scores indicating greater expectations of barriers relative to the pursuit of a STEM major.

Survey Design and Data Management

In many applied research settings, the most common metric of time is simply the wave of assessment. However, depending on the research questions, it may be more appropriate to use an alternative metric of time, such as the chronological age of the participants (Bollen & Curran, 2006). In the current study, the metric of time was defined as the number of semesters a person had spent in college since their most recent term admitted to the university, with one semester representing one unit of time. That is, the first time point would represent students' first semester in college upon being admitted, second time point would represent students' second semester in college since being admitted, and so on. Semester counts included the spring, summer, and fall semesters, with 3 semesters representing one full academic year since a participant was admitted to the university. Since participants of any academic year could participate in the survey at any given point of assessment, not all participants started the survey in the first semester of their most recent admittance.

For example, for the cohort that started the study in Spring 2014 (CM1), a first-year college student would have the opportunity to provide a set of eight repeated measures which covers his or her first year, second year, third year, and fourth year in college (assuming normal progress towards degree). In comparison, those who started the survey in Fall 2018 (CM7) would have the opportunity to provide only two semesters of data with no repetition of variables before the end of the data collection process. Despite being invited to the survey, participants could skip surveys at any time. In other words, the opportunity to take the survey is not equivalent to the presence of data. Data would be missing for participants who have graduated or were no longer interested in participating.

The current study utilized two forms of data. The first form of data consisted of participants' responses to surveys that they completed online. SCCT variables such as goal orientation and family attitudes towards education, interest in STEM, and intention to major in STEM were available in survey data. Certain SCCT variables (i.e., some person inputs and background/contextual affordances) were only collected in the initial survey, whereas other variables such as math self-efficacy and proximal supports and barriers were collected at multiple time points. Given this overlap in data, variables included in different components of the model were collected at specific time points for each individual (see Table 3). Specifically, the more distal components of the SCCT model were collected between a participant's first and sixth semester since attending the university. The more proximal components of the model were collected between a participant's fourth and ninth semester since attending the university. Because of individual differences in data collection timing, this resulted in approximately 3 – 5 timepoints of data being utilized for model testing.

The second form of data consisted of participants' academic records, which could be retrieved from the university's information storage system at any given point in time for those students who agreed to release these records. Academic variables such as number of credit hours completed in a given semester, choice of major, and time of enrollment were available in academic records. The survey data were merged with the academic data via the link between students' participant identification number and their student identification number and were reassembled in a wide format with variables arranged in order from more distal to more proximal variables.

Results

Data Screening

Data screening was conducted using IBM SPSS 26.0 and MPlus version 8.5 (Muthén & Muthén, 1998–2017). When screening the data for missing values using SPSS's multiple imputation feature, I found missing data in 965 (73.44%) out of 1,314 participants across the items making up the 27 main variables—excluding gender, race/ethnicity, and Native American-specific variables—used in the present study. According to Little's MCAR test (Little & Rubin, 2002), the data are not missing completely at random, $\chi^2(841) = 1027.145$, $p < .001$, suggesting systematic attrition may be occurring. Given the study design and procedures for data management (see Table 3), this finding is not unexpected and suggests the use of listwise deletion or pairwise deletion in my model analyses would be inappropriate. Therefore, the data are assumed to be missing at random (MAR) for the purposes of my analyses.

Next, data were examined for non-normality. Variables were considered to be non-normal if the absolute value of skew > 3 or if the absolute value of kurtosis > 10 (Weston & Gore, 2006). The majority of variables examined contained levels of skew above the threshold for non-normality (k = 19), though only one variable (intention to major in STEM) had kurtosis values above the threshold. Given the presence of non-normal, missing data, all of my analyses were conducted using maximum likelihood estimation methods with robust standard errors (MLR) in MPlus. MPlus also utilizes full information maximum likelihood (FIML) by default as a mechanism to handle missing data, which has been shown to be robust to non-normal, missing data for multivariate normal and multivariate non-normal samples (Collins, Schafer, & Kam, 2001; Enders, 2010; Jia, 2016; Yuan, Yang-Wallentin, & Bentler, 2012). Assuming the data are MAR, FIML is an appropriate technique to handle missingness (Collins et al.; Enders; Yuan et al.).

Finally, data were examined for multivariate outliers. Given the majority of participants had some amount of missing data, multivariate outliers could not be readily assessed prior to analyses. However, MPlus has the capability to assess multivariate outliers within each analysis performed using a variety of multivariate outlier detection techniques. For the present study, I assessed multivariate outliers using Cook's *D* (COOKS) and Mahalanobis distance (MAHALANOBIS). For each analysis, a participant was removed if their distance score was greater than or equal to 1 (Cook, 1997) and their Mahalanobis distance p-value was less than p = 0.001 (Tabachnick & Fidell, 2007).

Full Sample Analyses

Model testing was conducted using structural equation modeling (SEM) in MPlus version 8.5. Following Kline (2011), I employed a two-step modeling approach where I first fit a measurement model to the data and then tested the structural model. Model fit was assessed using the chi-square test statistic, though as this statistic is highly sensitive to sample size (Cheung & Rensvold, 2002), I also examined the comparative fit index (CFI), Tucker–Lewis Index (TLI), root mean squared error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Acceptable levels of fit may be inferred from CFI and TLI values ≥ .90 (Hoyle & Panter, 1995), SRMR values ≤ .08 (Hu & Bentler, 1999), and RMSEA values ≤ .08 (Browne & Cudeck, 1992). However, higher levels of CFI and TLI (≥ .95) and lower levels of SRMR and RMSEA (≤ .05) are preferable, as these indicate better fit (Hu & Bentler). Potential modifications to model fit were examined based on modification indices, with adjustments to the model made based on both theoretical and empirical considerations.

When comparing nested models (i.e., comparing structural models or testing gender and race invariance in the measurement and structural models), I used chi-square tests of difference to determine which models to retain (Kline, 2011). Given the use of MLR, the Satorra–Bentler scaled chi-square test of differences (S-B $\Delta\chi^2$) was calculated with an equation based on the chi-square values, scaling correction factors, and degrees of freedom of each nested (i.e., more restrictive) and comparison (i.e., less restrictive) model (Satorra & Bentler, 2001). However, as with the regular chi-square test, the S-B $\Delta\chi^2$ has been found to be affected by sample size and model complexity (Cheung & Rensvold, 2002). Therefore, more practical criteria were also used to determine which models to retain. Based on recommendations from the literature (Chen, 2007; Cheung & Rensvold, 2002; Kimber, Rehm, & Ferro, 2015; Wang & Wang, 2012), a value of the change in CFI (ΔCFI) or TLI (ΔTLI) greater than or equal to 0.01, as well as a value of the change in RMSEA (ΔRMSEA) greater than or equal to 0.015, indicate two models differ to a meaningful degree. Non-nested models were compared based on the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), with lower values indicating less misfit (Kline, 2011).

Model building process. The construction of the full sample measurement and structural models was an iterative process beginning with complete item-level data based on EFA results (see Table 5). In the measurement model, each latent variable was successively added to the model beginning with person inputs and ending with perceived supports and barriers. At each stage, correlated uniquenesses were added based on a) model modification indices that indicated a substantial improvement in model fit or b) EFA results that indicated items had residual covariances greater than 10. This resulted in an initial item-level measurement model with 14 correlated uniquenesses (see Table 5 for a complete list). The item-level measurement model had an acceptable fit to the data (see Table 6), so the structural model was assessed based on the hypothesized model in Figure 2. While this model was also considered an acceptable fit to the data (see Table 6), both models were too complex to attempt to conduct multiple-groups analyses. With the exception of the female sample, the number of free parameters in both the measurement and structural models was greater than the sample size for the analysis, which violates best practices for SEM (Kline, 2011).

Given the issue of model complexity, a simplified measurement model was developed based on theoretical and empirical considerations. Items with standardized loadings of 0.60 or higher were retained, and latent variables based on multiple subscales of a unidimensional construct[1] (i.e., math self-efficacy, science self-efficacy, and outcome expectations) were created using subscales as indicators. All other latent variables used item-level indicators. This simplified measurement model significantly reduced the number of correlated uniquenesses (*n* = 4; see Table 5) and fit the data better than the purely item-level model as evidenced by lower values of the AIC and BIC. The simplified structural model (see Figure 3) was also significantly less complex and fit the data better based on lower AIC and BIC values (see Table 6). Both models were also acceptable for performing multiple-groups analyses in terms of the number of free parameters compared to subgroup sample sizes.

While the simplified structural model fit the data well, the model assumed full mediation between person inputs, background characteristics, and self-efficacy and outcome expectations. This is contrary to both SCCT theory and research findings that indicate direct relationships between these variables. Therefore, an alternative simplified structural model was also tested (see Figure 4) with direct paths between a) person input variables and self-efficacy and outcome expectations, b) background characteristics and self-efficacy and outcome expectations, and c) perceived supports and barriers and self-efficacy. This alternative model also fit the data well and the S-B $\Delta\chi^2$ was significant (see Table 6), indicating the alternative model fit the data significantly better than the original simplified model. While the more practical criteria (i.e., ΔCFI, ΔTLI, ΔRMSEA) did not reach the critical values for model differences, based on SCCT theory and previous research findings, the alternative structural model was retained for all further analyses. The final model with significant standardized path coefficients is shown in Figure 5. The full list of direct and indirect effects can be found in Table 7.

[1] Attempts to simplify perceived supports and barriers and learning experiences variables resulted in inadmissible solutions.

Full Sample Results

Person inputs, background characteristics, and learning experiences. Hypotheses 1 and 2, as well as Research Question 1, focus on the relationships between goal orientation and learning experiences. Learning goal orientation was hypothesized to be positively related to learning experiences (H1), avoidance goal orientation was hypothesized to be negatively related to learning experiences (H2), and the relationship between prove goal orientation and learning experiences was left as an exploratory question (RQ1).

Based on results from the standardized model, LGO positively predicted both Realistic demonstrated abilities ($\beta = 0.17$) and Investigative learning influences ($\beta = 0.26$) but was not predictive of physiological arousal for either domain. Thus, higher LGO resulted in increased Realistic demonstrated abilities and Investigative learning influences but did not impact physiological arousal, partially supporting H1. PGO-A negatively predicted Realistic demonstrated abilities ($\beta = -0.29$), Realistic physiological arousal ($\beta = -0.43$), and Investigative physiological arousal ($\beta = -0.22$), but was not predictive of Investigative learning influences. Thus, higher PGO-A resulted in decreased Realistic demonstrated abilities. However, given that physiological arousal was reverse-coded, these results indicate that higher PGO-A resulted in higher levels of physiological arousal. Though not explicitly hypothesized, this relationship is expected given that high PGO-A individuals are motivated to avoid failure and therefore may be more likely to experience higher physiological arousal states (Payne et al., 2007). Thus, H2 was also partially supported. PGO-P positively predicted both Realistic demonstrated abilities ($\beta = 0.16$) and Investigative learning influences ($\beta = 0.17$). PGO-P was marginally significant for Realistic physiological arousal ($\beta = 0.15$, $p = 0.056$), but was not predictive of Investigative physiological arousal. Thus, higher PGO-P resulted in increased Realistic demonstrated abilities and Investigative learning experiences, and initial evidence indicates higher PGO-P may also lead to lower levels of Realistic physiological arousal. PGO-P does not appear to impact Investigative physiological arousal, however.

Hypotheses 3 and 4 focus on the relationship between math ability beliefs and learning experiences. More malleable math beliefs were hypothesized to be positively related to learning experiences (H3), whereas more fixed beliefs were hypothesized to be negatively related to learning experiences (H4). However, neither fixed or malleable math ability beliefs were significantly related to any learning experiences, so H3 and H4 were not supported.

Hypotheses 5a and 5b, as well as Research Question 3, focus on the relationship between high school math and science courses and learning experiences. Higher numbers of high school math (H5a) and science (H5b) courses were hypothesized to positively predict learning experiences, while the potential for differential prediction among these courses was left as an exploratory question (RQ3). High school math courses were negatively predictive of Realistic physiological arousal ($\beta = -0.10$) and positively predictive of Investigative learning influences ($\beta = 0.13$) but did not impact Realistic demonstrated abilities or Investigative physiological arousal. High school science courses were marginally significant for predicting Investigative physiological arousal ($\beta = 0.09$, $p = 0.088$), but did not impact any other learning experience factors. Based on these findings, higher numbers of high school math classes led to increased Realistic physiological arousal and Investigative learning influences, whereas higher numbers of high school science classes led to lower levels of Investigative physiological arousal. Thus, hypotheses 5a and 5b were partially supported. In terms of RQ3, there appears to be differential prediction between high school math and science in that only one set of classes was predictive of learning experiences, though caution should be taken with high school science as this relationship may be spurious.

Learning experiences, self-efficacy, and outcome expectations. Hypotheses 6-8 focus on the relationships between learning experiences, self-efficacy, and outcome expectations. Learning experiences were hypothesized to positively predict self-efficacy (H6) and outcome expectations (H7), and the relationship between learning experiences and outcome expectations was hypothesized to be mediated through self-efficacy (H8). Realistic demonstrated abilities (β = 0.28), Realistic physiological arousal (β = -0.25), and Investigative physiological arousal (β = 0.39) all significantly predicted math self-efficacy. Realistic demonstrated abilities (β = 0.24), Realistic physiological arousal (β = -0.32), Investigative learning influences (β = 0.18), and Investigative physiological arousal (β = 0.63) all significantly predicted science self-efficacy. Specifically, higher Realistic demonstrated abilities led to higher math and science self-efficacy, lower levels of Realistic physiological arousal led to decreased math and science self-efficacy, higher Investigative learning influences led to higher science self-efficacy, and lower levels of Investigative physiological arousal led to increased math and science self-efficacy. Thus, H6 was partially supported. In contrast, none of the learning experience factors directly predicted outcome expectations, so H7 was not supported.

To test for mediation, the MODEL INDIRECT command was used in the full sample final structural model (see Table 7). For each learning experience factor, the direct, specific indirect path, total indirect effect, and total effect (i.e., combined direct and indirect effects) were estimated related to outcome expectations. None of these effects were significant, indicating that in addition to no direct effects for learning experiences on outcome expectations, there were no indirect relationships between learning experiences and outcome expectations via self-efficacy. Thus, H8 was not supported.

Direct and indirect effects of person inputs and background characteristics on self-efficacy and outcome expectations. Though not originally hypothesized in the current study, given the final structural model features direct paths from person inputs and background characteristics to self-efficacy and outcome expectations, a discussion of these exploratory results is warranted. LGO positively predicted math ($\beta = 0.16$) and science ($\beta = 0.13$) self-efficacy but was not predictive of outcome expectations. PGO-P and PGO-A were not predictive of math self-efficacy, science self-efficacy, or outcome expectations. Thus, higher LGO lead to higher math and science self-efficacy but was not predictive of outcome expectations, and neither PGO-P or PGO-A impacted self-efficacy or outcome expectations.

In terms of indirect effects, the indirect effect from LGO to math self-efficacy through Realistic demonstrated abilities ($\beta = 0.05$) and the total effect from LGO to math self-efficacy ($\beta = 0.21$) were significant. The total indirect effect was marginally significant ($\beta = 0.06$, $p = 0.059$). Thus, the positive relationship between LGO and math self-efficacy is partially mediated through Realistic demonstrated abilities. The relationship from LGO to science self-efficacy also indicated partial mediation through learning experiences. Specifically, the indirect effect was significant through Realistic demonstrated abilities ($\beta = 0.04$) and Investigative learning influences ($\beta = 0.05$), thus supporting partial mediation from LGO to science self-efficacy through these variables. No other specific indirect effects were significant, but both the total indirect effect ($\beta = 0.12$) from LGO to science self-efficacy and the total effect ($\beta = 0.15$) were significant. None of the specific indirect effects from LGO to outcome expectations were significant, though the total indirect effect was marginally significant ($\beta = 0.15$, $p = 0.092$) and the total effect was significant (β = 0.12). These findings indicate that while no specific path from LGO to outcome expectations is significant, their combined effects are significant and positive. There is also preliminary evidence that the overall indirect effect may positively mediate the relationship between LGO and outcome expectations.

For PGO-P, the specific indirect effect of PGO-P on math self-efficacy through Realistic demonstrated abilities was marginally significant (β = 0.06, $p = 0.059$). No other specific indirect effects were significant, and the total indirect and total effect were not significant. Taken together, these findings present preliminary evidence that the relationship between PGO-P and math self-efficacy may be fully mediated by Realistic demonstrated abilities, though the size of this effect is relatively small. Mediation analyses for PGO-P and science self-efficacy found that the indirect effect through Realistic demonstrated abilities was significant (β = 0.04), and marginal significance was found for the indirect effect of Investigative learning influences (β = 0.03, $p = 0.057$). No other specific indirect effects were significant, nor were the total indirect or total effects significant. This indicates a positive relationship between PGO-P and science self-efficacy is fully mediated through Realistic demonstrated abilities and may also be positively mediated through Investigative learning influences. Mediation analyses for PGO-P and outcome expectations revealed no significant effects.

For PGO-A and math self-efficacy, the specific indirect effects through Realistic demonstrated abilities (β = -0.08), Realistic physiological arousal (β = 0.11), and Investigative physiological arousal (β = -0.09) were significant. No other effects were significant, indicating full mediation through the relevant learning experiences variables for the relationship between PGO-A and math self-efficacy. Similar findings were obtained for the relationship between PGO-A and science self-efficacy, with significant specific indirect effects through Realistic demonstrated abilities (β = -0.07), Realistic physiological arousal (β = 0.14), and Investigative physiological arousal (β = -0.14) but no other significant effects. These findings also indicate full mediation through the relevant learning experiences variables for the relationship between PGO-A and science self-efficacy. Mediation analyses for PGO-A and outcome expectations revealed no significant effects.

In terms of direct effects of math ability beliefs, fixed beliefs negatively predicted science self-efficacy (β = -0.21) but did not impact math self-efficacy or outcome expectations. Malleable beliefs did not significantly predict self-efficacy or outcome expectations. Thus, higher fixed beliefs in math ability led to lower science self-efficacy but did not impact math self-efficacy or outcome expectations, and malleable beliefs were not a significant predictor of self-efficacy or outcome expectations. When examining indirect effects of math ability beliefs, there were no significant effects between fixed beliefs or malleable beliefs and math self-efficacy. Only the direct effect of fixed beliefs on science self-efficacy was significant, indicating no mediation of this relationship. There were no significant effects for mediation analyses of malleable beliefs and science self-efficacy, and neither fixed nor malleable beliefs had significant effects with outcome expectations.

For high school math and science classes, math classes positively predicted math self-efficacy (β = 0.25), science self-efficacy (β = 0.09), and was marginally significant in negatively predicting outcome expectations (β = -0.13, $p = 0.077$). High school science classes were also marginally significant in negatively predicting outcome expectations (β = -0.11, $p = 0.093$). Thus, higher numbers of math classes led to higher math and science self-efficacy but was related to lower outcome expectations for pursuing a STEM degree. High school science classes were not significantly related to self-efficacy but evidenced the same pattern with outcome expectations.

When examining indirect effects, math classes did not have any significant indirect effects with math self-efficacy, indicating this relationship was a strictly direct effect. However, the indirect effect of the relationship between math classes and science self-efficacy was significant for Investigative learning experiences ($\beta = 0.02$) and marginally significant for Realistic physiological arousal ($\beta = 0.03$, $p = 0.080$). The total indirect effect ($\beta = 0.08$) and total effect ($\beta = 0.17$) were also significant. Taken together, these findings indicate the relationship between math classes and science self-efficacy is partially mediated through Investigative learning experiences and may also be partially mediated through Realistic physiological arousal, though both of these effects are weaker than the direct effect of high school math classes on science self-efficacy. For high school math classes and outcome expectations, the total indirect effect was marginally significant ($\beta = 0.09$, $p = 0.056$), though no specific indirect effects or the total effect were significant. This indicates preliminary evidence that the total combined mediation paths may partially mediate the relationship between high school math classes and outcome expectations, though this should be interpreted with caution given the marginal significance of the direct effect.

When examining indirect effects for high school science classes, no significant effects were found for math self-efficacy, science self-efficacy, or outcome expectations. These findings further illustrate that high school science classes do not seem to influence self-efficacy and that any possible relationship with outcome expectations may be limited to a direct effect.

Self-efficacy, outcome expectations, STEM interests, STEM intentions, and STEM persistence. Hypotheses 11a-d, 12a-c, 14a-b, and 15-16 focus on the relationships between the core SCCT variables of self-efficacy, outcome expectations, interests, intentions, and persistence in a STEM major. Self-efficacy was hypothesized to positively predict outcome expectations (H11a), STEM interests (H11b), intentions to pursue a STEM major (H11c), and actual persistence in a STEM major (11d). Outcome expectations were hypothesized to positively predict STEM interests (H12a), intentions to pursue a STEM major (H12b), and actual persistence in a STEM major (12c). STEM interests were hypothesized to be positively related to intentions to pursue a STEM major (H14a) and persistence in a STEM major (H14b), with the relationship between STEM interests and persistence hypothesized to be mediated by STEM intentions (H15). Finally, STEM intentions were hypothesized to be positively related to persistence (H16).

Based on the full sample final structural model, math self-efficacy was marginally significant in predicting outcome expectations ($\beta = 0.15$, $p = 0.09$), though the relationship was in the expected direction. Science self-efficacy did not significantly predict outcome expectations. Thus, H11a was partially supported. Math self-efficacy did not significantly predict research interests but was a significant predictor of STEM interests ($\beta = 0.77$) in the hypothesized direction. Conversely, science self-efficacy was a significant predictor of research interests ($\beta = 0.33$) in the hypothesized direction but not a significant predictor of STEM interests. Both findings indicate higher science or math self-efficacy led to higher interest in research activities or STEM courses, respectively. Thus, H11b was also partially supported. Neither math or science self-efficacy were significant predictors of STEM intentions, and math self-efficacy was only marginally significant in predicting persistence in STEM ($\beta = 0.16$, $p = 0.077$), though the relationship was in the expected direction. Therefore, H11c was not supported and H11d was only partially supported.

Outcome expectations was marginally significant in predicting research interests (β = 0.11, $p = 0.085$) in the expected direction, indicating preliminary evidence that higher outcome expectations may lead to higher research interests, but did not significantly predict STEM interests. Thus, H12a was partially supported. Outcome expectations were significantly related to intentions to pursue a STEM major ($\beta = 0.27$) in the expected direction but did not significantly predict persistence in STEM. Thus, H12b was supported but H12c was not supported.

Research interests were marginally significant in predicting intentions to pursue a STEM major ($\beta = 0.09$, $p = 0.086$), though the relationship was in the hypothesized direction, indicating preliminary evidence that higher research interest may lead to higher intentions to pursue a STEM major. STEM interests positively predicted intentions to major in STEM ($\beta = 0.39$) in the expected direction, as well. Thus, H14a was supported. However, neither research interests nor STEM interests were significantly predictive of persistence, so H14b was not supported. Mediation analyses indicated no significant indirect effects between research interests or STEM interests in persistence, so H15 was not supported. The relationship between intentions to major in STEM and actual persistence was also not significant, so H16 was not supported.

