

# Social Cognitive Predictors of Mexican American High School Students' Math/Science Career Goals

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Patton O. Garriott<sup>1</sup>, Trisha L. Raque-Bogdan<sup>1</sup>, Lorraine Zoma<sup>1</sup>, Dylan Mackie-Hernandez<sup>1</sup>, and Kelly Lavin<sup>1</sup>

## Abstract

This study tested a social cognitive model of math/science career goals in a sample ( $N = 258$ ) of Mexican American high school students. Familism and proximal family supports for math/science careers were examined as predictors of math/science: performance accomplishments, self-efficacy, interests, and goals. Results showed that the hypothesized model provided an adequate fit to the data. Familism predicted performance accomplishments and perceived family supports while perceived family supports predicted self-efficacy and goals. The final model explained 63% of the variance in interests and 53% of the variance in goals. Mediation tests showed that person-cognitive variables explained the relationships between contextual variables and goals. Contrary to hypotheses, interests did not predict goals and proximal family supports did not moderate the relationship between interests and goals. Results are discussed in terms of incorporating culture-specific values into interventions aimed at enhancing the math/science career interests and goals of Mexican American high school students.

## Keywords

Mexican American, math/science, social cognitive career theory, familism, family support

Current estimates indicate that 50.5 million individuals in the United States identify as “Hispanic or Latino,” and that this group accounted for more than half of the growth observed in the total U.S. population from the years 2000 to 2010 (U.S. Census Bureau, 2011). Individuals of Mexican origin represent approximately 63% of the total Latina/o population, with an increase of 54% (20.6 million to 31.8 million) from 2000 to 2010 (U.S. Census Bureau, 2011).

<sup>1</sup> Department of Counseling Psychology, University of Denver, Denver, CO, USA

## Corresponding Author:

Patton O. Garriott, Department of School and Counseling Psychology, University of Denver, 201A Ruffatto Hall, Denver, CO 80208, USA.

Email: pat.garriott@du.edu

Despite continued population growth, Latinas/os remain grossly underrepresented in science, technology, engineering, and math (STEM) fields. For example, <2% of the total STEM workforce is comprised of Latinas/os and of the over 400,000 STEM degrees awarded in 2009–2010, only 8% were awarded to Latinas/os (U.S. Department of Education, 2014). Although between the years of 1996 and 2004, the number of Latina/o students enrolled in STEM fields increased by 33%, only 16% of Latina/o students who began college in 2004 as STEM majors completed a STEM degree by 2009 (U.S. Department of Education, 2014).