Additional mediation analyses between person inputs, background characteristics, learning experiences, self-efficacy, outcome expectations, STEM interests, STEM intentions, and STEM persistence. Though not specifically hypothesized, additional mediation analyses were conducted on possible indirect effects between study variables in the full sample final structural model. For LGO, a significant indirect effect on research interests was found through Investigative learning influences and science self-efficacy ($\beta = 0.02$), as well as a significant total effect ($\beta = 0.12$) and total indirect effect ($\beta = 0.12$). Marginal significant indirect effects were found through science self-efficacy ($\beta = 0.04$, $p = 0.053$) and the combined path through Realistic demonstrated abilities and science self-efficacy (β = 0.01, $p = 0.069$). These findings indicate LGO may indirectly influence research interests through Investigative learning influences and science self-efficacy, as well as other potential mediation paths, and that the combination of mediating paths has a significant, positive influence on the relationship between LGO and research interests.

Significant specific indirect effects were also found between LGO and STEM interests through math self-efficacy (β = 0.12) and the combined path of Realistic demonstrated abilities and math self-efficacy (β = 0.04). The total effect (β = 0.19) and total indirect effect (β = 0.19) were also significant, though determination of partial or full mediation cannot be determined as the direct effect of LGO on research interests was not assessed. However, LGO does appear to positively influence STEM interests indirectly in the present model.

Marginally significant specific indirect effects were found between LGO and intentions to pursue a STEM major through the combined path of math self-efficacy and STEM interests (β = 0.05, $p = 0.063$) and the combined path of Realistic demonstrated abilities, math self-efficacy, and STEM interests (β = 0.01, $p = 0.071$). However, given the small parameter estimates, these effects may be spurious. The total effect (β = 0.13) and total indirect effect (β = 0.13) were significant, but this may also be due to the large number of indirect paths ($n = 75$) tested between LGO and STEM intentions. From LGO to STEM persistence, only the total effect (β = 0.08) and total indirect effect (β = 0.08) were significant, but this may also be due to the large number of indirect paths ($n = 100$) tested between LGO and STEM persistence.

For PGO-P, two marginally significant specific indirect effects were found between PGO-P and research interests through the combined path of Realistic demonstrated abilities and science self-efficacy (β = 0.01, $p = 0.079$) and the combined path of Investigative learning influences and science self-efficacy ($\beta = 0.01$, $p = 0.062$). However, given the small parameter estimates, these effects may be spurious. No other mediation analyses between PGO-P and research interests were significant. PGO-P and STEM interests also had a marginally significant specific indirect effect through Realistic demonstrated abilities and math self-efficacy ($\beta = 0.03$, $p = 0.061$), though this effect may be spurious given no other effects were significant. None of the mediation analyses for PGO-P and intentions to major in STEM or persistence in STEM were significant.

For PGO-A, three specific indirect effects were identified related to research interests. The combined paths of Realistic demonstrated abilities and science self-efficacy ($\beta = -0.02$); Realistic physiological arousal and science self-efficacy ($\beta = 0.05$); and Investigative physiological arousal and science self-efficacy ($\beta = -0.05$) were all significant. No other mediation analyses between PGO-A and research interests were significant, indicating PGO-A influences research interests at least partially through these specific paths. Three statistically significant specific indirect effects were also identified between PGO-A and STEM interests through the combined paths of Realistic demonstrated abilities and math self-efficacy ($\beta = -0.06$); Realistic physiological arousal and math self-efficacy ($\beta = 0.08$); and Investigative physiological arousal and math-self efficacy ($\beta = -0.07$). No other mediation analyses between PGO-A and STEM interests were significant, indicating PGO-A influences STEM interests at least partially through these specific paths. One specific indirect effect was identified between PGO-A and intentions to major in STEM through the combined path of Realistic demonstrated abilities, math self-efficacy, and interests in STEM ($\beta = -0.02$), though this effect is small. Two marginally significant specific indirect effects through the combined paths of Realistic physiological arousal, math self-efficacy, and STEM interests ($\beta = 0.03$, $p = 0.066$) and

Investigative physiological arousal, math self-efficacy, and STEM interests (β = -0.03, p = 0.063) were also identified. These effects may be spurious due to the number of indirect paths tested and as evidenced by the lack of significant effects for any other mediation analyses. None of the mediation analyses between PGO-A and persistence were significant.

When examining indirect effects of math ability beliefs on other social cognitive variables, fixed beliefs had a marginally significant indirect effect on research interests through science self-efficacy (β = -0.07, p = 0.080), indicating preliminary evidence that fixed beliefs of math ability negatively influences research interests via science self-efficacy. However, no other mediation analyses were significant between fixed beliefs and research interests, indicating this finding may be spurious. There were no significant mediation effects between fixed beliefs and STEM intentions or STEM persistence. There were also no significant mediation effects between malleable beliefs and STEM interests, STEM intentions, or STEM persistence.

Significant specific indirect effects were found for high school math in relation to both research interests and STEM interests. For research interests, the path through science self-efficacy (β = 0.03) was significant and the combined path through Investigative learning influences and science self-efficacy was marginally significant (β = 0.01, p = 0.059). The total effect (β = 0.09) and total indirect effect (β = 0.09) were also significant, indicating high school math positively influences research interests through science self-efficacy and may influence research interests through the combined path of Investigative learning influences and science self-efficacy. For STEM interests, the path through math self-efficacy (β = 0.19) was significant, as were the total effect (β = 0.23) and total indirect effect (β = 0.23). These findings indicate that high school math indirectly influences STEM interests at least partially through math self-efficacy, though claims about partial or full mediation cannot be tested as the direct effect was not examined. High school math also significantly predicted intentions to major in STEM through the combined indirect path of math self-efficacy and STEM interests ($\beta = 0.08$), and the total effect ($\beta = 0.08$) and total indirect effect ($\beta = 0.08$) were also significant, suggesting high school math at least partially influences STEM intentions through math self-efficacy and STEM interests. The total effect ($\beta = 0.07$) and total indirect effect ($\beta = 0.07$) of high school math on STEM persistence was also significant, though this may be spurious as no specific indirect effects were significant. It also may be evidence of an untested direct effect of high school math on persistence. Mediation analyses for high school science were not significant for STEM interests, STEM intentions, or STEM persistence.

Learning experience mediation analyses indicated significant indirect effects with STEM interests, STEM intentions, and persistence in STEM. Realistic demonstrated abilities ($\beta = 0.08$), Realistic physiological arousal ($\beta = -0.10$), Investigative learning influences ($\beta = 0.06$) and Investigative physiological arousal ($\beta = 0.21$) all indirectly effected research interests through science self-efficacy, and their total effects ($\beta = 0.11$; $\beta = -0.12$; $\beta = 0.07$; $\beta = 0.25$, respectively) and total indirect effects ($\beta = 0.11$; $\beta = -0.12$; $\beta = 0.07$; $\beta = 0.25$, respectively) were also significant. Realistic demonstrated abilities ($\beta = 0.21$), Realistic physiological arousal ($\beta = -0.19$), and Investigative physiological arousal ($\beta = 0.30$) all indirectly effected interests in STEM courses through math self-efficacy, and their total effects ($\beta = 0.23$; $\beta = -0.20$; $\beta = 0.33$, respectively) and total indirect effects ($\beta = 0.23$; $\beta = -0.20$; $\beta = 0.33$, respectively) were also significant. Investigative learning influences were not significantly related to interests in STEM via any mediating variables. Realistic demonstrated abilities ($\beta = 0.09$) and Investigative physiological arousal ($\beta = 0.12$) predicted intentions to pursue a STEM major through the combined path of math self-efficacy and interests in STEM courses. Realistic physiological arousal had a marginally significant effect on intentions to pursue a STEM major through this same path (β = -0.08, $p = 0.054$), and Investigative learning influences did not have any significant mediating effects with intentions to pursue a STEM major. For persistence in a STEM major, Realistic demonstrated abilities, Realistic physiological arousal, and Investigative physiological arousal all had significant total effects (β = 0.08; β = -0.09; β = 0.16, respectively) and total indirect effects (β = 0.08; β = -0.09; β = 0.16, respectively), but none of the specific indirect paths were significant. Investigative learning influences did not have any significant mediating effects with persistence in STEM.

Taken together, these results highlight the importance of learning experiences not just to the core social cognitive variable of self-efficacy, but also with more distal but equally important social cognitive outcomes such as interests, intentions, and choice actions. Investigative physiological arousal, in particular, had the highest mediation effects between interests, intentions, and persistence, all indicating that lower levels of physiological arousal or greater emotional stability in the Investigative domain lead to greater levels of interests in STEM-related activities, intentions to pursue, and persistence in a STEM major.

Self-efficacy, however, did not generally have indirect influences on STEM interests, intentions, or persistence. Math self-efficacy had a marginally significant total effect for interest in research (β = 0.13, $p = 0.084$), but no other significant effects, indicating this result may be spurious. Science self-efficacy also did not have any significant mediating effects, indicating that the direct relationship between science self-efficacy and research interests (β = 0.33) was the only influential path given the significant total effect (β = 0.39). Similarly, for math self-efficacy there was no significant mediation effect on interest in STEM courses, though the direct effect (β = 0.77) and total effect (β = 0.78) were significant. This also indicates math self-efficacy exerts a strong direct influence, so any possible indirect influences may not be practically important. Science self-efficacy did not have any significant mediation effects with interest in STEM courses. Math self-efficacy also significantly predicted intentions to pursue a STEM major through interest in STEM courses ($\beta = 0.30$), and the total effect ($\beta = 0.26$) and total indirect effect ($\beta = 0.36$) were both significant. Given the difference in estimates for the total effect and total indirect effect, it appears that both math self-efficacy's impact on STEM intentions through STEM interests and the overall mediating pathways is stronger than a potential direct effect and may even be suppressed were a direct effect to be estimated. Science self-efficacy had a marginally significant total effect ($\beta = 0.31$, $p = 0.086$) but no other significant effects, indicating this result may be spurious. For persistence, math self-efficacy had a significant total effect ($\beta = 0.18$) and a marginally significant direct effect ($\beta = 0.16$, $p = 0.077$), indicating that while there is no exact path for math self-efficacy's influence on persistence, there is support that the combined direct and indirect effects of math self-efficacy positively influence persistence in STEM. Science self-efficacy had a marginally significant total effect ($\beta = 0.17$, $p = 0.078$) but no other significant effects, indicating self-efficacy likely does not influence persistence either directly or indirectly.

Outcome expectations also did not have mediating effects on intentions to pursue a STEM major or persistence in a STEM major. However, both the direct ($\beta = 0.27$) and total effects ($\beta = 0.31$) for outcome expectations on intentions to pursue a STEM major were significant, indicating a mostly direct influence between outcome expectations and STEM intentions. Mediation analyses indicated no significant direct, total, or total indirect effects between outcome expectations and persistence.

Perceived supports and barriers, self-efficacy, STEM interests, STEM intentions, and STEM persistence. Hypotheses 17a-20 focus on the relationships between perceived supports and barriers with self-efficacy, outcome expectations, STEM interests, intentions, and persistence. Perceived supports are hypothesized to positively predict intentions to major in STEM (H17a) and persistence in a STEM major (H17b), with the relationship between perceived supports and interests in STEM hypothesized to be mediated through self-efficacy (H19a). Perceived barriers are hypothesized to negatively predict intentions to major in STEM (H18a) and persistence in a STEM major (H18b), with the relationship between perceived barriers and interests in STEM hypothesized to be mediated through self-efficacy (H19b). Perceived supports and barriers are also hypothesized to be moderately, negatively correlated with one another (H20). Though not specifically hypothesized, given the adoption of an alternative structural model with direct paths between perceived supports and barriers and self-efficacy, these results are also discussed.

Instrumental and social supports and financial resources did not significantly predict intentions to pursue a STEM major or persistence in a STEM major. They also were not significantly predictive of math or science self-efficacy. Mediation analyses also indicated no significant indirect effects between instrumental and social supports or financial resources and research interests or STEM interests. Thus, H17a, H17b, and H19a were not supported.

Social barriers were significantly predictive of intentions to pursue a STEM major in the expected direction ($\beta = -0.25$), indicating greater social barriers led to lower intentions to pursue a STEM major. Financial barriers were marginally significant in predicting intentions to pursue a STEM major ($\beta = 0.21$, $p = 0.077$), though not in the expected direction, indicating preliminary evidence that higher financial barriers may lead to greater intentions to pursue a STEM major.

Thus, H18a was partially supported. Neither social or financial barriers significantly predicted persistence, and neither barrier was a significant predictor of math or science self-efficacy. Mediation analyses also indicated no significant indirect effects between social or financial barriers and research interests or STEM interests. Thus, H18b and H19b were not supported.

Factor correlations between perceived supports and barriers were used to examine the relationships between these constructs. Instrumental and social supports were significantly, negatively correlated with social barriers ($r = -.26$) and financial barriers ($r = -.16$), whereas financial resources were only significantly, negatively correlated with financial barriers ($r = -.56$). While correlations for instrumental and social supports represent small to moderate effects, the correlation between financial resources and financial barriers represents a moderately large effect. Thus, H20 is only partially supported.

Additional mediation analyses between perceived supports and barriers and outcome expectations, STEM intentions, and STEM persistence. Though not specifically hypothesized, additional mediation analyses were conducted on possible indirect effects between study variables in the full sample final structural model. For perceived supports and barriers, these included mediation analyses for outcome expectations, STEM intentions, and STEM persistence. No significant mediation effects were found between any of the supports and barriers and outcome expectations or between supports and barriers and persistence. Supports were also not significantly related to intentions to pursue a STEM major in any mediation analyses. Significant total effects with intentions to pursue a STEM major were found for social barriers ($\beta = -0.33$) and financial barriers ($\beta = 0.29$), however. Both appear to be driven by their respective direct effects ($\beta = -0.25$ and $\beta = 0.21$), though the direct effect of financial barriers on STEM intentions is only marginally significant ($p = 0.077$). These findings indicate that while there may be some predictive power from mediating pathways, the total indirect effects for social and financial barriers are not significantly predictive of intentions to pursue a STEM major and these relationships are mainly a result of the direct influences of these barriers. Caution should be exercised when interpreting the financial barriers relationship, however, as the marginally significant result may be spurious.

Multiple-groups Analyses

Multiple-groups analyses were used to assess the final model fit across gender and race/ethnicity. Assessments of model fit were based on comparisons of unconstrained models, where factor loadings (measurement model) or structural paths (structural model) were allowed to vary, to constrained models, where factor loadings and intercepts (measurement model) or structural paths (structural model) were constrained to equality across groups. Previously discussed statistical and practical criteria were used to assess measurement and structural model invariance.

Model fit by gender. The final measurement model from the full sample was initially fit separately to men and women. The measurement model fit the data acceptably in both groups (see Table 8) with no needed modifications. Having established a baseline measurement model, invariance testing was done by comparing a configural (unconstrained), metric (factor loadings constrained), and scalar (factor loadings and intercepts constrained) model using both statistical and practical criteria. While comparisons between the configural and metric, configural and scalar, and metric and scalar models were all statistically significantly different from one another, none of the practical criteria met the threshold for the models to reject the hypothesis of invariance (see Table 8). Therefore, the measurement model was found to be invariant across men and women.

Given invariance at the measurement level, invariance testing of the structural model occurred. As with the measurement model, a baseline structural model was established separately for both groups. For women, factor correlations were added between (1) Realistic physiological arousal and Investigative physiological arousal and (2) Realistic physiological arousal and Realistic demonstrated abilities based on model identification parameters to improve baseline model fit. For men, the residual variance for science self-efficacy was fixed to zero, as the original residual variance was an extremely small negative number and nonsignificant, and the same two factor correlations were included to improve baseline model fit. Baseline models were also tested to verify that the alternative simplified structural model identified in the full sample analysis was still a significantly better fit than the original simplified structural model. For both men and women, the S-B $\Delta\chi^2$ was significant (see Table 8), indicating the alternative simplified structural model fit significantly better and should be retained. The final baseline structural models (see Table 8) provided an acceptable fit to the data, and further invariance testing was conducted. Comparison of the unconstrained structural model to the constrained structural model indicated the models were statistically but not practically different from one another (see Table 8). Therefore, the structural model was also found to be invariant across men and women.

Hypotheses 9 and 13, as well as Research Questions 8, 13a-c, and 17, all focus on gender differences in specific constructs. Specifically, it is hypothesized that men will report higher levels of Realistic and Investigative learning experiences than women (H9), women will report significantly lower levels of self-efficacy than men (H13), and exploratory questions are posed about gender differences in outcome expectations (RQ8), interest in STEM (RQ13a), intentions to major in STEM (RQ13b), persistence in a STEM major (RQ13c), and perceived supports and barriers (RQ17). While measurement invariance indicates that the factor loadings and intercepts are equivalent across groups, this does not mean that there cannot be significant differences between groups in the factor scores linked to each construct. MPlus, using the SCALAR command, automatically constrains one group's factor means and allows the other group's factor means to vary. Therefore, to test these hypotheses and explore these research questions, group differences in factor mean scores were examined. For the purposes of these analyses, men's factor scores were constrained to 0 and women's factor scores were allowed to vary. The sole exception to this was the examination of differences in persistence, which utilized an independent samples t-test as this is a manifest rather than latent variable.

Women were found to have significantly different factor scores from men on a variety of constructs (see Table 9 for full results). Specifically, factor scores for women were lower for Realistic demonstrated abilities (M = -0.50), Realistic physiological arousal (M = -0.36), and Investigative physiological arousal (M = -0.40), though the reverse-scored nature of physiological arousal indicates women had higher Realistic and Investigative physiological arousal than men. There was no significant difference for Investigative learning influences (M = -0.11) between groups, though the difference was in the expected direction. Women also had significantly lower levels of math self-efficacy (M = -0.27) and science self-efficacy (M = -0.30). Therefore, H9 was partially supported and H13 was fully supported.

For the research questions, women were found to have higher levels of outcome expectations (M = 0.12) and financial barriers (M = 0.26) than men. Women had lower levels of research interests (M = -0.23), interest in STEM courses (M = -0.73), intentions to pursue a STEM major (M = -0.26), and financial resources (M = -0.15) than men. Persistence in a STEM major had a marginally significant difference ($t(1127.374) = 1.91$, $p = 0.057$) with men reporting higher persistence (M = 11.23, SD = 4.23) than women (M = 10.71, SD = 4.23). There were no significant differences between men and women for instrumental and social supports or social barriers. Though not proposed as a hypothesis or research question, women were also found to have lower levels of malleable beliefs in math ability (M = -0.16). All other factor score differences were not significant.

Given the finding of invariance across genders, hypotheses and research questions related to gender differences in the relationships between constructs are inappropriate to explore, as the overall result indicates that gender does not moderate the relationships in the structural model. Therefore, Hypothesis 10, which predicts that gender moderates the relationships between learning experiences and self-efficacy (H10a) and between learning experiences and outcome expectations (H10b), is not supported. No further exploration of Research Questions 4, 9, 14, and 18 is necessary.

Model fit by race/ethnicity. The final measurement model from the full sample was initially fit separately to Native American, Asian, and White samples to establish a baseline model. However, after the removal of multivariate outliers, neither the Asian nor White samples had a sample size greater than the number of free parameters (k = 391) estimated in the measurement model. Therefore, the Asian and White samples were combined into one sample, as they make up the predominant race/ethnicity representation for STEM majors and STEM careers (NSF, 2019). For the Native American sample, the baseline model was modified to fix the residual variance for outcome expectations to zero, as the original residual variance was an extremely small negative number and nonsignificant, and correlated uniquenesses were added for (1) Social Barriers items 2 and 6, (2) Research Interest items 6 and 7, and (3) Research Interest items 4 and 5 based on item similarities. For the combined Asian and White sample, no model modifications were needed. The final baseline measurement models (see Table 10) provided an acceptable fit to the data. Having established a baseline measurement model, invariance testing was done by comparing a configural (unconstrained), metric (factor loadings constrained), and scalar (factor loadings and intercepts constrained) model using both statistical and practical criteria. The comparison between the configural and metric model yielded no statistical or practical differences, indicating metric invariance held across groups (see Table 10). Comparisons of the configural and scalar models, as well as metric and scalar models, did yield statistically significant differences but none of the practical criteria met the threshold for the models to reject the hypothesis of invariance. Therefore, the measurement model was found to be invariant across Native American and combined Asian and White groups.

Given invariance at the measurement level, invariance testing of the structural model occurred. As with the measurement model, a baseline structural model was established separately for both groups. The baseline structural model for the Asian and White subsample reached acceptable fit with the addition of a factor correlation between Investigative physiological arousal and Realistic physiological arousal, and tests of the original simplified and alternative simplified model found the S-B $\Delta\chi^2$ was significant (see Table 10), indicating the alternative simplified structural model fit significantly better and should be retained. However, the baseline structural model for Native Americans was not an acceptable fit to the data after four modifications based on modification indices and theoretical grounds (see Table 10), and the chi-square difference test indicated there was no significant improvement in fit by utilizing the alternative simplified model. Therefore, tests of structural invariance across groups were not warranted, as the baseline model could not reach acceptable fit in both groups. Thus, the structural model was deemed not invariant across Native American and combined Asian and White groups.

Research Questions 6, 10-11, 15a-c, and 19 all focus on racial/ethnic differences in specific constructs. Specifically, exploratory questions are posed about racial/ethnic differences in learning experiences (RQ6), self-efficacy (RQ10), outcome expectations (RQ11), interest in STEM (RQ15a), intentions to major in STEM (RQ15b), persistence in a STEM major (RQ15c), and perceived supports and barriers (RQ19). As with the analyses conducted in the multiple-groups analyses by gender, factor scores (with the exception of persistence, which used an independent samples t-test) were compared between Native American and combined Asian and White samples. Factor scores for the Native American sample were fixed at 0 and factor scores for the Asian and White sample were allowed to vary.

Findings indicated Native Americans differed from the combined Asian and White group on a variety of constructs (see Table 11 for full results). Related to the specific research questions, the Asian and White group had significantly higher factor scores on Investigative learning influences (M = 0.23), research interests (M = 0.18), and social barriers (M = 0.18) than Native Americans. The Asian and White group (M = 11.60, SD = 4.39) also had significantly higher persistence in a STEM major than Native Americans (M = 10.01, SD = 4.68), $t(1026.532) = -5.88$, $p < 0.001$. Conversely, the Asian and White group had significantly lower factor scores on instrumental or social supports (M = -0.11) than Native Americans. The difference in factor scores was marginally significant for outcome expectations (M = -0.08, p = 0.091), providing preliminary evidence that the Asian and White group may report lower levels of outcome expectations for pursuing a STEM degree than Native Americans. There were no significant differences between groups for the remaining learning experiences, self-efficacy, or interest in STEM courses. Though not proposed as specific research questions, the Asian and White group was also found to have significantly higher levels of avoidance orientation (M = 0.26) and fixed beliefs in math ability (*M* = 0.19) than Native Americans, as well as lower levels of learning orientation (*M* = -0.22). All other factor score differences were not significant.

Research Questions 5, 7a-b, 12, 16a-c, and 20a-c all focus on whether race/ethnicity moderates the relationships between constructs in the structural model. However, given that the structural model is a poor fit for the Native American sample, group comparisons on these parameters are not appropriate as the models do not fit equally well across groups. Therefore, the research questions are not explored and a determination of whether race/ethnicity moderates specific SCCT relationships is not made.

Native American Model Comparison

Given the poor fit of the structural model to the Native American sample, an exploration of a model that does fit the Native American sample was undertaken. A final, non-nested model comparison was conducted between the final measurement and structural model for Native American students as identified in the preceding analyses (i.e., the original simplified structural model) versus a set of models that incorporates a measure of tribal identity. Other Native American-specific variables were examined, but as these were manifest variables and missingness is not allowed on manifest variables in an SEM model, they lowered the sample size below the number of free model parameters and caused convergence issues in the program. As these models were non-nested, AIC and BIC were compared to determine which model fit the data better, with lower values indicating less misfit (Kline, 2011). Other model fit comparisons using the same indices listed for the full sample analysis were also made to determine whether a specific model was an acceptable fit to the data, but there is no direct comparison test (e.g., S-B $\Delta\chi^2$) to assess goodness of fit.

Model building process. As with the full sample analyses, an iterative process was taken to build the Native American comparison model. Initially, a modified measurement model based on the Native American final baseline measurement model with the inclusion of tribal identity was assessed. One correlated uniqueness between item 3 and item 4 of the tribal identity scale was added based on EFA results indicating a high residual covariance between these two indicators. While the model-specific fit indices indicated acceptable fit to the data (with the exception of TLI), the AIC and BIC values were greater than those of the original Native American baseline measurement model (see Table 12). Thus, the initial modified measurement model was rejected.

Given the issues attempting to identify an acceptable measurement and structural model in the Native American sample utilizing the full SCCT model, I explored simplifying the model by removing specific factors from both the measurement and structural models. I chose to remove the learning experience factors as these were originally designed to assess multidimensional constructs rather than a single unidimensional construct, were not considered a core social cognitive variable in the SCCT model, and had very few indicators (2-3) of each latent factor. This new modified measurement model, which kept the same set of modifications as the final Native American baseline measurement model, was an acceptable fit to the data using both local fit criteria and comparisons of the AIC and BIC (see Table 12), indicating the new measurement model should be retained as a better fitting model.

With a well-fitting measurement model, the structural model was examined utilizing the final new measurement model as its basis. The initial structural model consisted of the same hypothesized paths between variables as in Figure 2, with the exception that person inputs and background characteristics had only direct paths to self-efficacy and outcome expectations (see

Figure 6). An initial analysis produced convergence issues due to the estimated path from financial barriers to persistence, so this path was removed in the structural model. The residual variance for science self-efficacy was also fixed to zero, as the original estimate resulted in a small negative variance that was nonsignificant. The final model (see Figure 7) was an acceptable fit to the data based on local fit criteria (see Table 12), and the AIC and BIC values compared with the original Native American baseline structural model were lower, indicating the new Native-specific structural model fit better than the original. See Figure 8 for standardized path coefficients for significant and marginally significant results. Table 13 contains the full structural model results.

Results. In terms of hypotheses and research questions, only Research Question 2 focused on the influence of variables specific to Native Americans. Specifically, the question was posed as to how tribal identity influences learning experiences within the SCCT framework. Unfortunately, as the final full sample structural model did not fit the data well for Native Americans and learning experiences were eliminated from the final Native American comparison model, these relationships cannot be determined.

The final model results for the Native American sample do offer some unique insights into the relationships among social cognitive variables within this unique population, however. With the removal of learning experiences from the model, supports and barriers and high school math classes become the main predictors of math and science self-efficacy. Specifically, financial supports ($\beta = 2.74$; $\beta = 4.79$) and high school math classes ($\beta = 0.36$; $\beta = 0.37$) positively predicted math and science self-efficacy, respectively, with higher levels of each leading to increases in self-efficacy. Financial supports, in particular, had a pronounced effect on self-efficacy, with a one-point standard deviation increase in supports leading to roughly 3 and 5 standard deviation point increases in math and science self-efficacy. Instrumental and social supports (β = -1.79; β = -3.03), however, evidenced the opposite effect, with higher levels of instrumental and social support leading to lower math and science self-efficacy, respectively. Social (β = -3.11) and financial barriers (β = 4.27) also significantly impacted science self-efficacy, though greater social barriers lead to decreased science self-efficacy and greater financial barriers lead to greater science self-efficacy. Social (β = -1.81, p = 0.052) and financial barriers (β = 2.46, p = 0.065) were only marginally significant in their relationships with math self-efficacy, however, indicating that while the same pattern appears to hold for math self-efficacy this should be interpreted with caution. None of the person inputs (i.e., goal orientation, implicit theories of math ability, tribal identity) or number of high school science classes were significant predictors of self-efficacy.

For outcome expectations, tribal identity (β = 0.22) significantly predicted outcome expectations, indicating that higher tribal identity led to higher outcome expectations for pursuit of a STEM degree. High school science classes (β = -0.24) negatively predicted outcome expectations, indicating that higher numbers of high school science classes resulted in lower positive outcome expectations for pursuit of a STEM degree. No other person inputs, background characteristics, or supports and barriers variables significantly predicted outcome expectations.

For research interests, science self-efficacy (β = 0.40) was significant, indicating that higher science self-efficacy led to higher research interests. Interest in STEM courses was predicted by math self-efficacy (β = 0.84), indicating that higher math self-efficacy led to higher interest in STEM courses. All other paths for research interests and interest in STEM courses were not significant. For intentions to major in STEM, math self-efficacy (β = -0.55), outcome expectations ($\beta = 0.45$), and interest in STEM courses ($\beta = 0.78$) were significant predictors. Specifically, higher outcome expectations and interest in STEM course both led to increased intentions to major in STEM, whereas higher math self-efficacy led to decreased intentions to major in STEM. All other paths for STEM intentions were not significant.

Finally, examination of the paths to persistence revealed two marginally significant predictors. Math self-efficacy ($\beta = 0.24$, $p = 0.077$) and outcome expectations ($\beta = 0.19$, $p = 0.085$) both have preliminary evidence that increases in these constructs may lead to increased persistence in a STEM major. However, given the marginal significance and generally small effects for these paths, these should be interpreted with caution as these may be spurious results. All other paths to persistence were not significant.

Discussion

The present study sought to test a longitudinal full SCCT model as proposed by Lent and colleagues (Lent, Brown, & Hackett, 1994, 2000) in a sample of college students majoring in STEM. Additionally, the present study sought to test whether this full model fit across gender and race/ethnicity, utilizing the first known large sample population of Native American STEM students within a test of the full SCCT model. The study also employed an objective final outcome measure by assessing students' persistence towards a STEM degree based on their official academic records. A series of structural equation models were used to test overall model fit, as well as explore various hypotheses and research questions involving proposed relationships among SCCT constructs. Findings from full sample analyses indicate that the full SCCT model fits, and the model was invariant across men and women in the present sample. These findings are consistent with studies indicating variations of the SCCT model fit well in STEM student samples (Lent et al., 2005; Lent et al., 2008; Lent et al., 2011; Lent et al., 2013) and across men and women (Inda et al., 2013; Lent et al., 2018) and extend these conclusions into a longitudinal test of the full SCCT.

While the model fit the data well, the relationships among variables as proposed by previous research and the SCCT was not always found in the full sample SEM. The majority of hypotheses were either partially supported or not supported, with only one hypothesis—that women will report significantly lower levels of self-efficacy than men—fully supported by the data. Some relationships also relied on marginally significant findings, indicating these results may be spurious. This may be, in part, due to the non-normality of the data and the amount of missing data in the model, though FIML and robust standard errors were used to mitigate these effects. However, for those hypothesized relationships that were supported, they were generally in line with SCCT theory and past research.

Some predicted relationships were not found, and some specific latent factors did not predict anything in the full model. For example, malleable beliefs in math ability and financial supports had no significant direct relationships with other factors, and financial barriers only had one marginally significant relationship with intentions to pursue a STEM major. This may have been a result of the complexity of the model rendering certain factors unnecessary for the prediction of specific SCCT relationships or potential multicollinearity among related latent factors. Persistence, the main outcome variable in the model, only had one marginally significant direct path from math self-efficacy, suggesting that this may not be the most relevant conceptualization of choice actions within the SCCT framework. Outcome expectations, while predictive of other aspects of the model, only had one marginally significant direct effect from math self-efficacy, indicating that in the full SCCT model previously theorized factors may not be as important for outcome expectations as compared to tests of the core SCCT model (i.e., the interests-choice model).

In addition to predicted hypotheses and research questions, other unexpected relationships were also found between goal orientation, learning experiences, and more distal variables. Learning goal orientation and various learning experiences were shown to have significant indirect effects on more distal outcomes such as self-efficacy, interests, and intentions. This may, in part, explain the lack of findings for other hypothesized relationships, as the direct and indirect influences from these factors on self-efficacy, interests, and intentions may have rendered other proposed paths from supports and barriers or implicit theories of math ability unnecessary. The exclusion of learning experiences from the Native American-specific model provides some support for this explanation, as the removal of learning experiences resulted in supports and barriers becoming the primary predictors of self-efficacy and goal orientation was no longer significant. Regardless, the findings regarding mediation between distal predictors and more proximal outcomes highlights the role that these factors can play throughout the SCCT model.

Outside of the full sample analyses, examination of the SCCT model among men and women highlights some gender differences in various social cognitive constructs in addition to the model's invariance across these groups. Men were found to have higher math and science self-efficacy scores, consistent with previous literature (Byars-Winston & Fouad, 2008; Gainor & Lent, 1998; Hardin & Longhurst, 2016; Watson et al., 2019), and men were found to have higher Realistic demonstrated abilities, Realistic physiological arousal, and Investigative physiological arousal, with no significant difference between Investigative learning experiences. These findings are also consistent with previous literature (Babarović et al., 2018; Lapan et al., 2000; Ludwikowski et al., 2018; Su et al., 2009), though the present sample divides RIASEC in ways not typically used in other studies. Interestingly, the finding of higher physiological arousal in this case indicates greater emotional stability, meaning men may be more comfortable in Realistic and Investigative-related situations that directly translates to math and science self-efficacy. While these specific relationships were not hypothesized in the present study, they are also consistent with previous literature related to math and science anxiety (Maloney et al., 2015; Soni & Kumari, 2017) and further emphasize the need to include a full range of constructs when examining the SCCT model.

Other significant differences among men and women were more exploratory in nature, and indicated women had higher outcome expectations and financial barriers than men, as well as lower overall financial resources, interests, and intentions to pursue STEM. Persistence was only marginally significant, indicating males were more likely to persist. While the findings regarding lower interests, intentions, and persistence are supported by the literature (Burge, 2013; Hardin & Longhurst, 2016; Makarovaet al., 2019; Tellhed et al., 2017), the findings regarding gender differences in supports and barriers were mixed, as some supports and barriers were not significant and others were. Both of these findings are consistent with separate streams of literature reporting conflicting findings on gender differences in supports and barriers (Byars-Winston & Fouad, 2008; Garriott et al., 2014; Hoferichter & Raufelder, 2019; Ing, 2014; Lent et al., 2005; Lent et al., 2010), indicating more efforts may need to be taken to assess specific supports and barriers among a variety of sample populations to ensure adequate coverage of these factors.

Similarly, group differences were found between Native American STEM students and a combined group of Asian and White STEM students on various social cognitive constructs.

Interestingly, the Asian and White group reported greater social barriers and lower instrumental and social supports than Native American students. However, they did not differ on financial resources or financial barriers, and the Asian and White group reported higher Investigative learning influences, research interests, and persistence. Native Americans also had higher learning orientation and lower avoidance orientation and fixed beliefs in math ability than Asian and White students. Given the dearth of research on Native American students related to social cognitive variables, there are no specific studies in the literature that confirm or refute these findings. It is interesting, though, that Native American STEM students express greater social support and less social barriers towards pursuing a STEM degree but are less likely to persist in pursuing a STEM major. This indicates that while Native American students do not perceive the same level of social barriers—and may even perceive greater supports for doing so—other factors are hindering their progress in STEM, such as a lack of interest in research or intentions to pursue a degree outside of STEM even for those in a STEM major. This may also point to institutional and environmental factors that hinder Native American students' progress in STEM, which have been found to be key barriers for Native American students both in pursuit of higher education more generally and STEM-specific fields (Brayboy et al., 2014; Guillory & Wolverton, 2008; Shotton, 2017; Smith et al., 2014; Tachine et al., 2017; Windchief & Brown, 2017).

Even given these group differences in social cognitive variables, the full SCCT structural model did not fit well for Native Americans, indicating that the SCCT as currently proposed may be insufficient to explain Native Americans' persistence or lack of persistence in a STEM major. The addition of tribal identity in the baseline measurement model did not fit substantially better, but a revised model including tribal identity and excluding learning experiences did fit substantially better using both local and global fit criteria. This may, in part, be due to issues related to the measures selected for this study, as none of them have been previously validated on a large Native American population. However, it also lends support to the argument that the current SCCT model may need to be revised or refined when attempting to study Native American students' STEM career progression, potentially through integration with theories and frameworks created from a Native American perspective (Brayboy, 2005; Windchief & Brown, 2017)

The results from the final Native American-specific model also support this assertion, as tribal identity became a significant predictor of outcome expectations. Other constructs that were not significant in the final full sample model, such as supports and barriers, became much more important when examining Native American students, while other variables such as goal orientation, implicit theories of math ability, and high school science were no longer significant predictors. Specific relationships proposed by SCCT, such as the role of supports and barriers, were also confirmed in the Native American-specific model where they had been rejected in the full sample model. Financial resources and financial barriers became critical predictors of self-efficacy, which in turn predicted research interests, interests in STEM courses, and intentions to pursue a STEM degree.

However, the relationship between financial barriers and self-efficacy, as well as the role of instrumental and social supports and self-efficacy, was the opposite of what SCCT proposes and what other studies have found (Byars-Winston & Fouad, 2008; Lent et al., 2001; Lent, Brown, Schmidt et al., 2003; Lent et al., 2011; Lent et al., 2015). Instrumental supports led to decreased math and science self-efficacy, whereas greater financial barriers led to increased science self-efficacy. The effect of financial barriers on math self-efficacy was marginally significant, but in the same direction. While these findings seem counterintuitive, they may be the result of how the supports and barriers items are assessed. Instrumental and social supports relate more towards feeling accepted in one's field and receiving encouragement from others to do well rather than confidence in one's ability to perform math or science-related tasks. This may lead to a false confidence of one's ability in a STEM major, and so when one actually has to perform math or science-related activities and potentially does not do well, this may lead to a violation of expectations and subsequently large decrements in one's self-efficacy. Similarly, financial barriers may serve as a motivator to do well in a given field as a means to avoid similar levels of financial hardship in the future, thus increasing one's self-efficacy in a given field. However, it may also be that individuals' assessments of their self-efficacy are more positive because they are being asked how likely they would be able to perform a math or science-related activity rather than actually performing it.

Limitations and Directions for Future Research

While the results from this study represent a novel contribution to the literature, it is not without limitations. Though longitudinal in nature and employing a large and diverse student sample, these findings may have limited generalizability beyond a STEM student sample and are specific to a single focal university. To further confirm and extend these findings, an even larger sample of STEM and non-STEM students across several universities should be used. This could also allow for tests of racial/ethnic differences by specific racial and ethnic groups, rather than utilizing a combined Asian and White sample as was required here given model complexity. It would also allow for comparisons between STEM and non-STEM majors to see if the SCCT model fits equally well in both groups.

An important limitation and caveat to findings for Native American students is that while these results are presented at an aggregate level, Native American peoples are an extremely diverse group composed of hundreds of tribes with their own unique customs, culture, and traditions. Therefore, the present study's findings should not be taken as applying to all Native peoples, and future research should attempt to collect a diverse sample of Native American students large enough to examine possible differences across tribes. Lopez (2018) suggests several methods for obtaining participation from tribal communities that involve creating tribal partnerships, having tribal communities collect their own data to minimize suspicion of research methods that have historically harmed tribes, and attempting to centralize data collection among neighboring tribes to ensure representation from smaller tribes with potentially similar experiences.

The present study also had several methodological limitations that need to be acknowledged. The majority of the data used in this study comes from online self-report assessments provided by students. Data quality, then, is subject to what participants are willing to share. Rigorous checks are conducted each semester to ensure data quality, and the present study also included an objective measure of student persistence, but there are still issues of common-method bias that could have influenced the current study's results. Therefore, future research should seek to collect a variety of social cognitive variables through self-report and more objective means to minimize common-method bias.

Additionally, the conceptualization of persistence may have been problematic, as only one factor was marginally significant in predicting persistence in the full sample SEM. Persistence in the current study included all possible courses for which a student received credit from the most recent admittance through to graduation, six years after admittance, or the beginning of the Fall 2020 semester (whichever was appropriate). A more accurate measure may have been to limit persistence to courses related to a student's major, as these would be specific to STEM, or possibly to use STEM GPA as the final choice action variable. Future research should try to incorporate choice action outcomes that are specific to the model and sample they are testing (e.g., STEM measures for STEM samples), as well as try to incorporate multiple choice action outcomes to see if social cognitive variables have distinct relationships with different choice actions.

The survey design, specifically the timing of data collection and the need for specific sets of variables to come after other variables in the SCCT model (see Table 3), severely limited what data was available for use in the present study. For example, outcome expectations, one of the primary variables in the SCCT model, had the highest amount of missing data because it had to be collected after learning experiences, and these measures were administered in different surveys. While this project was part of a larger research effort, and a cohort design was employed with various measures collected at various timepoints to reduce participant fatigue and attrition, there is no doubt that this design and the longitudinal nature of the SCCT model tested here contributed to high amounts of missing data. Future studies should attempt to collect all measures at multiple time points to limit missing data due to study design characteristics.

Missing data may have also caused spurious results in the current analyses. While FIML estimation and robust standard errors using MLR in MPlus were specifically chosen to combat missing and non-normal data, other missing data techniques such as multiple imputation or the use of a non-parametric Bayesian analysis may have also been appropriate. Missing data techniques in SEM often utilize FIML or multiple imputation when data are missing at random (MAR), as these methods produce similar results when data are multivariate normal (Collins, Schafer, & Kam, 2001; Enders, 2010; Meng, 1994; Schafer, 2003), and the data in this study were assumed to be MAR. However, differences in bias have been found for normality-based FIML and MI when utilized with non-normal data (Yuan, Yang-Wallentin, & Bentler, 2012). Therefore, replication of the current results using an alternative missing data technique such as multiple imputation is recommended.

A final limitation of the present study is the possibility of alternative models. Though a large number of factors were tested in the present study, the possibility of other alternative models between these factors (e.g., bidirectional relationships, other direct paths) or other potential key variables missing from the model (e.g., a more relevant choice action variable) cannot be ruled out. While several different models were tested in the current effort, lending credence to the veracity of the final model, future research for both Native American students and the larger SCCT model should attempt to compare alternate models based on SCCT theory and research. The use of qualitative data to supplement quantitative findings is also recommended to help determine what Native American students consider most critical in their persistence of a STEM degree and to identify other potential key variables that may be missing from the SCCT model among other groups.

Practical Implications and Suggestions for Action

Practically speaking, the present study's findings indicate the full SCCT model fits well in a longitudinal sample of STEM college students and appears invariant across gender. In general, findings indicated support for key SCCT propositions and potential revisions for others when incorporated into a full SCCT model. The SCCT appears generally robust in explaining students' degree progression, though not necessarily their overall objective persistence towards their degree.

However, the lack of invariance across race suggests that the SCCT as currently conceptualized may not be sufficient to explain Native American STEM students' persistence in STEM. Therefore, the SCCT may need to be modified to incorporate more culturally relevant factors. Alternatively, assessments of key social cognitive variables may need to be modified or created that reflect more diverse populations than those normally used in SCCT STEM studies (i.e., predominately White college students with some studies examining race/ethnicity). Indeed, exclusion of the learning experiences factors and the inclusion of tribal identity resulted in a better-fitting SEM for Native students, though specific propositions of the SCCT theory were still not supported for this group.

Even with the lack of invariance across race, the general findings indicate several different avenues for supports and resources for all STEM students, as well as those specific to gender and racial/ethnic groups. In terms of potential actions aimed for pre-college students, encouraging and offering more math and science-related courses in high school may be one of the single most effective ways to boost learning experiences, which have been shown to be significantly related to self-efficacy, STEM interests, and STEM intentions. While offering these courses (and their overall quality) may be dependent on the financial situation of a chosen school district, taking these courses offers both a way to introduce high school students to STEM subjects and a way to boost their confidence in their own abilities.

Outside of high school science and math courses, another avenue that can be employed in any high school is attempting to help foster a learning goal orientation among students. This can be done by framing in-class activities, homework assignments, and informal group work as rewarding yet challenging experiences that will help students learn and grow (Chyung et al., 2010). Learning goal orientation has also been shown to directly influence learning experiences and self-efficacy (Chyung et al.; Payne et al., 2007), as well as indirectly influence several important social cognitive variables that influence a student to pursue or not pursue a major in STEM in college (Hazari et al., 2010; Payne et al.).

For actions targeted specifically at women entering STEM, both in high school and college, the strong relationships between learning experiences and self-efficacy indicates fostering positive Realistic and Investigative learning experiences is crucial. In particular, these experiences should involve STEM-related tasks or activities where girls or women can receive positive feedback and gain confidence in their abilities. Efforts should also be taken by college institutions to minimize financial barriers and provide financial resources for all STEM students, and given the higher reported barriers and lower reported financial resources among women in the current study, targeted resources for women in STEM majors may also be helpful.

For Native American students pursuing a STEM degree, schools at the preK-12 level, institutions of higher education, and tribal communities should attempt to help foster a strong connection to one's tribe, as well as provide financial resources and minimize social barriers. Given the extremely prominent role supports and barriers played in the final Native American structural model, offering financial resources and minimizing social barriers may be the single best way to assist both high school and college students in developing math and science self-efficacy, both of which are predictive of STEM interests, intentions, and (for math self-efficacy) potentially STEM persistence. In fostering tribal connections, preK-12 schools, as well as institutions of higher education, can seek to promote reciprocity in their interactions with Native American students, as well as frame broader curriculum in ways that allows for mutual discussion and learning rather than just teacher- or faculty-driven instruction (Brayboy et al., 2014; Kirkness & Barnhardt, 1991). Windchief and Brown (2017) also offer a framework that can be used to develop a Native American mentorship program specific to STEM, which can be adapted to institutional contexts but should include the core components of Indigenous identity continuum, Indigenous values/worldview, Indigenous family structure, and mentor interest/past success. In taking these actions, tribal communities, preK-12 schools and institutions of higher education, and family/friends should reframe pursuing a STEM degree and career as a way to give back to one's community or a way to help the tribe (Cech, Metz, Smith, & deVries, 2017; Guillory & Wolverton, 2008; Lee, 2009; Smith et al., 2014), while also acknowledging and embracing Native culture and values as compatible and complimentary to STEM fields. This helps connect earning a STEM degree with maintaining and potentially strengthening one's tribal identity and tribal community, which in turn may then help improve Native American students' outcome expectations of pursuing a STEM degree, thus potentially increasing their intent and persistence in a STEM degree field.