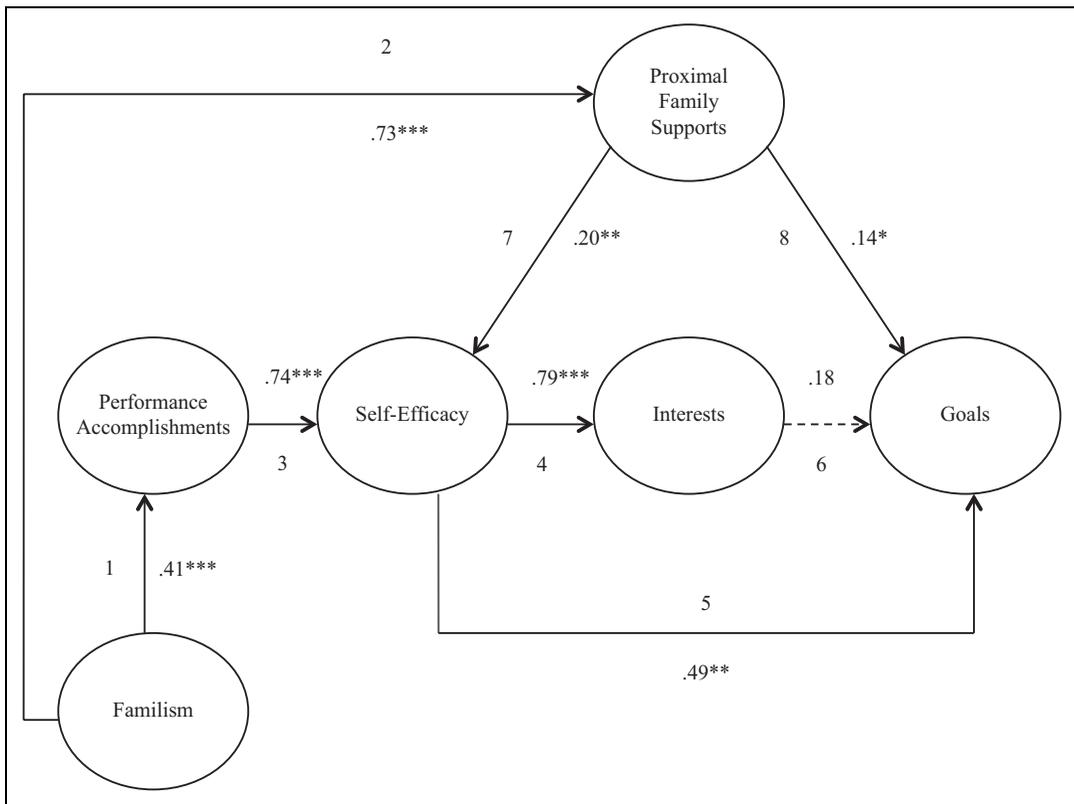
Clearly, more research is needed that examines predictors of STEM-related interests and goals among Latinas/os and Mexican Americans, specifically. Findings could assist in decreasing the exclusion of Latinas/os in STEM careers within the United States. Given early math and science education in high school is foundational to future STEM career interest and success (ACT, 2006), this study examined predictors of Mexican American high school students' math/science interests and goals.

## **Theoretical Framework**

Social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994, 2000) has been used to examine the STEM-related career goals of racially/ethnically diverse groups, with previous research explaining between 16% and 40% of the variance in choice goals among African American, Latina/o, Southeast Asian, and Native American students (Byars-Winston, Estrada, Howard, Davis, & Zalapa, 2010; Navarro, Flores, & Worthington, 2007). A particularly attractive feature of the SCCT framework for use with students of color is the focus it places on contextual factors in the formation of career interests and goals (Byars-Winston, 2006). Specifically, person inputs and background contextual affordances are proposed to have a direct link to domain-specific learning experiences (e.g., performance accomplishments; see Path 1 in Figure 1) and indirect links with self-efficacy (Path 3) and outcome expectations through learning experiences (Lent et al., 1994). In turn, self-efficacy is hypothesized to relate directly to interests (Path 4) and goals (Path 5). Additionally, supports and barriers proximal to career choice are hypothesized to relate directly (Path 8) and indirectly (Path 7) to choice goals through self-efficacy (Lent et al., 2000, 2003). Finally, while interests are hypothesized to relate directly to choice goals (Path 6), this relationship is posited to be contingent on proximal supports and barriers to career choice (Lent et al., 2000). Previous research has supported these hypothesized relationships among Mexican American middle school students (Navarro et al., 2007).

Conceptually, proximal contextual supports and barriers in SCCT include environmental factors that might facilitate or impede realization of career interests into goals. Contextual barriers and supports may be particularly relevant for Mexican American students, who despite having high aspirations frequently do not realize their educational goals (Garriott & Flores, 2013). In the present study, we focused on proximal supports, as supports have been shown to be stronger predictors of SCCT variables compared to barriers in prior research with racially/ethnically diverse high school students (Garriott, Flores, & Martens, 2013).