Conclusion

The current study addressed significant gaps in the SCCT literature by testing a longitudinal model of the full SCCT in a diverse group of college STEM students. This study was also the first study to specifically examine the SCCT within a large Native American student population. Structural equation modeling found that the full SCCT model fit well in the full sample and was invariant across gender, but the structural model did not fit well in the Native American student sample and so was not invariant across race/ethnicity. Given this lack of fit, a Native American comparison model using tribal identity was tested and found to fit the data well with the removal of learning experiences from the model.

Results from the full sample analyses and Native American specific model generally supported SCCT propositions, though some relationships were only marginally significant, and some relationships were not supported or were contradictory to SCCT theory and past research. Gender and racial/ethnic differences in various social cognitive variables were found, some of which supported past research and some of which were more exploratory in nature. Overall, study findings highlight the importance of high school math and science classes across all models, as well as the role of learning goal orientation and learning experiences within full sample and gender-based analyses. For Native American students, supports and barriers were especially critical and tribal identity played a unique role.

Taken together, the present study represents a novel contribution in testing a full SCCT model utilizing a longitudinal sample with a diverse population. While not all findings reflected SCCT research and theory, this effort highlights that the SCCT model is robust and key variables are still influential on a variety of outcomes related to STEM. These findings also point to the need to update and revise the SCCT when examining unique populations such as Native American students, as well as exciting avenues for future research and possible strategies to improve representation in STEM.

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Table 1. *List of Social Cognitive Variables Included in the Present Study*

Model Testing Variables
Race/Ethnicity
Gender
Person Inputs
Goal Orientation
Implicit Theories of Math Ability
Background/Contextual Inputs
Tribal Identity*
Number of HS Math Classes
Number of HS Science Classes
Learning Experiences
Learning Experiences Questionnaire
Self-Efficacy Expectations
Math Self-Efficacy
Science Self-Efficacy
Outcome Expectations
Outcome Expectations
Interests
STEM Interests
Research Interests
Goals
Academic Major Intentions
Proximal Barriers
Perceived Barriers
Proximal Supports
Perceived Supports
Overall Model Outcome
Persistence in STEM

Note. Variables included in the present study, ordered by SCCT category. Variables with an (*) next to them are only included in the Native American STEM student model.

Table 2. *Sample Characteristics of STEM Undergraduate Students*

Sample Size	Gender	Race/Ethnicity	Degree Progress[a]	STEM Major[b]
N = 1,314	Female = 747	Native American = 542	Graduated = 584	Engineering = 393
	Male = 552	Asian = 401	Continuing = 426	Pre-Professional STEM Area = 294[c]
	Other = 3	White = 371	Discontinued = 304	Biological Sciences = 248
	Unreported = 12			Health and Exercise Science = 113
				Chemistry and Biochemistry = 103
				Computer Sciences = 64
				Atmospheric and Geographic Sciences = 36
				Mathematics and Physics = 34
				Geosciences = 11
				STEM Education = 11
				Environmental Sciences = 7

Note. N = number of undergraduate STEM students included in the sample. Columns are sorted in terms of largest sub-sample to smallest sub-sample.
[a]Degree progress refers to a student's standing by the end of the Spring 2019 semester. Graduated indicates a student has graduated with a bachelor's degree in a STEM-related field. Continuing indicates a student is still enrolled at the focal university. Discontinued indicates a student is no longer enrolled at the focal university. [b]STEM majors are presented under major clusters.
[c]Individuals with pre-professional majors (e.g., Pre-Medicine) may or may not also be enrolled in a STEM major but are included in STEM due to the specific requirements of the pre-professional major.

Table 3. *Survey and Data Collection Timepoints for SCCT Variables*

SCCT Variable	Survey from which Data Was Taken	Data Collection Timepoint (Semesters)
Person Inputs	Initial Survey	1 – 6
Background/Contextual Affordances[a]	Initial Survey	1 – 6
Learning Experiences	Follow-Up Survey 1	1 – 6
Self-Efficacy		1 – 6
Science Self-Efficacy	Follow-Up Survey 1	1 – 6
Math Self-Efficacy	Follow-Up Survey 2	1 – 6
Outcome Expectations	Follow-Up Survey 2	1 – 6
Interests	Follow-Up Survey 2	4 – 9
Intentions	Follow-Up Survey 2	4 – 9
Perceived Supports	Follow-Up Survey 1 OR 2	4 – 9
Perceived Barriers	Follow-Up Survey 1 OR 2	4 – 9

Note. Person inputs includes measures of goal orientation and implicit theories of math ability. Background/Contextual affordances include tribal identity and number of high school math and science classes. Interests include interest in research and interest in STEM topics.
[a]Variable is measured for Native American participants only.

Table 4. *Means, Standard Deviations, Sample Sizes and Alpha Coefficients for SCCT Variables*

Scale	*M*	*SD*	N	Cronbach's α
Learning Goal Orientation	5.60	0.94	1217	0.89
Prove Goal Orientation	4.76	1.29	1217	0.82
Avoid Goal Orientation	3.87	1.33	1217	0.87
ITMA: Fixed	2.73	1.14	1217	0.89
ITMA: Malleable	4.44	1.04	1217	0.90
Tribal Identity[a]	2.22	0.68	514	0.92
High School Math Classes[b]	5.45	1.50	1216	--
High School Science Classes[b]	2.98	0.95	1208	--
Realistic Demonstrated Abilities	3.97	0.99	692	0.82
Realistic Physiological Arousal	3.76	0.96	692	0.77
Investigative Learning Influences	3.72	1.04	692	0.78
Investigative Physiological Arousal	3.93	1.11	691	0.72
Math Self-Efficacy: Mastery Experiences	4.43	1.11	423	0.93
Math Self-Efficacy: Social Persuasions	4.14	1.36	423	0.96
Math Self-Efficacy: Physiological States	4.23	1.24	423	0.93
Science Self-Efficacy: Mastery Experiences	4.57	0.90	677	0.90
Science Self-Efficacy: Social Persuasions	4.36	1.15	677	0.95
Science Self-Efficacy: Physiological States	4.28	1.19	677	0.93
Internal Outcome Expectations	4.17	0.69	418	0.91
External Outcome Expectations	4.24	0.65	418	0.90
Interest in STEM Topics	3.25	0.86	560	0.81
Research Interests	3.19	0.84	563	0.90
Intention to Major in STEM	4.38	0.97	559	0.96
Persistence in a STEM Major	10.93	4.58	1165	--
Instrumental and Social Supports	3.80	0.75	637	0.85
Financial Resources	3.27	0.94	637	0.85
Social Barriers	1.85	0.83	638	0.88
Financial Barriers	2.62	1.01	638	0.81

Note. Cronbach's alpha was calculated based on the available data for each scale, with standardized scores presented here. Cells with dashes did not have a Cronbach's alpha coefficient calculated due to the nature of the data. M = sample mean. SD = sample standard deviation. N = sample size for specific measure. ITMA = Implicit Theories of Math Ability. [a]Variable was only asked of Native American participants (n = 542). [b]Item represents count data.

Table 5. *Factor Loadings and Correlated Uniquenesses for the Full Sample Item-Level and Simplified Measurement Model*

Factor	Item-Level Model	Simplified Model
Learning Goal Orientation		
I am willing to select a challenging assignment that I can learn a lot from.	0.82	0.82
I often look for opportunities to develop new skills and knowledge.	0.80	0.79
I enjoy challenging and difficult tasks at school where I'll learn new skills.	0.85	0.85
For me, development of my academic ability is important enough to take risks.	0.73	0.73
I prefer situations at school that require a high level of ability and talent.	0.74	0.74
Prove Goal Orientation		
I try to figure out what it takes to prove my ability to others at school.	0.73	0.73
I enjoy it when others at school are aware of how well I am doing.	0.82	0.81
I prefer to work on projects where I can prove my ability to others.	0.81	0.81
Avoid Goal Orientation		
I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others.	0.76	0.77
Avoiding a show of low ability is more important to me than learning a new skill.	0.79	0.79
I'm concerned about taking on a task at school if my performance would reveal that I had low ability	0.84_a	0.84_a
I prefer to avoid situations at school where I might perform poorly	0.71_a	0.71_a
Implicit Theories of Math Ability – Fixed Beliefs		
You have a certain amount of math ability, and you can't really do much to change it.	0.74_b	0.74_b
Your math ability is something about you that you can't change very much.	0.76_b	0.76_b
To be honest, you can't really change how intelligent you are at math.	0.88	0.88
You can learn new things, but you can't really change your basic math ability.	0.80	0.80
Implicit Theories of Math Ability – Malleable Beliefs		
No matter who you are, you can significantly change your math ability level.	0.73_c	0.73_c
You can always substantially change how intelligent you are at math.	0.79_c	0.78_c
No matter how much math ability you have, you can always change it quite a bit.	0.91	0.91
You can change even your basic math ability level considerably	0.87	0.86

(continued)

Factor	Item-Level Model	Simplified Model
Realistic Demonstrated Abilities		
I have made simple car repairs.	0.59$_d$	–
I have made repairs around the house.	0.73$_d$	0.72
I have been successful when I used tools to work on things.	0.76	0.79
I have done well in building things.	0.72	0.72
People I respect have urged me to learn how to fix things that are broken.	0.59	–
Teachers I admired encouraged me to take classes in which I can use my mechanical abilities.	0.54	–
Realistic Physiological Arousal (Reverse-scored)		
I have become uptight while trying to repair something that was broken.	0.46	–
I have become nervous when working on mechanical things (e.g., appliances).	0.67	0.64
I have felt uneasy while using tools to build something.	0.79	0.81
I have felt anxious while performing basic repairs on a car.	0.59	–
I remember feeling anxious while working on something that required manual labor.	0.60	0.58
Investigative Learning Influences		
I recall seeing adults whom I admire working in a research laboratory.	0.59	–
While growing up, I recall seeing people I respected reading scientific articles.	0.72	0.72
I remember my family telling me that it is important to be able to solve science problems.	0.57$_e$	–
People whom I looked up to told me that it is important to read scholarly articles.	0.65$_e$	0.69
My friends have encouraged me to use my research abilities.	0.62	0.60
Investigative Physiological Arousal (Reverse-scored)		
I have felt anxious while taking a science course in school.	0.78	0.80
I have felt uneasy while learning new topics in biology courses.	0.79	0.79
Reading scientific articles has made me feel uneasy.	0.55	–
Math Self-Efficacy – Mastery Experience		0.89
I make excellent grades on math tests.	0.88	–
I have always been successful with math.	0.89	–
I got good grades in math on my last report card.	0.77	–
I do well on math assignments.	0.85	–
I do well on even the most difficult math assignments.	0.87	–

(continued)

Factor	Item-Level Model	Simplified Model
Math Self-Efficacy – Social Persuasion		0.89
People have told me that I have a talent for math.	0.94	–
Adults in my family have told me what a good math student I am.	0.93	–
I have been praised for my ability in math.	0.95	–
Other students have told me that I am good at learning math.	0.90	–
My classmates like to work with me in math because they think I am good at it.	0.82	–
Math Self-Efficacy – Physiological States (Reverse-scored)		0.69
Just being in math class makes me feel stressed and nervous.	0.77	–
Doing math work takes all of my energy.	0.77	–
I start to feel stressed-out as soon as I begin my math work.	0.90	–
My mind goes blank and I am unable to think clearly when doing math work.	0.88	–
I get depressed when I think about learning math.	0.81_{f}	–
My whole body becomes tense when I have to do math work.	0.84_{f}	–
Science Self-Efficacy – Mastery Experience		0.83
I make excellent grades on science tests.	0.85	–
I have always been successful with science.	0.87	–
I got good grades in science on my last report card.	0.71	–
I do well on science assignments.	0.82	–
I do well on even the most difficult science assignments.	0.81	–
Science Self-Efficacy – Social Persuasion		0.81
My science teachers have told me that I am good at learning science.	0.86	–
People have told me that I have a talent for science.	0.90_{g}	–
Adults in my family have told me what a good science student I am.	$0.84_{g,h}$	–
I have been praised for my ability in science.	0.89_{h}	–
Other students have told me that I am good at learning science.	0.88_{i}	–
My classmates like to work with me in science because they think I am good at it.	0.80_{i}	–
Science Self-Efficacy – Physiological States (Reverse-scored)		0.66
Just being in science class makes me feel stressed and nervous.	0.84	–
Doing science work takes all of my energy.	0.77_{j}	–

(continued)

Factor	Item-Level Model	Simplified Model
I start to feel stressed-out as soon as I begin my science work.	0.89j	–
My mind goes blank and I am unable to think clearly when doing science work.	0.88	–
I get depressed when I think about learning science.	0.79k	–
My whole body becomes tense when I have to do science work.	0.82k	–
Outcome Expectations – Internal		0.92
Do work that I would find satisfying	0.84	–
Increase my sense of self-worth	0.68	–
Do exciting work	0.82	–
Have the right type and amount of contact with other people (i.e., "right" for me)	0.77	–
Get the job I want most	0.80	–
Feel good about myself	0.77	–
Outcome Expectations – External		0.74
Receive a good job offer	0.82	–
Earn an attractive salary	0.88l	–
Get respect from other people	0.78	–
Have a career that is valued by my family	0.69	–
Go into a field with high employment demand	0.78l	–
Research Interests		
Being a member of a research team	0.81	0.82
Having research activities as part of every work week	0.83	0.84
Taking a research design course	0.82	0.82
Analyzing data	0.67m	0.65d
Discussing research findings with other students	0.75	0.75
Designing a study	0.72	0.72
Collecting data	0.71m	0.71d
Interest in STEM Topics		
Statistics	0.44	–
Physics	0.68	0.67
Basic Math	0.57n	–

(continued)

Factor	Item-Level Model	Simplified Model
Computer Science	0.57	–
Advanced Math	0.77_{n}	0.81
Engineering	0.77	0.75
Intention to Major in STEM		
I intend to major in a science/technology/engineering/math field.	0.92	0.93
I think that earning a bachelor's degree in science/technology/engineering/math is a realistic goal for me.	0.93	0.94
I am fully committed to getting my college degree in science/technology/engineering/math.	0.94	0.94
Instrumental and Social Supports		
Feel accepted by your classmates	0.69	0.68
Have access to a "role model" in this field (i.e., someone you can look up to and learn from by observing)	0.70	0.70
Feel that there are people "like you" in this field	0.67	0.68
Get helpful assistance from a tutor, if you felt you needed such help	0.71	0.70
Get encouragement from your friends for pursuing this major	0.78	0.77
Get helpful assistance from your advisor	0.66	0.66
Financial Resources		
Be able to afford the extra cost of advanced training in this field	0.78	0.79
Be able to receive enough money through financial aid or other sources to allow you to pursue this major	0.70	0.69
Have enough money saved up to be able to complete your education in this field	0.84	0.83
Have enough financial support from your family to pursue this academic major	0.76	0.76
Social Barriers		
Receive negative comments or discouragement about your major from family members	0.64	0.63
Receive unfair treatment because of your racial or ethnic group	0.75	0.74
Feel pressure from your family to get out of college and begin making money	0.60	0.60
Receive negative comments or discouragement about your major from friends	0.83	0.83
Feel a lack of support from professors or your advisor	0.71	0.71
Feel that you are different from others in this major because of your racial or ethnic group	0.79	0.78

(continued)

Factor	Item-Level Model	Simplified Model
Feel pressure from parents or other important people to change your major to some other field	0.78	0.78
Financial Barriers		
Experience financial strain, especially if this career path required additional training	0.70	0.70
Have too little money to afford things (like computer software or tutoring) that you might need to do well in your coursework	0.78	0.77
Feel that your educational/career options are limited by financial concerns	0.84	0.82

Note. $N_{\text{Item-level}}$ = 1,262 and $N_{\text{Simplified}}$ = 1,282. All loadings are standardized. Correlated uniquenesses between items are denoted with a lower-case subscript (e.g., a) next to the standardized loading. Items with more than one subscript have multiple correlated uniquenesses. For the simplified model, factor loadings are presented at the subscale level for math self-efficacy, science self-efficacy, and outcome expectations. High school math and science classes, as well as persistence in a STEM major, were treated as manifest variables and were not included in factor analyses.

Table 6. *Fit Indices for the Full Sample Item-Level, Simplified, and Alternative Simplified SEM*

Model	AIC/ BIC	χ^2	*df*	CFI	TLI	RMSEA	SRMR	ΔS-B χ^2	Δ*df*	ΔCFI	ΔTLI	ΔRMSEA
Measurement Model												
Item-level[a]	205461.819/ 208787.693	10,015.066	6,612	0.930	0.926	0.020	0.047	–	–	–	–	–
Simplified[b]	149,924.131/ 151,940.196	3,803.100	2,309	0.947	0.941	0.022	0.044	–	–	–	–	–
Structural Model												
Item-level[c]	198,859.729/ 201,592.387	11628.402	7,080	0.904	0.900	0.023	0.105	–	–	–	–	–
Simplified[d]	150,662.026/ 152,347.117	4,695.723	2,589	0.923	0.917	0.026	0.067	–	–	–	–	–
Alternate Simplified[e]	150,160.485/ 151,952.192	4,616.56	2,568	0.925	0.919	0.026	0.066	66.811	21	0.002	0.002	0

Note. All models are significant at $p < 0.001$. Lower AIC and BIC values indicate better model fit for non-nested models. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; $\chi 2$ = chi-square (robust); *df* = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; ΔS-B χ^2 = Satorra-Bentler scaled chi-square difference test; Δ = change in value.
[a]*N* = 1,262. [b]*N* = 1,282. [c]*N* = 1,165. Paths from Financial Barriers to Persistence, Intentions to Major in STEM, and Math Self-Efficacy Physiological Arousal were removed from the model based on warnings from the MPlus program about issues with estimating these paths. [d]*N* = 1,201. [e]*N* = 1,200.

Table 7. *Full Sample Final Structural Model Mediation Analyses*

Model Effect	*β*	*SE*
Direct Effects		
Realistic Demonstrated Abilities ON		
Learning Goal Orientation	**0.17**	(0.06)
Prove Goal Orientation	**0.16**	(0.07)
Avoid Goal Orientation	**-0.29**	(0.08)
IMTA: Fixed Beliefs	-0.09	(0.11)
ITMA: Malleable Beliefs	-0.03	(0.10)
High School Math Classes	-0.01	(0.05)
High School Science Classes	0.04	(0.05)
Realistic Physiological Arousal ON		
Learning Goal Orientation	0.02	(0.07)
Prove Goal Orientation	*0.15*	(0.08)
Avoid Goal Orientation	**-0.43**	(0.08)
IMTA: Fixed Beliefs	-0.15	(0.14)
ITMA: Malleable Beliefs	0.00	(0.13)
High School Math Classes	**-0.10**	(0.05)
High School Science Classes	0.05	(0.05)
Investigative Learning Influences ON		
Learning Goal Orientation	**0.26**	(0.06)
Prove Goal Orientation	**0.17**	(0.07)
Avoid Goal Orientation	-0.07	(0.07)
IMTA: Fixed Beliefs	0.14	(0.10)
ITMA: Malleable Beliefs	0.10	(0.09)
High School Math Classes	**0.13**	(0.05)
High School Science Classes	-0.03	(0.05)
Investigative Physiological Arousal ON		
Learning Goal Orientation	0.05	(0.07)
Prove Goal Orientation	-0.01	(0.07)

(continued)

Model Effect	β	*SE*
Avoid Goal Orientation	**-0.22**	(0.08)
IMTA: Fixed Beliefs	-0.08	(0.13)
ITMA: Malleable Beliefs	0.05	(0.12)
High School Math Classes	0.04	(0.05)
High School Science Classes	*0.09*	(0.05)
Math Self-Efficacy ON		
Learning Goal Orientation	**0.16**	(0.07)
Prove Goal Orientation	-0.02	(0.07)
Avoid Goal Orientation	0.11	(0.08)
IMTA: Fixed Beliefs	-0.09	(0.11)
ITMA: Malleable Beliefs	-0.04	(0.10)
Realistic Demonstrated Abilities	**0.28**	(0.08)
Realistic Physiological Arousal	**-0.25**	(0.10)
Investigative Learning Influences	-0.02	(0.08)
Investigative Physiological Arousal	**0.39**	(0.08)
Instrumental and Social Supports	0.08	(0.15)
Financial Resources	0.13	(0.19)
Social Barriers	-0.08	(0.14)
Financial Barriers	0.09	(0.17)
High School Math Classes	**0.25**	(0.05)
High School Science Classes	0.01	(0.05)
Science Self-Efficacy ON		
Learning Goal Orientation	**0.13**	(0.06)
Prove Goal Orientation	0.01	(0.06)
Avoid Goal Orientation	0.00	(0.07)
IMTA: Fixed Beliefs	**-0.21**	(0.10)
ITMA: Malleable Beliefs	-0.15	(0.10)
Realistic Demonstrated Abilities	**0.24**	(0.06)
Realistic Physiological Arousal	**-0.32**	(0.09)
Investigative Learning Influences	**0.18**	(0.06)

(continued)

Model Effect	*β*	*SE*
Investigative Physiological Arousal	**0.63**	(0.08)
Instrumental and Social Supports	0.05	(0.17)
Financial Resources	0.24	(0.18)
Social Barriers	-0.21	(0.14)
Financial Barriers	0.19	(0.15)
High School Math Classes	**0.09**	(0.04)
High School Science Classes	0.01	(0.04)
Outcome Expectations ON		
Learning Goal Orientation	0.04	(0.10)
Prove Goal Orientation	0.04	(0.10)
Avoid Goal Orientation	0.03	(0.11)
IMTA: Fixed Beliefs	0.22	(0.19)
ITMA: Malleable Beliefs	0.18	(0.17)
Realistic Demonstrated Abilities	-0.19	(0.18)
Realistic Physiological Arousal	0.30	(0.25)
Investigative Learning Influences	-0.01	(0.11)
Investigative Physiological Arousal	-0.42	(0.38)
Math Self-Efficacy	*0.15*	(0.09)
Science Self-Efficacy	0.55	(0.45)
High School Math Classes	*-0.13*	(0.07)
High School Science Classes	*-0.11*	(0.06)
Research Interests ON		
Math Self-Efficacy	0.12	(0.08)
Science Self-Efficacy	**0.33**	(0.08)
Outcome Expectations	*0.11*	(0.07)
Interest in STEM Topics ON		
Math Self-Efficacy	**0.77**	(0.07)
Science Self-Efficacy	0.05	(0.07)
Outcome Expectations	0.06	(0.05)

(continued)