Although SCCT may provide a useful framework from which to understand the career development of underrepresented students in STEM domains, Mexican Americans have received limited attention within the SCCT literature. Of the SCCT studies that have examined Mexican Americans specifically, only one has tested SCCT hypotheses among Mexican American students in math and science (Navarro et al., 2007), and none have used SCCT to examine math/science career decision-making with Mexican American high school students. More research on the math/science career interests and goals of Mexican American high school students is needed, as high school is a critical period during which important decisions related to STEM career pursuit are made (President's Council of Advisors on Science and Technology, 2010). Research that investigates Mexican American students' career goals in math and science early in their high school education could be particularly helpful, as these early experiences could dictate future participation in important STEM-related educational activities



**Figure 1.** The final structural model. Path coefficients represent standardized estimates. Solid paths are statistically significant.  $^{***}p < .001$ .  $^{**}p < .01$ .  $^*p < .05$ . Dashed path is not statistically significant ( $p = .153$ ).

(e.g., taking advanced placement classes in math and science). Indeed, the first 2 years of high school have been found to be critical to students’ future achievement, particularly those from groups with low educational attainment (McCallumore & Sparapani, 2010). Additionally, research with Mexican Americans is needed that incorporates culture-specific values into SCCT models of math/science goal development. Cultural strengths, such as familism, may be particularly salient for Mexican American high school students, as they engage in the process of career exploration.

### Family and Mexican American Students’ Math/Science Goals

**Familism.** Given the importance placed on family within Mexican American culture (Santiago-Rivera, Arredondo, & Gallardo-Cooper, 2002), familism was included as a background contextual factor in the present study. Familism has been defined as “feelings and beliefs concerning family and feelings of loyalty, solidarity, and reciprocity” (Villareal, Blozis, & Widaman, 2005, p. 411). Among Latinas/os, familism may encompass nuclear and extended family members (Ayón, Marsiglia, & Bermudez-Parsai, 2010) and can play a vital role in child upbringing, material and emotional support, and sense of family communalism (Calzada, Tamis-LeMonda, & Yoshikawa, 2013). Conceptually, familism was modeled as a background contextual variable in this study due to its hypothesized direct effect on learning experiences. Specifically, it has been asserted that individuals who internalize the cultural value of familism may be more likely to approach career-related tasks (Flores, Robertschek, Celebi, Andersen, & Hoang, 2010). For example, a strong sense of familism may motivate students to achieve

in order to honor or support their family. In a study with predominantly White undergraduate students, researchers found that family relationships did not predict learning experiences in math and science (Ferry, Fouad, & Smith, 2000). However, this study included a limited number of Latina/o (2% of the total sample) students, who may place greater emphasis on family when engaging in career tasks.

Research with Latina/o high school students has found a positive relationship between familism and academic achievement (Niemeyer, Wong, & Westerhaus, 2009). In a study with Mexican American male college students, researchers found that familism predicted college persistence intentions, and that this relationship was mediated by parental encouragement for educational pursuits (Ojeda, Navarro, & Morales, 2011). Research with Mexican American college students found that familism predicted investigative-themed self-efficacy and that investigative self-efficacy predicted investigative interests (Flores et al., 2010). Contrary to expectations, self-efficacy and interests did not predict investigative career choice goals, and the SCCT model explained only a modest amount of variance (8%) in goals (Flores et al., 2010). It should be noted that this study did not assess math/science interests and goals specifically. Thus, results may have been affected by the domain specificity of analyses. The current study extends these findings by testing relations among SCCT variables at a more domain-specific level (i.e., math and science) and including performance accomplishments as a variable linking family values to self-efficacy.

**Proximal family supports.** Pursuing a career that matches one's interests while also meeting family expectations has been identified as an important element of career decision-making among Latina/o students (Risco & Duffy, 2011). Thus, perceived support from family was included as a proximal contextual variable in the present study. Proximal family supports were differentiated from familism in this study, as *proximal supports* in SCCT refer to supports one anticipates they will encounter along the career decision-making process. Thus, proximal supports are process oriented. Conversely, *background contextual affordances* reference environmental supports that may encourage academic behavior and are posited to assume a more distal role in the SCCT model (Lent et al., 2000). Among Mexican American high school students, it is plausible that while a strong sense of familism may encourage achievement-related behavior in math and science during high school, the decision to pursue a college degree in math or science may be perceived as being met with varying levels of support. Thus, these two variables were included as related but distinct constructs in our hypothesized model.