Model Effect	*β*	*SE*
Intentions to Major in STEM ON		
Math Self-Efficacy	-0.10	(0.12)
Science Self-Efficacy	0.09	(0.09)
Outcome Expectations	**0.27**	(0.06)
Research Interests	*0.09*	(0.05)
Interest in STEM Topics	**0.39**	(0.10)
Instrumental and Social Supports	0.03	(0.10)
Financial Resources	0.10	(0.12)
Social Barriers	**-0.25**	(0.08)
Financial Barriers	*0.21*	(0.12)
Persistence in a STEM Major ON		
Intentions to Major in STEM	0.06	(0.07)
Math Self-Efficacy	*0.16*	(0.09)
Science Self-Efficacy	0.14	(0.09)
Outcome Expectations	0.02	(0.08)
Instrumental and Social Supports	-0.15	(0.12)
Financial Resources	0.07	(0.16)
Social Barriers	0.07	(0.12)
Financial Barriers	-0.03	(0.15)
Indirect Effects		
Math Self-Efficacy←Realistic Demonstrated Abilities←Learning Goal Orientation	**0.05**	(0.02)
Math Self-Efficacy←Realistic Physiological Arousal←Learning Goal Orientation	0.00	(0.02)
Math Self-Efficacy←Investigative Learning Influences←Learning Goal Orientation	-0.01	(0.02)
Math Self-Efficacy←Investigative Physiological Arousal←Learning Goal Orientation	0.02	(0.03)
Math Self-Efficacy←Realistic Demonstrated Abilities←Prove Goal Orientation	*0.04*	(0.02)
Math Self-Efficacy←Realistic Physiological Arousal←Prove Goal Orientation	-0.04	(0.02)
Math Self-Efficacy←Investigative Learning Influences←Prove Goal Orientation	0.00	(0.01)
Math Self-Efficacy←Investigative Physiological Arousal←Prove Goal Orientation	-0.01	(0.03)
Math Self-Efficacy←Realistic Demonstrated Abilities←Avoid Goal Orientation	**-0.08**	(0.03)
Math Self-Efficacy←Realistic Physiological Arousal←Avoid Goal Orientation	**0.11**	(0.05)

(continued)

Model Effect	β	*SE*
Math Self-Efficacy←Investigative Learning Influences←Avoid Goal Orientation	0.00	(0.01)
Math Self-Efficacy←Investigative Physiological Arousal←Avoid Goal Orientation	**-0.09**	(0.04)
Math Self-Efficacy←Realistic Demonstrated Abilities←ITMA: Fixed Beliefs	-0.02	(0.03)
Math Self-Efficacy←Realistic Physiological Arousal←ITMA: Fixed Beliefs	0.04	(0.04)
Math Self-Efficacy←Investigative Learning Influences←ITMA: Fixed Beliefs	0.00	(0.01)
Math Self-Efficacy←Investigative Physiological Arousal←ITMA: Fixed Beliefs	-0.03	(0.05)
Math Self-Efficacy←Realistic Demonstrated Abilities←ITMA: Malleable Beliefs	-0.01	(0.03)
Math Self-Efficacy←Realistic Physiological Arousal←ITMA: Malleable Beliefs	0.00	(0.03)
Math Self-Efficacy←Investigative Learning Influences←ITMA: Malleable Beliefs	0.00	(0.01)
Math Self-Efficacy←Investigative Physiological Arousal←ITMA: Malleable Beliefs	0.02	(0.05)
Math Self-Efficacy←Realistic Demonstrated Abilities←High School Math Classes	0.00	(0.01)
Math Self-Efficacy←Realistic Physiological Arousal←High School Math Classes	0.02	(0.02)
Math Self-Efficacy←Investigative Learning Influences←High School Math Classes	0.00	(0.01)
Math Self-Efficacy←Investigative Physiological Arousal←High School Math Classes	0.02	(0.02)
Math Self-Efficacy←Realistic Demonstrated Abilities←High School Science Classes	0.01	(0.01)
Math Self-Efficacy←Realistic Physiological Arousal←High School Science Classes	-0.01	(0.01)
Math Self-Efficacy←Investigative Learning Influences←High School Science Classes	0.00	(0.00)
Math Self-Efficacy←Investigative Physiological Arousal←High School Science Classes	0.03	(0.02)
Science Self-Efficacy←Realistic Demonstrated Abilities←Learning Goal Orientation	**0.04**	(0.02)
Science Self-Efficacy←Realistic Physiological Arousal←Learning Goal Orientation	-0.01	(0.02)
Science Self-Efficacy←Investigative Learning Influences←Learning Goal Orientation	**0.05**	(0.02)
Science Self-Efficacy←Investigative Physiological Arousal←Learning Goal Orientation	0.03	(0.04)
Science Self-Efficacy←Realistic Demonstrated Abilities←Prove Goal Orientation	**0.04**	(0.02)
Science Self-Efficacy←Realistic Physiological Arousal←Prove Goal Orientation	*-0.05*	(0.03)
Science Self-Efficacy←Investigative Learning Influences←Prove Goal Orientation	*0.03*	(0.02)
Science Self-Efficacy←Investigative Physiological Arousal←Prove Goal Orientation	-0.01	(0.05)
Science Self-Efficacy←Realistic Demonstrated Abilities←Avoid Goal Orientation	**-0.07**	(0.03)
Science Self-Efficacy←Realistic Physiological Arousal←Avoid Goal Orientation	**0.14**	(0.05)
Science Self-Efficacy←Investigative Learning Influences←Avoid Goal Orientation	-0.01	(0.01)
Science Self-Efficacy←Investigative Physiological Arousal←Avoid Goal Orientation	**-0.14**	(0.05)

(continued)

Model Effect	*β*	*SE*
Science Self-Efficacy←Realistic Demonstrated Abilities←ITMA: Fixed Beliefs	-0.02	(0.03)
Science Self-Efficacy←Realistic Physiological Arousal←ITMA: Fixed Beliefs	0.05	(0.05)
Science Self-Efficacy←Investigative Learning Influences←ITMA: Fixed Beliefs	0.03	(0.02)
Science Self-Efficacy←Investigative Physiological Arousal←ITMA: Fixed Beliefs	-0.05	(0.08)
Science Self-Efficacy←Realistic Demonstrated Abilities←ITMA: Malleable Beliefs	-0.01	(0.02)
Science Self-Efficacy←Realistic Physiological Arousal←ITMA: Malleable Beliefs	0.00	(0.04)
Science Self-Efficacy←Investigative Learning Influences←ITMA: Malleable Beliefs	0.02	(0.02)
Science Self-Efficacy←Investigative Physiological Arousal←ITMA: Malleable Beliefs	0.03	(0.08)
Science Self-Efficacy←Realistic Demonstrated Abilities←High School Math Classes	0.00	(0.01)
Science Self-Efficacy←Realistic Physiological Arousal←High School Math Classes	*0.03*	(0.02)
Science Self-Efficacy←Investigative Learning Influences←High School Math Classes	**0.02**	(0.01)
Science Self-Efficacy←Investigative Physiological Arousal←High School Math Classes	0.03	(0.03)
Science Self-Efficacy←Realistic Demonstrated Abilities←High School Science Classes	0.01	(0.01)
Science Self-Efficacy←Realistic Physiological Arousal←High School Science Classes	-0.02	(0.02)
Science Self-Efficacy←Investigative Learning Influences←High School Science Classes	-0.01	(0.01)
Science Self-Efficacy←Investigative Physiological Arousal←High School Science Classes	0.05	(0.03)
Outcome Expectations←Realistic Demonstrated Abilities←Learning Goal Orientation	-0.03	(0.03)
Outcome Expectations←Realistic Physiological Arousal←Learning Goal Orientation	0.01	(0.02)
Outcome Expectations←Investigative Learning Influences←Learning Goal Orientation	0.00	(0.03)
Outcome Expectations←Investigative Physiological Arousal←Learning Goal Orientation	-0.02	(0.03)
Outcome Expectations←Math Self-Efficacy←Learning Goal Orientation	0.02	(0.02)
Outcome Expectations←Science Self-Efficacy←Learning Goal Orientation	0.07	(0.07)
Outcome Expectations←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Outcome Expectations←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.02	(0.02)
via O Realistic Physiological Arousal	0.00	(0.01)

(continued)

Model Effect	β	*SE*
via O Investigative Learning Influences	0.03	(0.02)
via O Investigative Physiological Arousal	0.02	(0.03)
Outcome Expectations←Realistic Demonstrated Abilities←Prove Goal Orientation	-0.03	(0.03)
Outcome Expectations←Realistic Physiological Arousal←Prove Goal Orientation	0.04	(0.04)
Outcome Expectations←Investigative Learning Influences←Prove Goal Orientation	0.00	(0.02)
Outcome Expectations←Investigative Physiological Arousal←Prove Goal Orientation	0.01	(0.03)
Outcome Expectations←Math Self-Efficacy←Prove Goal Orientation	0.00	(0.01)
Outcome Expectations←Science Self-Efficacy←Prove Goal Orientation	0.01	(0.03)
Outcome Expectations←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Outcome Expectations←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.02	(0.02)
via O Realistic Physiological Arousal	-0.03	(0.03)
via O Investigative Learning Influences	0.02	(0.01)
via O Investigative Physiological Arousal	-0.01	(0.03)
Outcome Expectations←Realistic Demonstrated Abilities←Avoid Goal Orientation	0.05	(0.05)
Outcome Expectations←Realistic Physiological Arousal←Avoid Goal Orientation	-0.13	(0.11)
Outcome Expectations←Investigative Learning Influences←Avoid Goal Orientation	0.00	(0.01)
Outcome Expectations←Investigative Physiological Arousal←Avoid Goal Orientation	0.09	(0.09)
Outcome Expectations←Math Self-Efficacy←Avoid Goal Orientation	0.02	(0.02)
Outcome Expectations←Science Self-Efficacy←Avoid Goal Orientation	0.00	(0.04)
Outcome Expectations←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.02	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)

(continued)

Model Effect	β	*SE*
Outcome Expectations←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	-0.04	(0.04)
via O Realistic Physiological Arousal	0.07	(0.08)
via O Investigative Learning Influences	-0.01	(0.01)
via O Investigative Physiological Arousal	-0.08	(0.08)
Outcome Expectations←Realistic Demonstrated Abilities←ITMA: Fixed Beliefs	0.02	(0.02)
Outcome Expectations←Realistic Physiological Arousal←ITMA: Fixed Beliefs	-0.05	(0.06)
Outcome Expectations←Investigative Learning Influences←ITMA: Fixed Beliefs	0.00	(0.02)
Outcome Expectations←Investigative Physiological Arousal←ITMA: Fixed Beliefs	0.03	(0.06)
Outcome Expectations←Math Self-Efficacy←ITMA: Fixed Beliefs	-0.01	(0.02)
Outcome Expectations←Science Self-Efficacy←ITMA: Fixed Beliefs	-0.12	(0.13)
Outcome Expectations←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
Outcome Expectations←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	-0.01	(0.02)
via O Realistic Physiological Arousal	0.03	(0.04)
via O Investigative Learning Influences	0.01	(0.02)
via O Investigative Physiological Arousal	-0.03	(0.05)
Outcome Expectations←Realistic Demonstrated Abilities←ITMA: Malleable Beliefs	0.01	(0.02)
Outcome Expectations←Realistic Physiological Arousal←ITMA: Malleable Beliefs	0.00	(0.04)
Outcome Expectations←Investigative Learning Influences←ITMA: Malleable Beliefs	0.00	(0.01)
Outcome Expectations←Investigative Physiological Arousal←ITMA: Malleable Beliefs	-0.02	(0.06)
Outcome Expectations←Math Self-Efficacy←ITMA: Malleable Beliefs	-0.01	(0.02)
Outcome Expectations←Science Self-Efficacy←ITMA: Malleable Beliefs	-0.08	(0.11)
Outcome Expectations←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.01)

(continued)

Model Effect	*β*	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Outcome Expectations←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.00	(0.02)
via O Investigative Learning Influences	0.01	(0.01)
via O Investigative Physiological Arousal	0.02	(0.05)
Outcome Expectations←Realistic Demonstrated Abilities←High School Math Classes	0.00	(0.01)
Outcome Expectations←Realistic Physiological Arousal←High School Math Classes	-0.03	(0.03)
Outcome Expectations←Investigative Learning Influences←High School Math Classes	0.00	(0.02)
Outcome Expectations←Investigative Physiological Arousal←High School Math Classes	-0.02	(0.03)
Outcome Expectations←Math Self-Efficacy←High School Math Classes	*0.04*	(0.02)
Outcome Expectations←Science Self-Efficacy←High School Math Classes	0.05	(0.04)
Outcome Expectations←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Outcome Expectations←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.02	(0.02)
via O Investigative Learning Influences	0.01	(0.01)
via O Investigative Physiological Arousal	0.01	(0.02)
Outcome Expectations←Realistic Demonstrated Abilities←High School Science Classes	-0.01	(0.01)
Outcome Expectations←Realistic Physiological Arousal←High School Science Classes	0.02	(0.02)
Outcome Expectations←Investigative Learning Influences←High School Science Classes	0.00	(0.00)
Outcome Expectations←Investigative Physiological Arousal←High School Science Classes	-0.04	(0.04)
Outcome Expectations←Math Self-Efficacy←High School Science Classes	0.00	(0.01)
Outcome Expectations←Science Self-Efficacy←High School Science Classes	0.01	(0.02)

(continued)

Model Effect	*β*	*SE*
Outcome Expectations←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.00)
Outcome Expectations←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	0.03	(0.03)
Outcome Expectations←Math Self-Efficacy←Realistic Demonstrated Abilities	0.04	(0.03)
Outcome Expectations←Science Self-Efficacy←Realistic Demonstrated Abilities	0.13	(0.13)
Outcome Expectations←Math Self-Efficacy←Realistic Physiological Arousal	-0.04	(0.03)
Outcome Expectations←Science Self-Efficacy←Realistic Physiological Arousal	-0.17	(0.18)
Outcome Expectations←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.01)
Outcome Expectations←Science Self-Efficacy←Investigative Learning Influences	0.10	(0.08)
Outcome Expectations←Math Self-Efficacy←Investigative Physiological Arousal	0.06	(0.04)
Outcome Expectations←Science Self-Efficacy←Investigative Physiological Arousal	0.35	(0.32)
Outcome Expectations←Math Self-Efficacy←Instrumental and Social Supports	0.01	(0.03)
Outcome Expectations←Science Self-Efficacy←Instrumental and Social Supports	0.03	(0.11)
Outcome Expectations←Math Self-Efficacy←Financial Resources	0.02	(0.03)
Outcome Expectations←Science Self-Efficacy←Financial Resources	0.13	(0.11)
Outcome Expectations←Math Self-Efficacy←Social Barriers	-0.01	(0.02)
Outcome Expectations←Science Self-Efficacy←Social Barriers	-0.12	(0.09)
Outcome Expectations←Math Self-Efficacy←Financial Barriers	0.01	(0.03)
Outcome Expectations←Science Self-Efficacy←Financial Barriers	0.10	(0.11)
Research Interests←Math Self-Efficacy←Learning Goal Orientation	0.02	(0.02)
Research Interests←Science Self-Efficacy←Learning Goal Orientation	*0.04*	(0.02)
Research Interests←Outcome Expectations←Learning Goal Orientation	0.00	(0.01)

(continued)

Model Effect	*β*	*SE*
Research Interests←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	*0.01*	(0.01)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	**0.02**	(0.01)
via O Investigative Physiological Arousal	0.01	(0.01)
Research Interests←Outcome Expectations←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.01	(0.01)
Research Interests←Outcome Expectations←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Outcome Expectations←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Math Self-Efficacy←Prove Goal Orientation	0.00	(0.01)
Research Interests←Science Self-Efficacy←Prove Goal Orientation	0.00	(0.02)
Research Interests←Outcome Expectations←Prove Goal Orientation	0.01	(0.01)

(continued)

Model Effect	*β*	*SE*
Research Interests←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	*0.01*	(0.01)
via O Realistic Physiological Arousal	-0.02	(0.01)
via O Investigative Learning Influences	*0.01*	(0.01)
via O Investigative Physiological Arousal	0.00	(0.02)
Research Interests←Outcome Expectations←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Research Interests←Outcome Expectations←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Outcome Expectations←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Math Self-Efficacy←Avoid Goal Orientation	0.01	(0.01)
Research Interests←Science Self-Efficacy←Avoid Goal Orientation	0.00	(0.02)
Research Interests←Outcome Expectations←Avoid Goal Orientation	0.00	(0.01)

(continued)

Model Effect	*β*	*SE*
Research Interests←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
Research Interests←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	**-0.02**	(0.01)
via O Realistic Physiological Arousal	**0.05**	(0.02)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	**-0.05**	(0.02)
Research Interests←Outcome Expectations←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	-0.02	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Research Interests←Outcome Expectations←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Outcome Expectations←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
Research Interests←Math Self-Efficacy←ITMA: Fixed Beliefs	-0.01	(0.01)
Research Interests←Science Self-Efficacy←ITMA: Fixed Beliefs	*-0.07*	(0.04)
Research Interests←Outcome Expectations←ITMA: Fixed Beliefs	0.03	(0.02)

(continued)

Model Effect	β	SE
Research Interests←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Research Interests←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.02	(0.02)
via O Investigative Learning Influences	0.01	(0.01)
via O Investigative Physiological Arousal	-0.02	(0.03)
Research Interests←Outcome Expectations←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.01	(0.01)
Research Interests←Outcome Expectations←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Outcome Expectations←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Research Interests←Math Self-Efficacy←ITMA: Malleable Beliefs	0.00	(0.01)
Research Interests←Science Self-Efficacy←ITMA: Malleable Beliefs	-0.05	(0.04)
Research Interests←Outcome Expectations←ITMA: Malleable Beliefs	0.02	(0.02)

(continued)

Model Effect	*β*	*SE*
Research Interests←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Research Interests←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.01	(0.01)
via O Investigative Physiological Arousal	0.01	(0.03)
Research Interests←Outcome Expectations←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.01	(0.01)
Research Interests←Outcome Expectations←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Outcome Expectations←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Research Interests←Math Self-Efficacy←High School Math Classes	0.03	(0.02)
Research Interests←Science Self-Efficacy←High School Math Classes	**0.03**	(0.02)
Research Interests←Outcome Expectations←High School Math Classes	-0.01	(0.01)

(continued)

Model Effect	*β*	*SE*
Research Interests←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	*0.01*	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
Research Interests←Outcome Expectations←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.01	(0.01)
Research Interests←Outcome Expectations←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Outcome Expectations←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Math Self-Efficacy←High School Science Classes	0.00	(0.01)
Research Interests←Science Self-Efficacy←High School Science Classes	0.00	(0.01)
Research Interests←Outcome Expectations←High School Science Classes	-0.01	(0.01)

(continued)

Model Effect	β	SE
Research Interests←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.02	(0.01)
Research Interests←Outcome Expectations←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Research Interests←Outcome Expectations←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Outcome Expectations←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Research Interests←Math Self-Efficacy←Realistic Demonstrated Abilities	0.03	(0.02)
Research Interests←Science Self-Efficacy←Realistic Demonstrated Abilities	**0.08**	(0.03)
Research Interests←Outcome Expectations←Realistic Demonstrated Abilities	-0.02	(0.02)

(continued)

Model Effect	*β*	*SE*
Research Interests←Outcome Expectations←O←Realistic Demonstrated Abilities		
via O Math Self-Efficacy	0.01	(0.00)
via O Science Self-Efficacy	0.02	(0.01)
Research Interests←Math Self-Efficacy←Realistic Physiological Arousal	-0.03	(0.02)
Research Interests←Science Self-Efficacy←Realistic Physiological Arousal	**-0.10**	(0.05)
Research Interests←Outcome Expectations←Realistic Physiological Arousal	0.04	(0.03)
Research Interests←Outcome Expectations←O←Realistic Physiological Arousal		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.02	(0.02)
Research Interests←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.01)
Research Interests←Science Self-Efficacy←Investigative Learning Influences	**0.06**	(0.02)
Research Interests←Outcome Expectations←Investigative Learning Influences	0.00	(0.01)
Research Interests←Outcome Expectations←O←Investigative Learning Influences		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.01	(0.01)
Research Interests←Math Self-Efficacy←Investigative Physiological Arousal	0.05	(0.03)
Research Interests←Science Self-Efficacy←Investigative Physiological Arousal	**0.21**	(0.07)
Research Interests←Outcome Expectations←Investigative Physiological Arousal	-0.05	(0.04)
Research Interests←Outcome Expectations←O←Investigative Physiological Arousal		
via O Math Self-Efficacy	0.01	(0.01)
via O Science Self-Efficacy	0.04	(0.03)
Research Interests←Outcome Expectations←Math Self-Efficacy	0.02	(0.01)
Research Interests←Outcome Expectations←Science Self-Efficacy	0.06	(0.04)
Research Interests←Math Self-Efficacy←Instrumental and Social Supports	0.01	(0.02)
Research Interests←Science Self-Efficacy←Instrumental and Social Supports	0.02	(0.06)
Research Interests←Outcome Expectations←O←Instrumental and Social Supports		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.01)
Research Interests←Math Self-Efficacy←Financial Supports	0.02	(0.02)
Research Interests←Science Self-Efficacy←Financial Supports	0.08	(0.06)

(continued)