In a test of the SCCT framework with Mexican American middle school students, researchers found that out of several sources of proximal support, parental supports were the only significant predictor of math/science self-efficacy but did not predict goals (Navarro et al., 2007). However, a significant indirect relationship was found between parental support and math/science goals through self-efficacy (Navarro et al., 2007). In a more recent qualitative study, Latina adolescents identified encouragement from family as an important aspect of their educational and career plans (McWhirter, Valdez, & Caban, 2013).

Although not included in Lent, Brown, and Hackett's (1994, 2000) initial description of SCCT hypotheses, previous SCCT research with college students has found a significant relationship between background contextual affordances (i.e., parental involvement) and proximal contextual factors (i.e., perceived barriers; Byars-Winston & Fouad, 2008). Given these findings as well as research suggesting parental encouragement might mediate the relationship between familism and academic intentions among Latino students, we included a path (see Path 2 in Figure 1) between familism and proximal family supports in our hypothesized structural model.

## Purpose of the Present Study

This study served as an initial investigation of Mexican American high school students' math/science career goals using the SCCT framework. Particular emphasis was placed on the role of family as both a background and proximal contextual factor in predicting math/science performance accomplishments,

self-efficacy, interests, and goals. Based on theoretical propositions of SCCT (Lent et al., 1994, 2000, 2003) as well as findings from previous research (e.g., Flores et al., 2010; Ojeda et al., 2011), the following hypotheses were made:

**Hypothesis 1:** The hypothesized structural model would fit the data well and all variables would relate as proposed in SCCT (Lent et al., 1994, 2000, 2003).

**Hypothesis 2a:** Self-efficacy would mediate relationships between proximal family supports and interests/goals variables.

**Hypothesis 2b:** Self-efficacy would mediate the relationship between performance accomplishments and interests/goals variables.

**Hypothesis 2c:** Interests would mediate the relationship between self-efficacy and goals.

**Hypothesis 2d:** Proximal family supports would mediate the relationships between familism and goals.

**Hypothesis 3:** Proximal family supports would moderate the relationship between interests and goals.

## Method

### Instruments

**Performance accomplishments.** Performance accomplishments in math and science were assessed with the investigative performance accomplishments subscale of the Learning Experiences Questionnaire (LEQ; Schaub & Tokar, 2005). The subscale includes 4 items that are rated on a Likert-type scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). A sample item is “I have easily understood new math concepts after learning about them in class.” Scale scores are obtained by averaging items.

Internal consistency estimates for scale scores ranging from .67 to .71 have been found in samples of predominantly White college students (Tokar, Buchanan, Subich, Hall, & Williams, 2012; Williams & Subich, 2006). An  $\alpha$  coefficient of .70 was found for the subscale in a sample of high school students of color (Garriott et al., 2014). The subscale has been shown to correlate in expected directions with other forms of investigative learning experiences, Holland-themed performance accomplishments (Tokar et al., 2012), and related SCCT constructs, such as self-efficacy (Garriott et al., 2014). Coefficient  $\alpha$  for scores on the LEQ investigative performance accomplishments subscale in the present study was .78.

**Math/science goals.** Math/science goals were assessed with the Math/Science Intentions and Goals Scale (MSIGS; Smith & Fouad, 1999). The 7-item scale assesses students’ intentions to pursue math- and science-related educational and career activities. Items are rated on a Likert-type scale ranging from 1 (*very strongly disagree*) to 6 (*very strongly agree*) with high scores reflective of high levels of goals in math and science. Sample items include “I intend to enter a career that will use science” and “I am committed to study hard in my math courses.” Scale scores are obtained by summing and averaging items. An  $\alpha$  coefficient of .81 has been reported for scale scores on the MSIGS in prior research with Mexican American middle school students (Navarro et al., 2007). The scale has been shown to correlate in expected directions with measures of math/science interests, self-efficacy, and outcome expectations (Navarro et al., 2007; Smith & Fouad, 1999). Coefficient  $\alpha$  for scale scores on the MSIGS in the present study was .82.

**Math/science interests.** Math- and science-related interests were measured with the Math/Science Interest Scale (MSIS; Smith & Fouad, 1999). The MSIS includes 20 items rated on a Likert-type scale ranging from 1 (*very strongly dislike*) to 6 (*very strongly like*). Sample items include “watching a science program on TV” and “taking classes in math.” Items are summed and averaged with high scores indicating

high math/science interests. An internal consistency estimate of .91 was reported in a Mexican American sample (Navarro et al., 2007). Validity for the MSIS has been established through observed relationships with math/science self-efficacy, outcome expectations, and goal intentions (Navarro et al., 2007; Smith & Fouad, 1999). Coefficient  $\alpha$  for MSIS scores in the present study was .94.

**Math/science self-efficacy.** The Expanded Skills Confidence Inventory for High School Students (ESCI-HS; Betz & Wolfe, 2005) was used to measure math/science self-efficacy. The ESCI-HS assesses 14 self-efficacy domains based on the Holland code (Holland, 1997). The 8-item Math subscale and the 8-item Science subscale were used in the present investigation. These subscales assess self-reported confidence in one's ability to perform an activity, task, or school subject associated with math or science. Items are rated on a 5-point Likert-type scale ranging from 1 (*no confidence*) to 5 (*complete confidence*) with high scores indicating high self-efficacy. Sample items include "solve math word problems" for the Math subscale and "learn about the origins of a species" for the Science subscale. Scale scores are computed by summing and averaging items.

The Math (.90) and Science (.80) subscale scores of the ESCI-HS have exhibited adequate internal consistency estimates in a sample of high school students of color (Garriott et al., 2014). The ESCI-HS subscales have been shown to correlate in expected directions with Holland theme scores of the Skills Confidence Inventory (Betz & Wolfe, 2005). Coefficient  $\alpha$  for scale scores was .91 for both the Math and Science subscales in the present study.

**Familism.** Familism was measured with the Pan-Hispanic Familism Scale (Villarreal, Blozis, & Widaman, 2005). The 5-item scale assesses attitudinal familism, which refers to "feelings and beliefs concerning family" as well as "feelings of loyalty, solidarity and reciprocity among members of the same family" (Villarreal et al., 2005, p. 411). Items are rated on a Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) with high scores reflective of high levels of attitudinal familism. Sample items include "my family is always there for me in times of need" and "my family members and I share similar values and beliefs." A confirmatory factor analysis supported the unidimensional factor structure of the scale (Villarreal et al., 2005). Scale scores are obtained by summing and averaging items. In a sample reflective of the U.S. Latina/o adult population, coefficient  $\alpha$  was reported as .82 (Villarreal et al., 2005). Coefficient  $\alpha$  for scale scores in the present study was .90.

**Proximal family supports.** Perceptions of proximal family supports were assessed using items developed by Lent et al. (2003) and modified for the present study. The original instrument included 4 Likert-type scale items ranging from 1 (*not at all likely*) to 7 (*extremely likely*) that assess perceived social supports for the decision to pursue a career domain (Lent, Paixão, da Silva, & Leitão, 2010). Items are averaged with high scores indicative of high perceptions of supports for the decision to pursue a career domain. For the present study, 2 items were added to the scale, and family members were used as the social support reference point for all items. The terms "family member" and "relative" were selected as opposed to "parent," as extended family members often serve maternal and paternal roles within Latina/o families (Santiago-Rivera et al., 2002). The prompt for the scale read "If you were to pursue a math/science degree in college, how likely would you be to . . ." Sample items for the modified supports scale included "Feel family members were happy about your decision" and "Feel that relatives would be proud of you for making this decision."