Model Effect	β	*SE*
Research Interests←Outcome Expectations←O←Financial Supports		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.02	(0.01)
Research Interests←Math Self-Efficacy←Social Barriers	-0.01	(0.02)
Research Interests←Science Self-Efficacy←Social Barriers	-0.07	(0.04)
Research Interests←Outcome Expectations←O←Social Barriers		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.01	(0.01)
Research Interests←Math Self-Efficacy←Financial Barriers	0.01	(0.02)
Research Interests←Science Self-Efficacy←Financial Barriers	0.06	(0.05)
Research Interests←Outcome Expectations←O←Financial Barriers		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.01	(0.01)
Interest in STEM Topics←Math Self-Efficacy←Learning Goal Orientation	**0.12**	(0.05)
Interest in STEM Topics←Science Self-Efficacy←Learning Goal Orientation	0.01	(0.01)
Interest in STEM Topics←Outcome Expectations←Learning Goal Orientation	0.00	(0.01)
Interest in STEM Topics←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	**0.04**	(0.02)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	-0.01	(0.02)
via O Investigative Physiological Arousal	0.01	(0.02)
Interest in STEM Topics←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.01)
Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Math Self-Efficacy←Prove Goal Orientation	-0.02	(0.06)
Interest in STEM Topics←Science Self-Efficacy←Prove Goal Orientation	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Prove Goal Orientation	0.00	(0.01)
Interest in STEM Topics←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	*0.03*	(0.02)
via O Realistic Physiological Arousal	-0.03	(0.02)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	0.00	(0.02)
Interest in STEM Topics←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Math Self-Efficacy←Avoid Goal Orientation	0.09	(0.06)
Interest in STEM Topics←Science Self-Efficacy←Avoid Goal Orientation	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Avoid Goal Orientation	0.00	(0.01)
Interest in STEM Topics←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	**-0.06**	(0.02)
via O Realistic Physiological Arousal	**0.08**	(0.04)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	**-0.07**	(0.03)
Interest in STEM Topics←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
Interest in STEM Topics←Outcome Expectations←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Physiological Arousal	0.01	(0.01)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
Interest in STEM Topics←Math Self-Efficacy←ITMA: Fixed Beliefs	-0.07	(0.08)
Interest in STEM Topics←Science Self-Efficacy←ITMA: Fixed Beliefs	-0.01	(0.02)
Interest in STEM Topics←Outcome Expectations←ITMA: Fixed Beliefs	0.01	(0.02)
Interest in STEM Topics←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	-0.02	(0.02)
via O Realistic Physiological Arousal	0.03	(0.03)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	-0.02	(0.04)
Interest in STEM Topics←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Interest in STEM Topics←Outcome Expectations←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.01	(0.01)
Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Math Self-Efficacy←ITMA: Malleable Beliefs	-0.03	(0.08)
Interest in STEM Topics←Science Self-Efficacy←ITMA: Malleable Beliefs	-0.01	(0.01)
Interest in STEM Topics←Outcome Expectations←ITMA: Malleable Beliefs	0.01	(0.01)
Interest in STEM Topics←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	-0.01	(0.02)
via O Realistic Physiological Arousal	0.00	(0.03)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	0.02	(0.04)
Interest in STEM Topics←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.01	(0.01)
Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Math Self-Efficacy←High School Math Classes	**0.19**	(0.04)
Interest in STEM Topics←Science Self-Efficacy←High School Math Classes	0.00	(0.01)
Interest in STEM Topics←Outcome Expectations←High School Math Classes	-0.01	(0.01)
Interest in STEM Topics←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.02	(0.01)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	0.01	(0.02)
Interest in STEM Topics←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	SE
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Math Self-Efficacy←High School Science Classes	0.01	(0.04)
Interest in STEM Topics←Science Self-Efficacy←High School Science Classes	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←High School Science Classes	-0.01	(0.01)
Interest in STEM Topics←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.03	(0.02)
Interest in STEM Topics←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Interest in STEM Topics←Math Self-Efficacy←Realistic Demonstrated Abilities	**0.22**	(0.06)
Interest in STEM Topics←Science Self-Efficacy←Realistic Demonstrated Abilities	0.01	(0.02)
Interest in STEM Topics←Outcome Expectations←Realistic Demonstrated Abilities	-0.01	(0.01)
Interest in STEM Topics←Outcome Expectations←O←Realistic Demonstrated Abilities		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.01	(0.01)
Interest in STEM Topics←Math Self-Efficacy←Realistic Physiological Arousal	**-0.19**	(0.08)
Interest in STEM Topics←Science Self-Efficacy←Realistic Physiological Arousal	-0.02	(0.02)
Interest in STEM Topics←Outcome Expectations←Realistic Physiological Arousal	0.02	(0.02)
Interest in STEM Topics←Outcome Expectations←O←Realistic Physiological Arousal		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.01	(0.01)
Interest in STEM Topics←Math Self-Efficacy←Investigative Learning Influences	-0.02	(0.06)
Interest in STEM Topics←Science Self-Efficacy←Investigative Learning Influences	0.01	(0.01)
Interest in STEM Topics←Outcome Expectations←Investigative Learning Influences	0.00	(0.01)
Interest in STEM Topics←Outcome Expectations←O←Investigative Learning Influences		
via O Math Self-Efficacy	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Science Self-Efficacy	0.01	(0.01)
Interest in STEM Topics←Math Self-Efficacy←Investigative Physiological Arousal	**0.30**	(0.07)
Interest in STEM Topics←Science Self-Efficacy←Investigative Physiological Arousal	0.03	(0.05)
Interest in STEM Topics←Outcome Expectations←Investigative Physiological Arousal	-0.03	(0.03)
Interest in STEM Topics←Outcome Expectations←O←Investigative Physiological Arousal		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.02	(0.02)
Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy	0.01	(0.01)
Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy	0.03	(0.04)
Interest in STEM Topics←Math Self-Efficacy←Instrumental and Social Supports	0.06	(0.12)
Interest in STEM Topics←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.01)
Interest in STEM Topics←Outcome Expectations←O←Instrumental and Social Supports		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.01)
Interest in STEM Topics←Math Self-Efficacy←Financial Supports	0.10	(0.14)
Interest in STEM Topics←Science Self-Efficacy←Financial Supports	0.01	(0.02)
Interest in STEM Topics←Outcome Expectations←O←Financial Supports		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.01	(0.01)
Interest in STEM Topics←Math Self-Efficacy←Social Barriers	-0.06	(0.1)
Interest in STEM Topics←Science Self-Efficacy←Social Barriers	-0.01	(0.02)
Interest in STEM Topics←Outcome Expectations←O←Social Barriers		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.01	(0.01)
Interest in STEM Topics←Math Self-Efficacy←Financial Barriers	0.07	(0.13)
Interest in STEM Topics←Science Self-Efficacy←Financial Barriers	0.01	(0.02)
Interest in STEM Topics←Outcome Expectations←O←Financial Barriers		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.01	(0.01)
Intention to Major in STEM←Math Self-Efficacy←Learning Goal Orientation	-0.02	(0.02)

(continued)

Model Effect	*β*	*SE*
Intention to Major in STEM←Science Self-Efficacy←Learning Goal Orientation	0.01	(0.01)
Intention to Major in STEM←Outcome Expectations←Learning Goal Orientation	0.01	(0.03)
Intention to Major in STEM←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Intention to Major in STEM←Outcome Expectations←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	-0.01	(0.01)
via O Math Self-Efficacy	0.01	(0.01)
via O Science Self-Efficacy	0.02	(0.02)
Intention to Major in STEM←Research Interests←O←Learning Goal Orientation		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←O←Learning Goal Orientation		
via O Math Self-Efficacy	*0.05*	(0.03)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.01	(0.01)
via O Investigative Physiological Arousal	0.00	(0.01)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	*0.01*	(0.01)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	0.01	(0.01)

(continued)

Model Effect	β	*SE*
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←Prove Goal Orientation	0.00	(0.01)
Intention to Major in STEM←Science Self-Efficacy←Prove Goal Orientation	0.00	(0.01)
Intention to Major in STEM←Outcome Expectations←Prove Goal Orientation	0.01	(0.03)
Intention to Major in STEM←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	0.00	(0.01)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.01)
Intention to Major in STEM←Research Interests←O←Prove Goal Orientation		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Intention to Major in STEM←Interest in STEM Topics←O←Prove Goal Orientation		
via O Math Self-Efficacy	-0.01	(0.02)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.01	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←Avoid Goal Orientation	-0.01	(0.02)
Intention to Major in STEM←Science Self-Efficacy←Avoid Goal Orientation	0.00	(0.01)
Intention to Major in STEM←Outcome Expectations←Avoid Goal Orientation	0.01	(0.03)
Intention to Major in STEM←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
Intention to Major in STEM←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
Intention to Major in STEM←Outcome Expectations←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.02)
via O Realistic Physiological Arousal	-0.04	(0.03)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.03	(0.03)

(continued)

Model Effect	β	SE
via O Math Self-Efficacy	0.01	(0.00)
via O Science Self-Efficacy	0.00	(0.01)
Intention to Major in STEM←Research Interests←O←Avoid Goal Orientation		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←O←Avoid Goal Orientation		
via O Math Self-Efficacy	0.04	(0.03)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.02	(0.02)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.02	(0.02)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
Intention to Major in STEM←Research Interests←Outcome Expectations←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	**-0.02**	(0.01)
via O Realistic Physiological Arousal	*0.03*	(0.02)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	*-0.03*	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←ITMA: Fixed Beliefs	0.01	(0.02)
Intention to Major in STEM←Science Self-Efficacy←ITMA: Fixed Beliefs	-0.02	(0.02)
Intention to Major in STEM←Outcome Expectations←ITMA: Fixed Beliefs	0.06	(0.06)
Intention to Major in STEM←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Intention to Major in STEM←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
via O Investigative Physiological Arousal	-0.01	(0.01)
Intention to Major in STEM←Outcome Expectations←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	-0.01	(0.02)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.02)
via O Math Self-Efficacy	0.00	(0.01)
via O Science Self-Efficacy	-0.03	(0.04)
Intention to Major in STEM←Research Interests←O←ITMA: Fixed Beliefs		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.01	(0.01)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←O←ITMA: Fixed Beliefs		
via O Math Self-Efficacy	-0.03	(0.03)
via O Science Self-Efficacy	0.00	(0.01)
via O Outcome Expectations	0.01	(0.01)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.02)
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←ITMA: Malleable Beliefs	0.00	(0.01)
Intention to Major in STEM←Science Self-Efficacy←ITMA: Malleable Beliefs	-0.01	(0.02)
Intention to Major in STEM←Outcome Expectations←ITMA: Malleable Beliefs	0.05	(0.05)
Intention to Major in STEM←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	SE
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Intention to Major in STEM←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Intention to Major in STEM←Outcome Expectations←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.02)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.02	(0.03)
Intention to Major in STEM←Research Interests←O←ITMA: Malleable Beliefs		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←O←ITMA: Malleable Beliefs		
via O Math Self-Efficacy	-0.01	(0.03)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.01)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.01)

(continued)

Model Effect	*β*	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←High School Math Classes	-0.02	(0.03)
Intention to Major in STEM←Science Self-Efficacy←High School Math Classes	0.01	(0.01)
Intention to Major in STEM←Outcome Expectations←High School Math Classes	-0.03	(0.02)
Intention to Major in STEM←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
via O Math Self-Efficacy	0.01	(0.01)
via O Science Self-Efficacy	0.01	(0.01)
Intention to Major in STEM←Research Interests←O←High School Math Classes		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←O←High School Math Classes		
via O Math Self-Efficacy	**0.08**	(0.03)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.01	(0.01)

(continued)

Model Effect	β	SE
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←High School Science Classes	0.00	(0.01)
Intention to Major in STEM←Science Self-Efficacy←High School Science Classes	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←High School Science Classes	-0.03	(0.02)
Intention to Major in STEM←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Intention to Major in STEM←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
Intention to Major in STEM←Outcome Expectations←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.01)
Intention to Major in STEM←Research Interests←O←High School Science Classes		
via O Math Self-Efficacy	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←O←High School Science Classes		
via O Math Self-Efficacy	0.00	(0.02)
via O Science Self-Efficacy	0.00	(0.00)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←Realistic Demonstrated Abilities	-0.03	(0.04)
Intention to Major in STEM←Science Self-Efficacy←Realistic Demonstrated Abilities	0.02	(0.02)
Intention to Major in STEM←Outcome Expectations←Realistic Demonstrated Abilities	-0.05	(0.05)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Realistic Demonstrated Abilities	0.01	(0.01)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Realistic Demonstrated Abilities	0.04	(0.04)
Intention to Major in STEM←Research Interests←O ←Realistic Demonstrated Abilities		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.01	(0.01)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←O ←Realistic Demonstrated Abilities		
via O Math Self-Efficacy	**0.09**	(0.04)
via O Science Self-Efficacy	0.01	(0.01)

(continued)

Model Effect	*β*	*SE*
via O Outcome Expectations	0.00	(0.01)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Intention to Major in STEM← Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←Realistic Physiological Arousal	0.02	(0.03)
Intention to Major in STEM←Science Self-Efficacy←Realistic Physiological Arousal	-0.03	(0.03)
Intention to Major in STEM←Outcome Expectations←Realistic Physiological Arousal	0.08	(0.07)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Realistic Physiological Arousal	-0.01	(0.01)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Realistic Physiological Arousal	-0.05	(0.05)
Intention to Major in STEM←Research Interests←O ←Realistic Physiological Arousal		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	-0.01	(0.01)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←O ←Realistic Physiological Arousal		
via O Math Self-Efficacy	*-0.08*	(0.04)
via O Science Self-Efficacy	-0.01	(0.01)
via O Outcome Expectations	0.01	(0.01)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Intention to Major in STEM← Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	SE
Intention to Major in STEM←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.01)
Intention to Major in STEM←Science Self-Efficacy←Investigative Learning Influences	0.02	(0.02)
Intention to Major in STEM←Outcome Expectations←Investigative Learning Influences	0.00	(0.03)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Investigative Learning Influences	0.03	(0.02)
Intention to Major in STEM←Research Interests←O ←Investigative Learning Influences		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.01	(0.00)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←O ←Investigative Learning Influences		
via O Math Self-Efficacy	-0.01	(0.03)
via O Science Self-Efficacy	0.00	(0.01)
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Intention to Major in STEM← Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←Investigative Physiological Arousal	-0.04	(0.05)
Intention to Major in STEM←Science Self-Efficacy←Investigative Physiological Arousal	0.06	(0.06)
Intention to Major in STEM←Outcome Expectations←Investigative Physiological Arousal	-0.12	(0.11)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Investigative Physiological Arousal	0.02	(0.01)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Investigative Physiological Arousal	0.10	(0.09)
Intention to Major in STEM←Research Interests←O ←Investigative Physiological Arousal		
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.02	(0.01)

(continued)

Model Effect	β	*SE*
via O Outcome Expectations	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←O ←Investigative Physiological Arousal		
via O Math Self-Efficacy	**0.12**	(0.05)
via O Science Self-Efficacy	0.01	(0.02)
via O Outcome Expectations	-0.01	(0.01)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Intention to Major in STEM← Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Investigative Physiological Arousal	0.01	(0.01)
Intention to Major in STEM←Outcome Expectation←Math Self-Efficacy	0.04	(0.03)
Intention to Major in STEM←Research Interests←Math Self-Efficacy	0.01	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy	**0.30**	(0.09)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy	0.00	(0.00)
Intention to Major in STEM←Outcome Expectation←Science self-Efficacy	0.15	(0.13)
Intention to Major in STEM←Research Interests←Science self-Efficacy	0.03	(0.02)
Intention to Major in STEM←Interest in STEM Topics←Science self-Efficacy	0.02	(0.03)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science self-Efficacy	0.01	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science self-Efficacy	0.01	(0.01)
Intention to Major in STEM←Research Interests←Outcome Expectations	0.01	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations	0.02	(0.02)
Intention to Major in STEM←Math Self-Efficacy←Instrumental and Social Supports	-0.01	(0.02)
Intention to Major in STEM←Science Self-Efficacy←Instrumental and Social Supports	0.01	(0.02)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.01)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Instrumental and Social Supports	0.01	(0.03)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Intention to Major in STEM←Research Interests←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Instrumental and Social Supports	0.02	(0.05)
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←Financial Resources	-0.01	(0.02)
Intention to Major in STEM←Science Self-Efficacy←Financial Resources	0.02	(0.03)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Financial Resources	0.01	(0.01)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Financial Resources	0.04	(0.03)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←Financial Resources	0.00	(0.00)
Intention to Major in STEM←Research Interests←Science Self-Efficacy←Financial Resources	0.01	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Financial Resources	0.04	(0.06)
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Financial Resources	0.01	(0.01)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Financial Resources	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Financial Resources	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Financial Resources	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Financial Resources	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←Social Barriers	0.01	(0.02)
Intention to Major in STEM←Science Self-Efficacy←Social Barriers	-0.02	(0.02)

(continued)

Model Effect	β	*SE*
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Social Barriers	0.00	(0.01)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Social Barriers	-0.03	(0.03)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←Social Barriers	0.00	(0.00)
Intention to Major in STEM←Research Interests←Science Self-Efficacy←Social Barriers	-0.01	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Social Barriers	-0.02	(0.04)
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Social Barriers	0.00	(0.01)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Social Barriers	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Social Barriers	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Social Barriers	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Social Barriers	0.00	(0.00)
Intention to Major in STEM←Math Self-Efficacy←Financial Barriers	-0.01	(0.02)
Intention to Major in STEM←Science Self-Efficacy←Financial Barriers	0.02	(0.02)
Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Financial Barriers	0.00	(0.01)
Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Financial Barriers	0.03	(0.03)
Intention to Major in STEM←Research Interests←Math Self-Efficacy←Financial Barriers	0.00	(0.00)
Intention to Major in STEM←Research Interests←Science Self-Efficacy←Financial Barriers	0.01	(0.01)
Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Financial Barriers	0.03	(0.05)
Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Financial Barriers	0.00	(0.01)
Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Financial Barriers	0.00	(0.00)
Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Financial Barriers	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Financial Barriers	0.00	(0.00)
Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Learning Goal Orientation	0.03	(0.02)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Science Self-Efficacy←Learning Goal Orientation	0.02	(0.02)
Persistence in a STEM Major←Outcome Expectations←Learning Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Persistence in a STEM Major←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.01	(0.01)
via O Investigative Physiological Arousal	0.00	(0.01)
Persistence in a STEM Major←Outcome Expectations←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Learning Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Learning Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Learning Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Learning Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Learning Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Learning Goal Orientation	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Learning Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Learning Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Learning Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←Learning Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Prove Goal Orientation	0.00	(0.01)
Persistence in a STEM Major←Science Self-Efficacy←Prove Goal Orientation	0.00	(0.01)
Persistence in a STEM Major←Outcome Expectations←Prove Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.01)
via O Realistic Physiological Arousal	-0.01	(0.01)

(continued)

Model Effect	β	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Persistence in a STEM Major←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.01	(0.00)
via O Realistic Physiological Arousal	-0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Persistence in a STEM Major←Outcome Expectations←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Prove Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Prove Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Prove Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Prove Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Prove Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Prove Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Prove Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Prove Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Prove Goal Orientation	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←Prove Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Avoid Goal Orientation	0.02	(0.02)
Persistence in a STEM Major←Science Self-Efficacy←Avoid Goal Orientation	0.00	(0.01)
Persistence in a STEM Major←Outcome Expectations←Avoid Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.02	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
Persistence in a STEM Major←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	-0.01	(0.01)
via O Realistic Physiological Arousal	0.02	(0.01)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
via O Investigative Physiological Arousal	-0.02	(0.01)
Persistence in a STEM Major←Outcome Expectations←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Avoid Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Avoid Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Avoid Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.01)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Avoid Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Avoid Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Avoid Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Avoid Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Avoid Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Avoid Goal Orientation	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	SE
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←Avoid Goal Orientation		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←ITMA: Fixed Beliefs	-0.02	(0.02)
Persistence in a STEM Major←Science Self-Efficacy←ITMA: Fixed Beliefs	-0.03	(0.03)
Persistence in a STEM Major←Outcome Expectations←ITMA: Fixed Beliefs	0.00	(0.02)
Persistence in a STEM Major←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
Persistence in a STEM Major←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.01	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	-0.01	(0.01)
Persistence in a STEM Major←Outcome Expectations←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←ITMA: Fixed Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←ITMA: Fixed Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←ITMA: Fixed Beliefs	0.00	(0.01)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←ITMA: Fixed Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←ITMA: Fixed Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←ITMA: Fixed Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←ITMA: Fixed Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←ITMA: Fixed Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←ITMA: Fixed Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←ITMA: Fixed Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←ITMA: Malleable Beliefs	-0.01	(0.02)
Persistence in a STEM Major←Science Self-Efficacy←ITMA: Malleable Beliefs	-0.02	(0.02)
Persistence in a STEM Major←Outcome Expectations←ITMA: Malleable Beliefs	0.00	(0.01)
Persistence in a STEM Major←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.01)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Persistence in a STEM Major←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.01)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
Persistence in a STEM Major←Outcome Expectations←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←ITMA: Malleable Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←ITMA: Malleable Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←ITMA: Malleable Beliefs	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	SE
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←ITMA: Malleable Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←ITMA: Malleable Beliefs	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←ITMA: Malleable Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←ITMA: Malleable Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←ITMA: Malleable Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←ITMA: Malleable Beliefs	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←ITMA: Malleable Beliefs		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←High School Math Classes	0.04	(0.03)
Persistence in a STEM Major←Science Self-Efficacy←High School Math Classes	0.01	(0.01)
Persistence in a STEM Major←Outcome Expectations←High School Math Classes	0.00	(0.01)
Persistence in a STEM Major←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.01)
Persistence in a STEM Major←Outcome Expectations←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←High School Math Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←High School Math Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←High School Math Classes	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←High School Math Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←High School Math Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←High School Math Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←High School Math Classes	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←High School Math Classes	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←High School Math Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←High School Math Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←High School Science Classes	0.00	(0.01)
Persistence in a STEM Major←Science Self-Efficacy←High School Science Classes	0.00	(0.01)
Persistence in a STEM Major←Outcome Expectations←High School Science Classes	0.00	(0.01)
Persistence in a STEM Major←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.01	(0.01)
Persistence in a STEM Major←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Physiological Arousal	0.01	(0.01)
Persistence in a STEM Major←Outcome Expectations←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←High School Science Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←High School Science Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←High School Science Classes	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←High School Science Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←High School Science Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←High School Science Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←High School Science Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←High School Science Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←High School Science Classes	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
via O Math Self-Efficacy	0.00	(0.00)
via O Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←O←High School Science Classes		
via O Realistic Demonstrated Abilities	0.00	(0.00)
via O Realistic Physiological Arousal	0.00	(0.00)
via O Investigative Learning Influences	0.00	(0.00)
via O Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Realistic Demonstrated Abilities	0.05	(0.03)
Persistence in a STEM Major←Science Self-Efficacy←Realistic Demonstrated Abilities	0.03	(0.02)
Persistence in a STEM Major←Outcome Expectations←Realistic Demonstrated Abilities	0.00	(0.02)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Realistic Demonstrated Abilities	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Realistic Demonstrated Abilities	0.01	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Realistic Demonstrated Abilities	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Realistic Physiological Arousal	-0.04	(0.03)
Persistence in a STEM Major←Science Self-Efficacy←Realistic Physiological Arousal	-0.05	(0.03)
Persistence in a STEM Major←Outcome Expectations←Realistic Physiological Arousal	0.01	(0.03)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←Realistic Physiological Arousal	0.00	(0.02)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Realistic Physiological Arousal	0.01	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Realistic Physiological Arousal	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Realistic Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.01)
Persistence in a STEM Major←Science Self-Efficacy←Investigative Learning Influences	0.03	(0.02)
Persistence in a STEM Major←Outcome Expectations←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←Investigative Learning Influences	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Investigative Learning Influences	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intentions to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Investigative Learning Influences	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Investigative Physiological Arousal	0.06	(0.04)
Persistence in a STEM Major←Science Self-Efficacy←Investigative Physiological Arousal	0.09	(0.06)
Persistence in a STEM Major←Outcome Expectations←Investigative Physiological Arousal	-0.01	(0.04)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←Investigative Physiological Arousal	0.00	(0.01)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←Investigative Physiological Arousal	0.01	(0.03)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Investigative Physiological Arousal	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Investigative Physiological Arousal	-0.01	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Investigative Physiological Arousal	0.01	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Investigative Physiological Arousal	0.01	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)

(continued)

Model Effect	*β*	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Intentions to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Investigative Physiological Arousal	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy	-0.01	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy	0.02	(0.02)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy	0.01	(0.05)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy	0.01	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy	0.01	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations	0.02	(0.02)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Instrumental and Social Supports	0.01	(0.03)
Persistence in a STEM Major←Science Self-Efficacy←Instrumental and Social Supports	0.01	(0.02)
Persistence in a STEM Major←Intentions to Major in STEM←Instrumental and Social Supports	0.00	(0.01)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)

(continued)

Model Effect	β	SE
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Instrumental and Social Supports	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Financial Supports	0.02	(0.03)
Persistence in a STEM Major←Science Self-Efficacy←Financial Supports	0.04	(0.04)
Persistence in a STEM Major←Intentions to Major in STEM←Financial Supports	0.01	(0.01)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←Financial Supports	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Financial Supports	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Social Barriers	-0.01	(0.02)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Science Self-Efficacy←Social Barriers	-0.03	(0.03)
Persistence in a STEM Major←Intentions to Major in STEM←Social Barriers	-0.01	(0.02)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←Social Barriers	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Social Barriers	0.00	(0.00)
Persistence in a STEM Major←Math Self-Efficacy←Financial Barriers	0.01	(0.03)
Persistence in a STEM Major←Science Self-Efficacy←Financial Barriers	0.03	(0.03)
Persistence in a STEM Major←Intentions to Major in STEM←Financial Barriers	0.01	(0.02)
Persistence in a STEM Major←Outcome Expectations←Math Self-Efficacy←Financial Barriers	0.00	(0.00)

(continued)

Model Effect	β	*SE*
Persistence in a STEM Major←Outcome Expectations←Science Self-Efficacy←Financial Barriers	0.00	(0.01)
Persistence in a STEM Major←Intention to Major in STEM←Math Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Science Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Math Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Outcome Expectations←Science Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Math Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Science Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Math Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Science Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Math Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests←Outcome Expectations←Science Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Math Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Interest in STEM Topics←Outcome Expectations←Science Self-Efficacy←Financial Barriers	0.00	(0.00)
Persistence in a STEM Major←Intention to Major in STEM←Research Interests	0.01	(0.01)
Persistence in a STEM Major←Intentions to Major in STEM←Interest in STEM Topics	0.02	(0.03)

Note. The notation for model effects indicates that the dependent variable is regressed on the independent variable. Mediating paths are indicated through arrows, with the specific mediator indicated by an O in the path. Bolded cells are significant at $p < 0.05$. Italicized cells are significant at $p < 0.10$. β = standardized coefficient. *SE* = standard error.
$N = 1{,}200$.