Cronbach's  $\alpha$ s for the scale scores on the original supports measure have ranged from .81 to .88 with Italian and Portuguese high school students (Lent et al., 2010). An internal consistency estimate of .90 was found for the original social supports scale in a sample of racially/ethnically diverse high school students (Garriott et al., 2013). A previous version of the scale has been shown to correlate in expected directions with self-efficacy and interests in math and science among high school students (Garriott et al., 2013). Coefficient  $\alpha$  for scale scores in the present study was .93.

## Participants and Procedure

The sample ( $N = 258$ ) was comprised of self-identified Mexican American high school students in the Rocky Mountain region of the United States. Approximately 45% of participants were female. Mean age was 15.21 years ( $SD = 0.84$ ). Forty-eight percent of participants were freshmen and 52% were sophomores. Fourteen (5%) participants reported having a parent who had completed a bachelor's degree. The remaining participants ( $n = 240$ ; 93%) reported their parents had not completed a bachelor's degree or did not answer this question ( $n = 4$ ; 2%).

Institutional review board approval was received prior to study procedures. Participants were recruited from classrooms at a high school serving a relatively large percentage of Latina/o students. Trained research assistants described the study and distributed and collected paper-and-pencil surveys at the beginning of class periods. Participants provided signed assent. Implied consent was received from parents. Informational letters detailing the purpose of the study as well as procedures involved were sent to parents through the school serving as the site for data collection. Parents were instructed to speak with their child about not participating in the study if they preferred they withhold participation. Contact information for the principle investigator was also provided for parents to make inquiries or express concerns about their child's participation in the study. Implied consent materials were translated by a professional translation service into Spanish. English and Spanish informational letters were provided to parents of students. Students who volunteered to complete the study were entered into a raffle for 1 of 10 US\$20 gift certificates as compensation for their time.

## Results

### Preliminary Analyses

**Data screening.** A total of 378 students completed and returned surveys to research assistants. Of these participants, 263 self-identified as "Mexican American." The Missing Values Analysis function in SPSS 22.0 was used to evaluate the pattern of missing data. Item parcels, subscales of the ESCI-HS, and total scales for familism and performance accomplishment variables were analyzed for missing values. There were a total of six cases with missing data and 24 missing values of a total possible 3,682 values in the data set. Results of Little's missing completely at random (MCAR) test were not significant,  $\chi^2 = 33.03$ ,  $p = .103$ , indicating data were MCAR. Two participants had excessive (i.e., >20% items missing on one of the scales) missing data and were deleted from the data set. Because the percentage of missing data was relatively small, the expectation maximization function in SPSS 22.0 was used to account for missing values in data analyses (Schlomer, Bauman, & Card, 2010).

Next, data were assessed for multivariate normality. Three participants had Mahalanobis distance values that exceeded the acceptable critical value,  $\chi^2(6) = 22.45$ , and were deleted as multivariate outliers, leaving a total sample of  $N = 258$ . Mardia's coefficient (26.57) was outside the range (>5) recommended for multivariate normality in structural equation modeling (SEM; Bentler, 2004). Therefore, robust maximum-likelihood estimation was used in SEM analyses.

SEM was conducted using Mplus 7.2 (Muthén & Muthén, 1998/2012) statistical package. The comparative fit index (CFI), root mean square error approximation (RMSEA), and standardized root mean square residual (SRMR) were examined to determine adequacy of model fit. In general,  $CFI \geq .95$ ,  $RMSEA \leq .06$ , and  $SRMR \leq .05$  represent close model-to-data fit, while  $CFI \geq .90$ ,  $RMSEA \leq .08$ , and  $SRMR \leq .08$  represent adequate model fit (Kline, 2005).