Table 8. *Fit Indices for the Gender Multiple-Groups Analyses*

Model	χ^2	*df*	CFI	TLI	RMSEA	SRMR	ΔS-B χ^2	Δ*df*	ΔCFI	ΔTLI	ΔRMSEA
					Baseline Model						
Measurement Model											
Males[a]	3,401.527	2,309	0.910	0.900	0.030	0.065	–	–	–	–	–
Females[b]	3,560.671	2,309	0.928	0.920	0.027	0.052	–	–	–	–	–
Structural Model											
Males: Simplified[c]	3,905.333	2588	0.890	0.882	0.032	0.079	–	–	–	–	–
Males: Alternate Simplified[d]	3,850.404	2567	0.893	0.884	0.032	0.078	64.214	21	0.003	0.002	0
Females: Simplified[e]	4,081.187	2587	0.912	0.906	0.029	0.068	–	–	–	–	–
Females: Alternate Simplified[f]	3,991.569	2566	0.917	0.91	0.029	0.069	64.214	21	0.005	0.004	0
					Measurement Model[g]						
Configural	6,964.701	4,618	0.921	0.912	0.029	0.058	–	–	–	–	–
Metric	7,047.282	4,671	0.920	0.912	0.029	0.059	–	–	–	–	–
Scalar	7,182.681	4,724	0.917	0.910	0.029	0.060	–	–	–	–	–
Multiple-Groups Analyses											
Metric vs Configural	–	–	–	–	–	–	82.313	53	0.001	0.000	0
Scalar vs Configural	–	–	–	–	–	–	215.220	106	0.004	0.002	0
Metric vs Scalar	–	–	–	–	–	–	136.117	53	0.003	0.002	0
					Structural Model[h]						
Unconstrained	8,071.242	5239	0.903	0.897	0.031	0.074	–	–	–	–	–
Constrained (structural paths)	8,469.811	5384	0.894	0.891	0.031	0.088	376.313	145	0.009	0.006	0

Note. All models are significant at $p < 0.001$ except the chi-square test for the Metric versus Configural models, which is significant at $p < 0.01$. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; $\chi 2$ = chi-square (robust); *df* = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; ΔS-B χ^2 = Satorra-Bentler scaled chi-square difference test; Δ = change in value.
[a]*N* = 516. [b]*N* = 727. [c]*N* = 482. [d]*N* = 481. [e]*N* = 688. [f]*N* = 679. [g]*N* = 1,243. [h]*N* = 1,160.

Table 9. *Factor Score Mean Differences by Gender*

Factor	*B* (*SE*)	
Learning Goal Orientation	-0.01	(0.06)
Prove Goal Orientation	0.00	(0.07)
Avoid Goal Orientation	0.06	(0.08)
Implicit Theories of Math Ability – Fixed Beliefs	0.09	(0.06)
Implicit Theories of Math Ability – Malleable Beliefs	-0.16**	(0.06)
Realistic Demonstrated Abilities	-0.50***	(0.09)
Realistic Physiological Arousal[a]	-0.36***	(0.08)
Investigative Learning Influences	-0.11	(0.10)
Investigative Physiological Arousal[a]	-0.40***	(0.10)
Math Self-Efficacy	-0.27**	(0.09)
Science Self-Efficacy	-0.30***	(0.06)
Outcome Expectations	0.12*	(0.06)
Research Interests	-0.23**	(0.08)
Interest in STEM Topics	-0.73***	(0.10)
Intention to Major in STEM	-0.26***	(0.07)
Instrumental and Social Supports	0.02	(0.05)
Financial Resources	-0.15*	(0.08)
Social Barriers	-0.01	(0.06)
Financial Barriers	0.26†	(0.08)

Note. Males are the referent group for factor mean comparisons, so all factor mean scores reported are for the female sample. *B* = unstandardized factor mean; *SE* = standard error.
[a]Indicators are reverse-scored, so higher factor means indicate less physiological arousal.
**p* < 0.05. ***p* < 0.01. †*p* = 0.001. ****p* < 0.001.

Table 10. *Fit Indices for the Race/Ethnicity Multiple-Groups Analyses*

Model	χ^2	*df*	CFI	TLI	RMSEA	SRMR	ΔS-B χ^2	Δ*df*	ΔCFI	ΔTLI	ΔRMSEA
					Baseline Model						
Measurement Model											
Native Americans[a]	3,573.480	2,307	0.900	0.890	0.033	0.071	–	–	–	–	–
Asians & Whites[b]	3,471.012	2,309	0.933	0.925	0.026	0.051	–	–	–	–	–
Structural Model											
Native Americans: Simplified[c]	4,044.468	2,584	0.882	0.874	0.034	0.090	–	–	–	–	–
Native Americans: Alternate Simplified[d]	4,033.326	2,563	0.883	0.873	0.035	0.089	21.440*ns*	21	0.001	0.001	0.001
Asians & Whites: Simplified[e]	4,119.373	2588	0.91	0.903	0.029	0.069	–	–	–	–	–
Asians & Whites: Alternate Simplified[f]	4,064.194	2567	0.912	0.904	0.029	0.068	51.912	21	0.002	0.001	0
					Measurement Model[g]						
Configural	7,041.029	4,616	0.92	0.911	0.029	0.060	–	–	–	–	–
Metric	7,111.056	4,669	0.919	0.911	0.029	0.060	–	–	–	–	–
Scalar	7,197.247	4,722	0.918	0.911	0.029	0.060	–	–	–	–	–
Multiple-Groups Analyses											
Metric vs Configural	–	–	–	–	–	–	70.699*ns*	53	0.001	0	0
Scalar vs Configural	–	–	–	–	–	–	156.323	106	0.002	0	0
Metric vs Scalar	–	–	–	–	–	–	86.348	53	0.001	0	0

Note. All model-specific chi-square tests are significant at $p < 0.001$. All nested model chi-square tests are significant at $p < 0.01$, except those labeled *ns* afterwards. As the structural model did not fit well in the Native American sample, multiple-groups analyses for the structural model were not conducted. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; $\chi 2$ = chi-square (robust); *df* = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; ΔS-B χ^2 = Satorra-Bentler scaled chi-square difference test; Δ = change in value.
[a]*N* = 492. [b]*N* = 754. [c]*N* = 486. [d]*N* = 474. [e]*N* = 693. [f]*N* = 692. [g]*N* = 1,246.

Table 11. *Factor Score Mean Differences by Race/Ethnicity*

Factor	*B* (*SE*)	
Learning Goal Orientation	-0.22***	(0.06)
Prove Goal Orientation	0.11	(0.07)
Avoid Goal Orientation	0.26†	(0.08)
Implicit Theories of Math Ability – Fixed Beliefs	0.19**	(0.06)
Implicit Theories of Math Ability – Malleable Beliefs	0.00	(0.06)
Realistic Demonstrated Abilities	-0.07	(0.09)
Realistic Physiological Arousal[a]	0.04	(0.08)
Investigative Learning Influences	0.23*	(0.11)
Investigative Physiological Arousal[a]	-0.02	(0.11)
Math Self-Efficacy	0.13	(0.10)
Science Self-Efficacy	-0.06	(0.07)
Outcome Expectations	-0.08‡	(0.05)
Research Interests	0.18*	(0.09)
Interest in STEM Topics	0.12	(0.09)
Intention to Major in STEM	0.11	(0.09)
Instrumental and Social Supports	-0.11*	(0.05)
Financial Resources	0.11	(0.08)
Social Barriers	0.18**	(0.07)
Financial Barriers	-0.09	(0.08)

Note. Native Americans are the referent group for factor mean comparisons, so all factor mean scores reported are for the combined Asian and White sample. *B* = unstandardized factor mean; *SE* = standard error.

[a]Indicators are reverse-scored, so higher factor means indicate less physiological arousal.

‡$p < 0.10$. *$p < 0.05$. **$p < 0.01$. †$p = 0.001$. ***$p < 0.001$.

Table 12. *Fit Indices for the Native American Sample Baseline SEM, SEM with Tribal Identity, and Modified SEM with Tribal Identity and No Learning Experiences*

Model	AIC, BIC	χ^2	*df*	CFI	TLI	RMSEA	SRMR
Native American Measurement Model							
Baseline[a]	50,697.069 52,347.071	3573.480	2,307	0.900	0.890	0.033	0.071
Baseline + Tribal Identity[b]	54,677.913 56,476.598	4137.350	2,652	0.899	0.889	0.034	0.071
Modified (Tribal Identity, No LE) [c]	46,721.386 48,087.21	2970.919	1,952	0.923	0.915	0.033	0.065
Native American Structural Model							
Baseline[d]	53,204.224 54,610.79	4044.468	2,584	0.882	0.874	0.034	0.090
Modified (Tribal Identity, No LE)[e]	49,280.761 50,566.558	3313.653	2,172	0.911	0.904	0.033	0.084

Note. All models are significant at $p < 0.001$. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; $\chi 2$ = chi-square (robust); *df* = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; LE = Learning Experiences (Realistic Demonstrated Abilities, Realistic Physiological Arousal, Investigative Learning Influences, and Investigative Physiological Arousal).
[a]$N = 492$. [b]$N = 494$. [c]$N = 494$. [d]$N = 486$. [e]$N = 487$.

Table 13. *Native American Sample Final Structural Model Standardized Path Coefficients*

Model Path	Standardized	*SE*
Math Self-Efficacy ON		
Learning Goal Orientation	0.26	(0.16)
Prove Goal Orientation	0.13	(0.26)
Avoid Goal Orientation	0.03	(0.20)
ITMA: Fixed Beliefs	-0.40	(0.39)
ITMA: Malleable Beliefs	-0.49	(0.42)
Tribal Identity	0.10	(0.17)
Instrumental and Social Supports	**-1.79**	(0.87)
Financial Resources	**2.74**	(1.39)
Social Barriers	*-1.81*	(0.93)
Financial Barriers	*2.46*	(1.33)
High School Math Classes	**0.36**	(0.08)
High School Science Classes	0.08	(0.09)
Science Self-Efficacy ON		
Learning Goal Orientation	0.35	(0.23)
Prove Goal Orientation	0.06	(0.38)
Avoid Goal Orientation	-0.16	(0.29)
ITMA: Fixed Beliefs	-0.56	(0.57)
ITMA: Malleable Beliefs	-0.85	(0.61)
Tribal Identity	0.32	(0.26)
Instrumental and Social Supports	**-3.03**	(1.46)
Financial Resources	**4.79**	(2.27)
Social Barriers	**-3.11**	(1.49)
Financial Barriers	**4.27**	(2.16)
High School Math Classes	**0.24**	(0.07)
High School Science Classes	0.01	(0.09)
Outcome Expectations ON		
Learning Goal Orientation	-0.02	(0.15)
Prove Goal Orientation	-0.07	(0.15)
Avoid Goal Orientation	0.07	(0.16)
ITMA: Fixed Beliefs	-0.30	(0.29)
ITMA: Malleable Beliefs	-0.29	(0.27)
Tribal Identity	**0.22**	(0.10)
Math Self-Efficacy	-0.03	(0.14)
Science Self-Efficacy	0.21	(0.14)
High School Math Classes	0.07	(0.10)
High School Science Classes	**-0.24**	(0.10)
Research Interests ON		
Math Self-Efficacy	0.09	(0.12)
Science Self-Efficacy	**0.40**	(0.13)
Outcome Expectations	0.01	(0.10)

(continued)

Model Path	Standardized	*SE*
Interest in STEM Topics ON		
Math Self-Efficacy	**0.84**	(0.07)
Science Self-Efficacy	0.08	(0.09)
Outcome Expectations	0.01	(0.06)
Intentions to Major in STEM ON		
Math Self-Efficacy	**-0.55**	(0.27)
Science Self-Efficacy	-0.03	(0.26)
Outcome Expectations	**0.45**	(0.09)
Research Interests	-0.08	(0.08)
Interest in STEM Topics	**0.78**	(0.23)
Instrumental and Social Supports	-1.05	(0.71)
Financial Resources	1.65	(1.14)
Social Barriers	-1.20	(0.74)
Financial Barriers	1.57	(1.02)
Persistence in a STEM Major ON		
Intentions to Major in STEM	0.06	(0.11)
Math Self-Efficacy	*0.24*	(0.14)
Science Self-Efficacy	0.06	(0.14)
Outcome Expectations	*0.19*	(0.11)
Instrumental and Social Supports	-0.07	(0.13)
Financial Resources	0.16	(0.13)
Social Barriers	-0.01	(0.10)

Note. The notation for model effects indicates that the dependent variable is regressed on the independent variable. Bolded cells are significant at $p < 0.05$. Italicized cells are significant at $p < 0.10$. *SE* = standard error. $N = 487$.

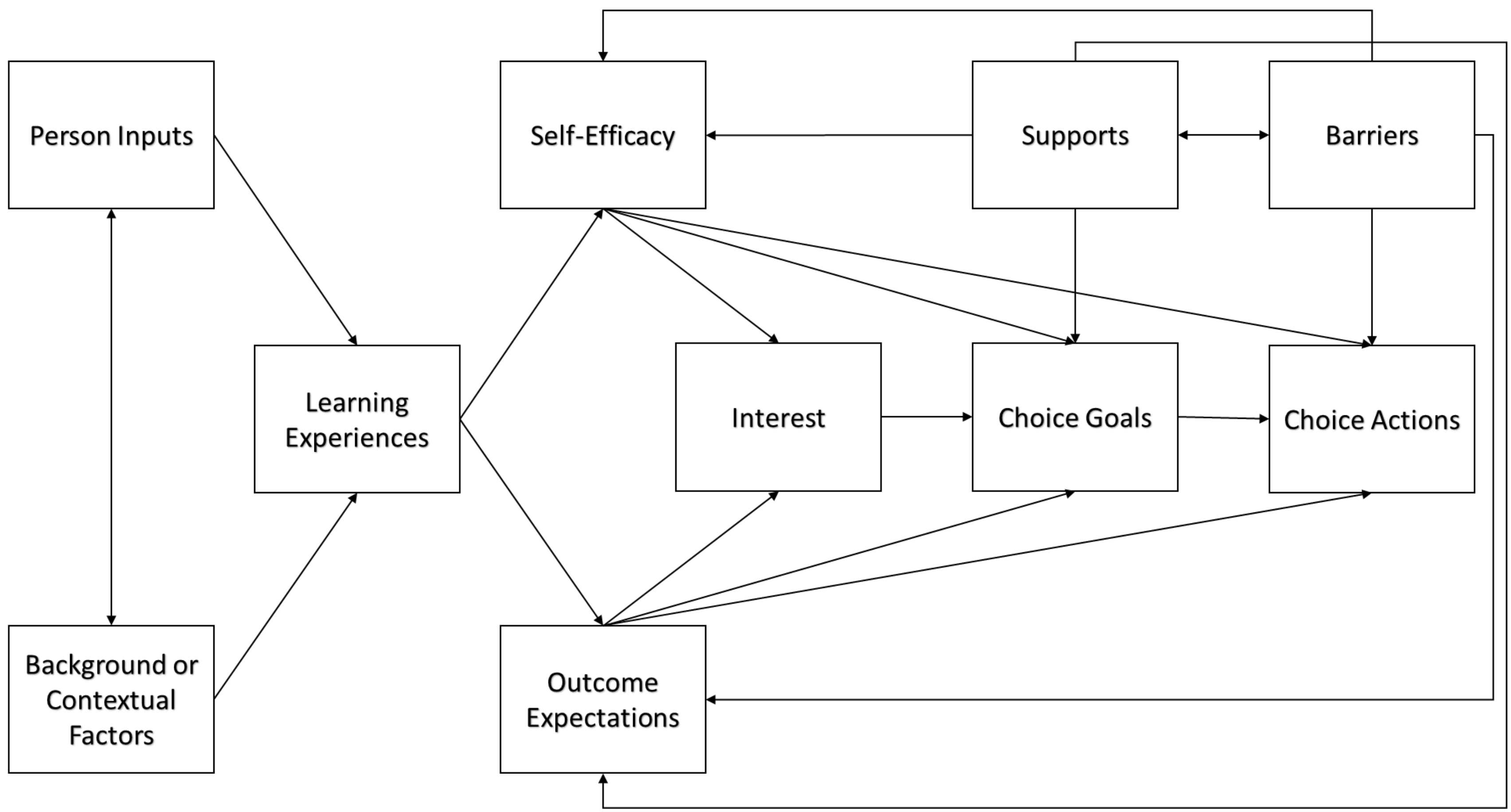

Figure 1. General proposed structure of the Social Cognitive Career Theory model (Lent, Brown, & Hackett, 1994, 2000).

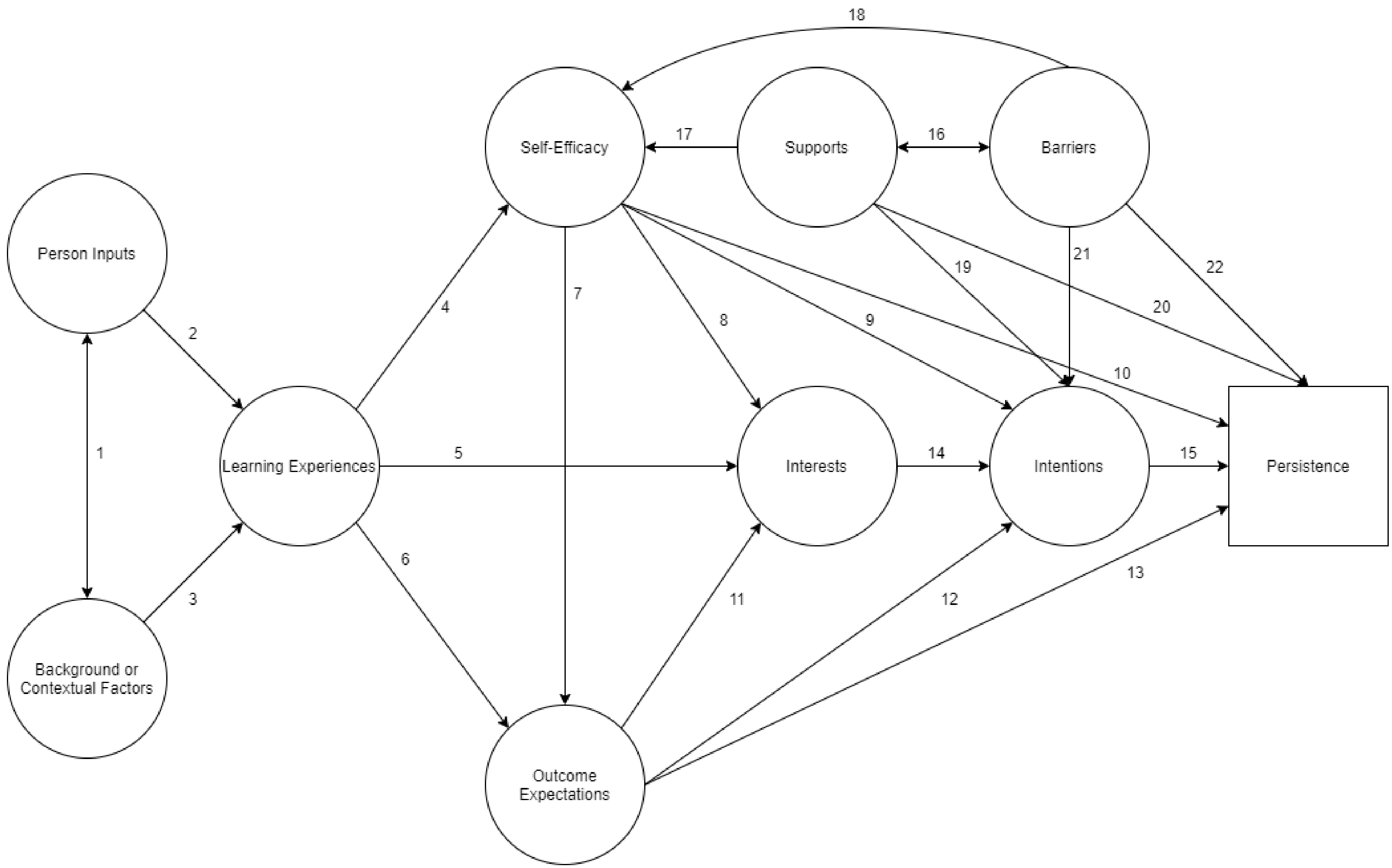

Figure 2. Modified SCCT model for the current study. Predicted relationships are labeled for each path. Factors with multiple sub-dimensions have been simplified for ease of reading.