**Measurement model.** Item parceling was used to create latent variables and better account for measurement error. Individual items for the familism and performance accomplishment scales were used as indicators for these latent variables, as each contained a limited number of items. Items for the math and science subscales of the ESCI-HS served as two separate indicators for the math/

**Table 1.** Means, Standard Deviations, and Correlations Among Study Variables.

Variables	1	2	3	4	5	6	7	8
1. Performance accomplishments	—	.54	.52	.65	.35	.40	.02	.13
2. Interests		—	.59	.65	.28	.41	.09	-.01
3. Goals			—	.54	.36	.43	.03	-.01
4. Self-efficacy				—	.29	.40	.10	.07
5. Familism					—	.68	-.05	-.10
6. Proximal family supports						—	-.10	-.10
7. Sex							—	-.02
8. Grade level								—
M	3.80	3.29	3.80	2.95	3.99	3.80	—	—
SD	0.95	1.03	0.95	0.76	0.95	0.96	—	—

Note. Correlations of  $|\geq .13|$  and above are statistically significant at the  $p < .05$  level. Correlations of  $|\geq .28|$  and above are statistically significant at the  $p < .001$  level.

science self-efficacy latent variable. Items for the proximal family supports, interests, and goals scales were subjected to maximum-likelihood exploratory factor analysis and assigned to parcels with high, medium, and low item factor loadings balanced for each parcel (Weston & Gore, 2006). The proximal family supports variable contained three parcels, each with 2 items. The goals variable included three parcels, with one parcel containing 3 items and the other two parcels containing 2 items. The interest variable was comprised of four parcels, each containing 5 items. Confirmatory factor analyses were conducted to ensure parcels adequately loaded onto their respective factors (Hagtvet & Nasser, 2004).

A measurement model with these latent variables suggested adequate model-to-data fit,  $\chi^2(174) = 402.47, p < .001$ ; CFI = .933; RMSEA = .071 (90% confidence interval [CI] = [.062, .080]); SRMR = .048. Furthermore, all items, parcels, and subscales significantly loaded ( $p < .001$ ) onto their respective factors. Standardized factor loadings ranged from 0.56 for the third item of the performance accomplishments variable to 0.94 for the second parcel of the supports variable. A table with factor loadings for all latent variables is available from the first author upon request.

### Primary Analyses

Means, standard deviations, and correlations among observed variables are included in Table 1. The hypothesized structural model (see Figure 1) provided an adequate fit to the data, with all fit indices meeting acceptable cutoff criteria,  $\chi^2(181) = 429.12, p < .001$ ; CFI = .928; RMSEA = .072 (90% CI = [.064, .081]); SRMR = .060. All paths within the model, with the exception of the path from interests to goals, were statistically significant. Notably, familism significantly predicted performance accomplishments ( $\beta = .41, p < .001$ ) and perceived family supports ( $\beta = .73, p < .001$ ). Perceived family supports significantly predicted self-efficacy ( $\beta = .20, p = .005$ ) and goals ( $\beta = .14, p = .047$ ). The structural model explained: 17% of the variance in performance accomplishments, 68% of the variance in self-efficacy, 53% of the variance in perceived family supports, 63% of the variance in interests, and 53% of the variance in goals.

**Mediation and moderation.** Bootstrapping with 95% bias-corrected CIs and 1,000 bootstrap samples was conducted to test mediation hypotheses. CIs not including zero were indicative of a significant mediation effect (Mallinckrodt, Abraham, Wei, & Russell, 2006). Results indicated that, with the exception of the indirect path from self-efficacy to goals through interests, all indirect effects were statistically significant (see Table 2). As hypothesized, performance accomplishments mediated the

**Table 2.** Summary of Standardized Indirect Effects.

Path/Effect	Bootstrap Estimates			
	Mean B	Mean SE	95% CI	p Value
Familism → Performance accomplishments → self-efficacy	.305	.055	[.214, .396]	<.001
Performance accomplishments → self-efficacy → interests	.319	.047	[.232, .415]	<.001
Performance accomplishments → self-efficacy → goals	.223	.042	[.150, .314]	<.001
Self-efficacy → interests → goals	.118	.121	[-.080, .317]	.326
Supports → self-efficacy → interests	.191	.057	[.097, .285]	.001
Supports → self-efficacy → goals	.149	.064	[.043, .255]	.021
Familism → supports → goals	.252	.059	[.139, .371]	<.001

Note. CI = confidence interval.

relationship between familism and self-efficacy. Self-efficacy mediated the relationship between proximal family supports and interests as well as goals. Self-efficacy also mediated the relationship between performance accomplishments and interests as well as goals. Finally, proximal family supports mediated the relationship between familism and goals. An interaction term between the proximal family supports and interests latent variables was created to test for moderation. The path coefficient between the latent interaction variable and goals was not statistically significant ( $\beta = .004, p = .937$ ). Therefore, it was determined that proximal family supports did not moderate the relationship between interests and goals.