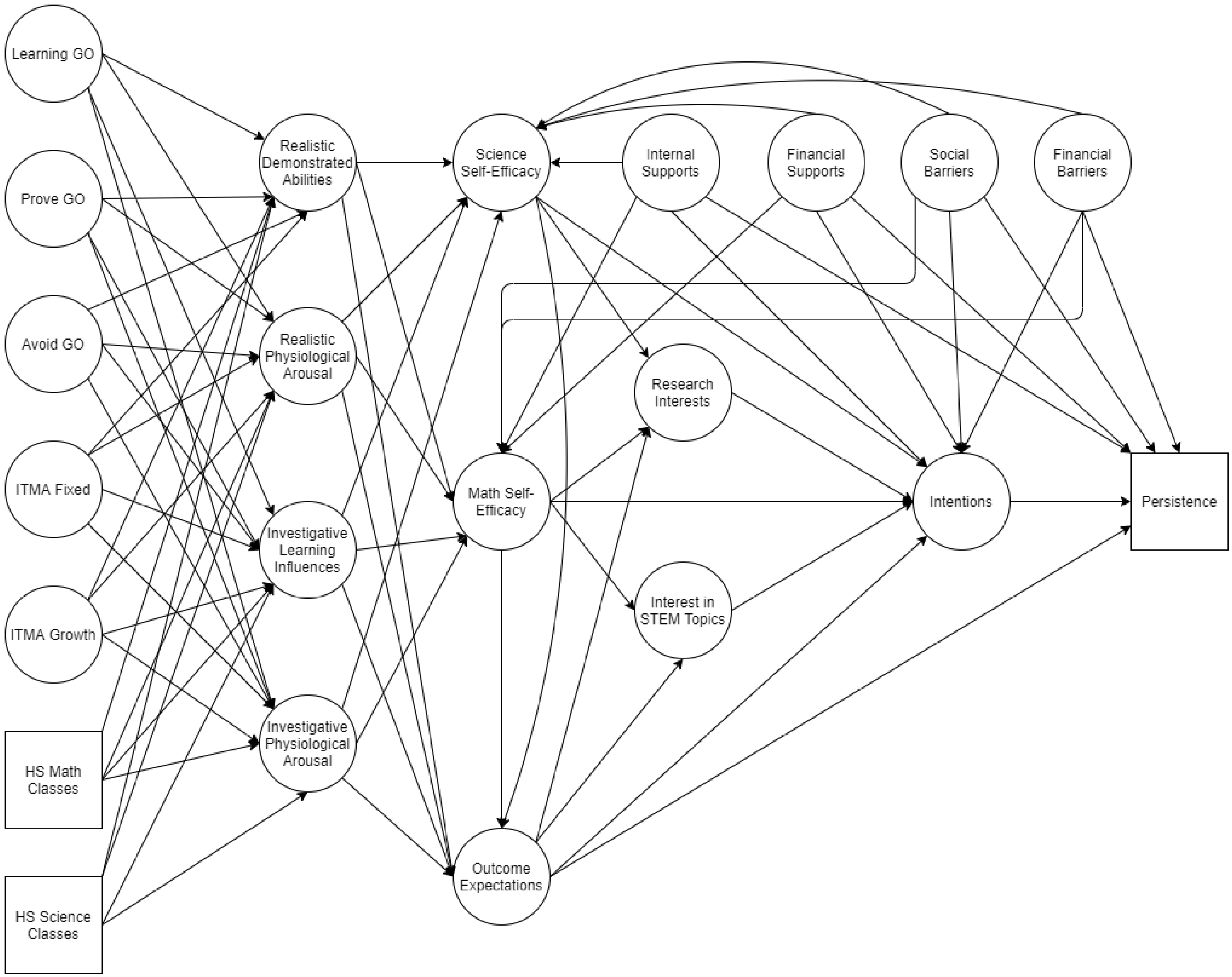

Figure 3. Simplified structural model for full sample SEM analyses.

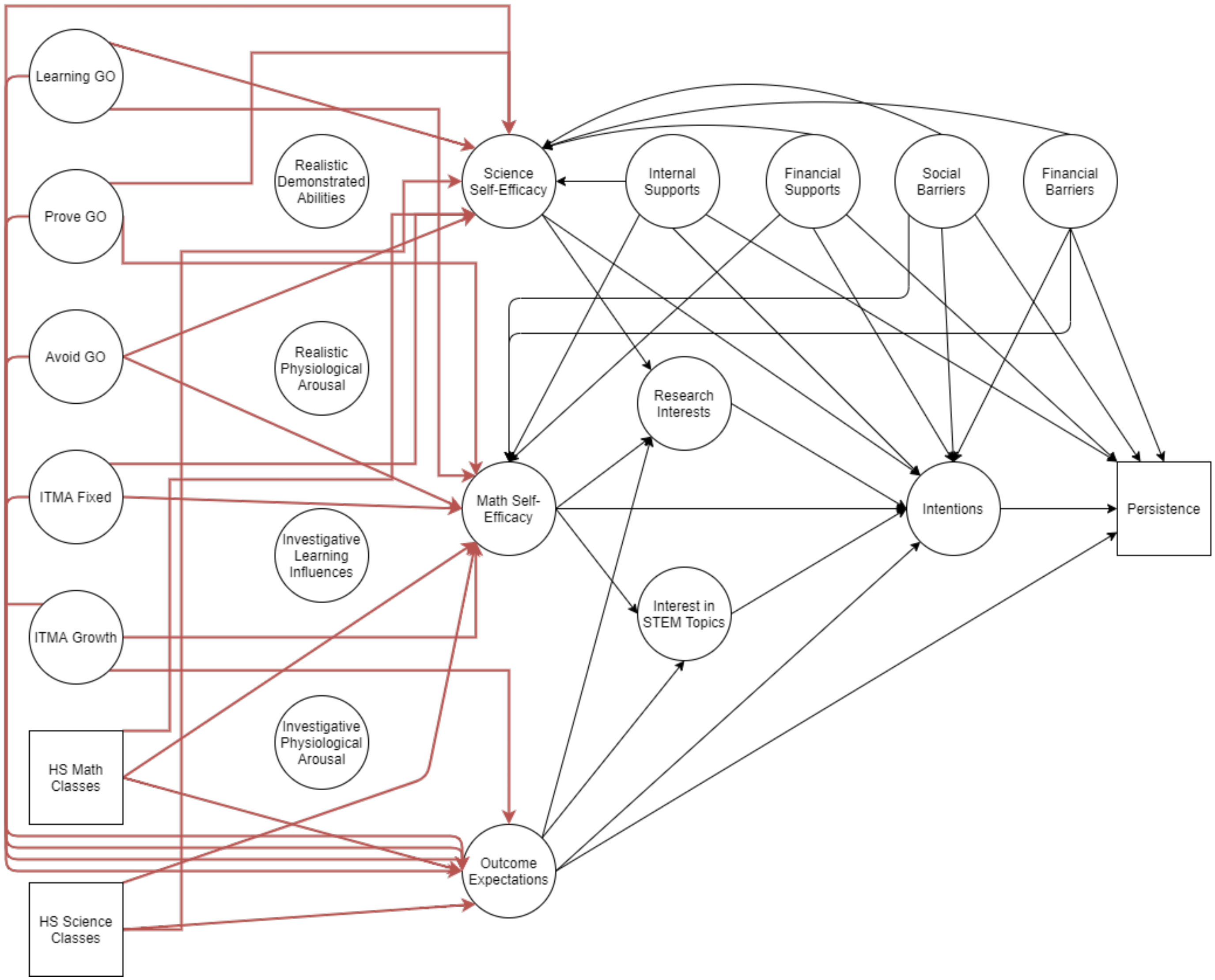

Figure 4. Alternative simplified structural model for full sample SEM analyses. Added paths are in red, with originally hypothesized direct paths from person inputs, background characteristics, learning experiences, self-efficacy, and outcome expectations removed for figure readability.

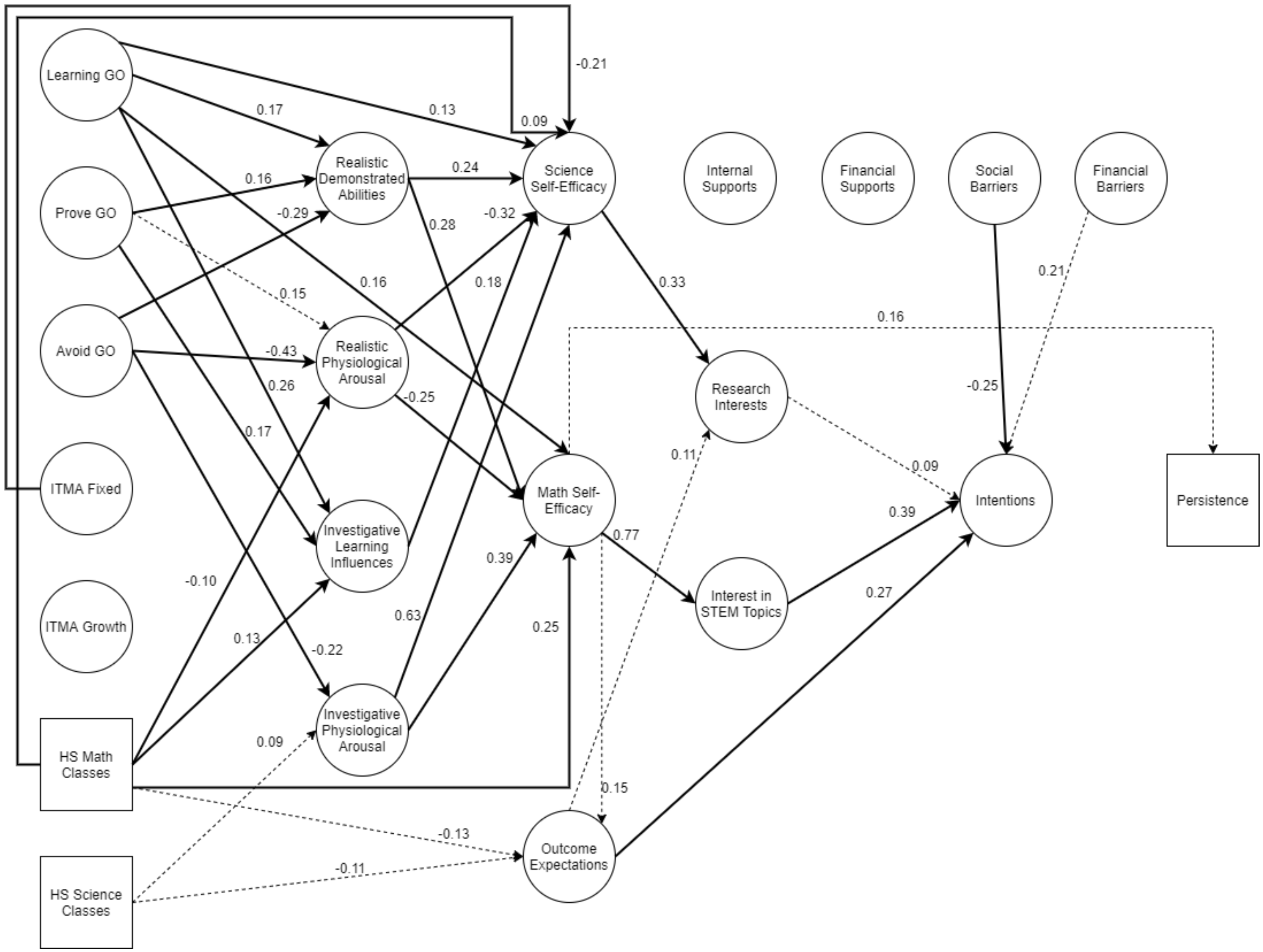

Figure 5. Full sample final model standardized results. Thick black lines represent statistically significant ($p < 0.05$) relationships. Dashed lines represent marginally significant ($p < 0.10$) relationships. Non-significant relationships are not shown to simplify readability of the figure.

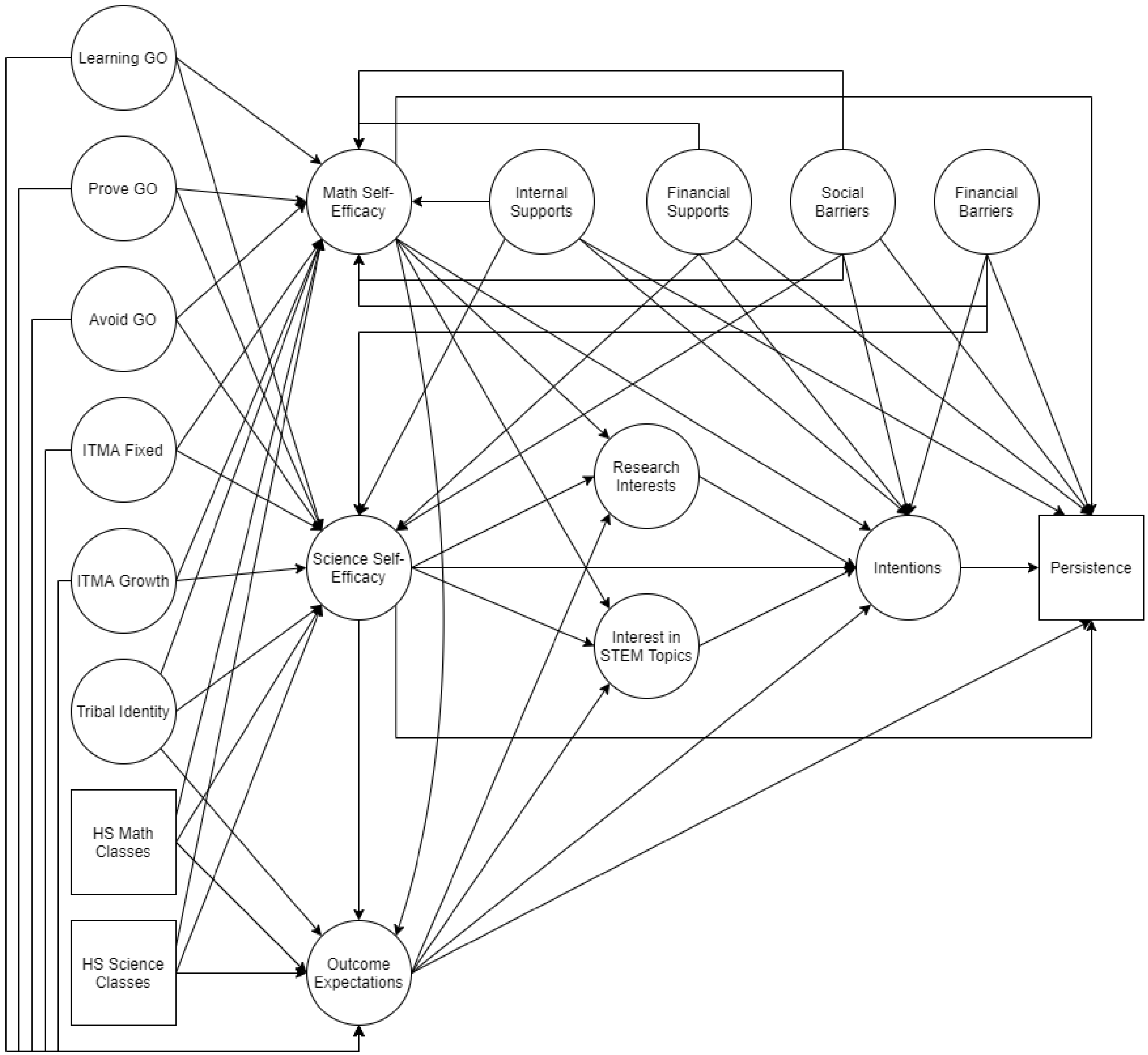

Figure 6. Initial modified model for the Native American sample. Tribal identity is included and learning experiences are excluded.

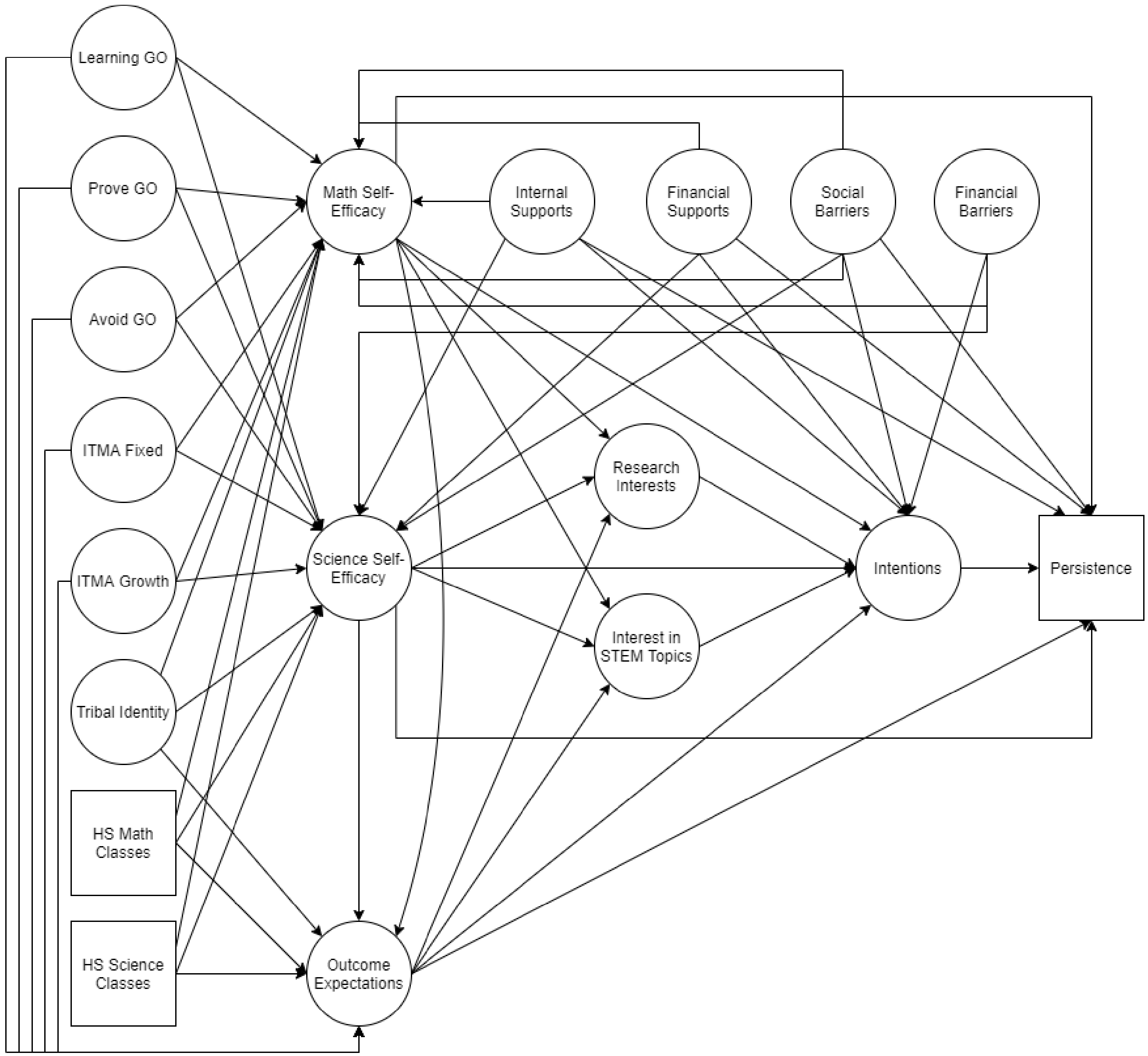

Figure 7. Final modified model for the Native American sample with the path from financial barriers to persistence removed.

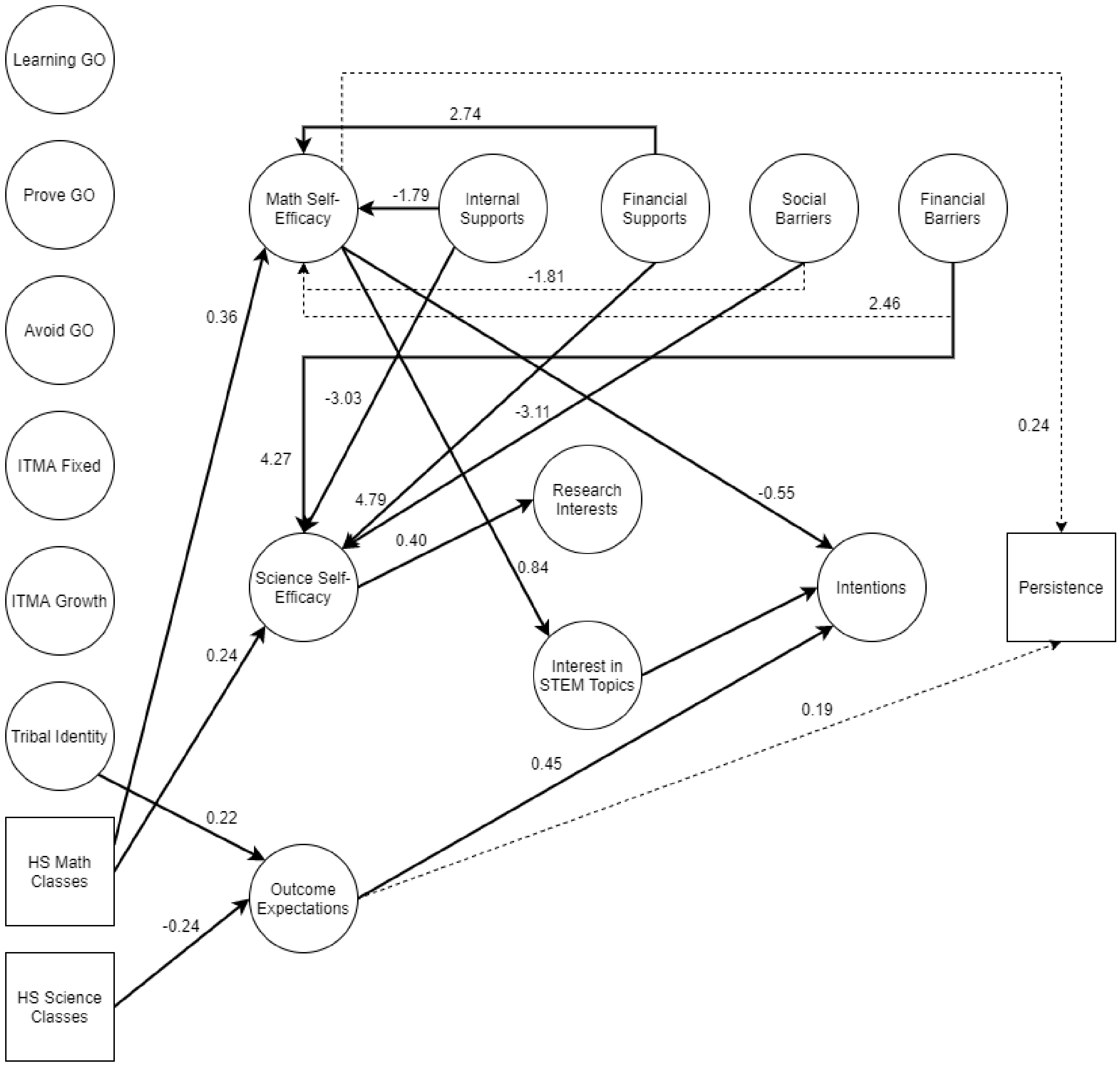

Figure 8. Native American final model standardized results. Thick black lines represent statistically significant ($p < 0.05$) relationships. Dashed lines represent marginally significant ($p < 0.10$) relationships. Non-significant relationships are not shown to simplify readability of the figure.