## Discussion

Findings from the present study advance the SCCT literature in several ways. This is the first study to examine the math/science career goals of Mexican American high school students and one of the few studies to investigate familism as a background contextual predictor of person-cognitive variables. Furthermore, results of this study elucidate both direct and indirect pathways from familial contextual variables to math/science career interests and goals among Mexican American high school students.

Our prediction that the hypothesized structural model would adequately fit the data and that all variables would relate as posited in SCCT (Hypothesis 1) received partial support. Although the model adequately fit the data, not all paths within the model were statistically significant. Specifically, the path from interests to goals was the only path that did not reach statistical significance. Prior research with Mexican American middle school (Navarro et al., 2007) students found a moderately strong ( $\beta$ 's = .42), significant relationship between these variables. However, Lent et al. (1994) asserted that under conditions of limited educational or economic opportunity, occupational choices are more heavily influenced by self-efficacy beliefs relative to interests. Findings from the present study may reflect this hypothesis, as participants resided in a school district serving a large number of low-income families. Perceptions of limited opportunity to pursue one's interests within this environment may have influenced participants' responses.

In terms of significant paths within the model, our findings suggest that Mexican American students endorsing high levels of familism are more likely to perceive support from family related to pursuing math/science educational and career choices. In turn, this perceived support was shown to predict math/science goals directly and indirectly through self-efficacy. These results contrast research conducted with predominantly White college students, which suggested a nonsignificant relationship between family variables and learning experiences (Ferry et al., 2000). Mexican American students' emphasis on family as well as the age range of participants may explain our findings. That is, family

relationships may exert more influence on career decision-making in adolescence, particularly for Mexican American students.

It is noteworthy that the final structural model in this study explained substantially more variance in math/science interests (63%) and goals (53%) compared to previous research on the math/science interests (22%) and goals (40%) of Mexican American middle school students (Navarro et al., 2007) as well as investigative career goals (8%) of Mexican American college students (Flores et al., 2010). These results suggest the variables included in the present study may represent particularly influential factors in Mexican American high school students' math/science career development.

Hypotheses 2a–2d were also largely supported, as the indirect path from self-efficacy to goals through interests was the only nonsignificant indirect effect. These results suggest that performance accomplishments, self-efficacy, and interests may help explain why familial relationships and supports predict math/science career goals for Mexican American high school students. Our findings also corroborate prior research indicating parental encouragement explains the relationship between familism and academic outcomes in Mexican American college students (Ojeda et al., 2011). Our results extend this literature, indicating the relationship between familism and math/science career goals for Mexican American high school students may be explained by proximal family supports. Similarly, our findings replicate prior research with Mexican American middle school students, suggesting that the relationship between parental support and math/science goals is explained by self-efficacy (Navarro et al., 2007).

Hypothesis 3—that the relationship between interests and goals would depend upon levels of proximal family supports—was not supported in the present study. To our knowledge, this is the first study to test the moderating role of proximal family supports on the relationship between math/science interests and goals among Mexican American high school students. Previous research with Mexican American middle school students also failed to find support for the hypothesis that the relationship between math/science interests and goals is dependent upon proximal supports (Navarro et al., 2007). It may be that other forms of material support, not captured in this study, influence the relationship between Mexican American students' math/science interests and goals.

### *Implications for Research and Practice*

Findings from the present study suggest background and proximal contextual factors may play a significant role in Mexican American high school students' career development in math and science. Future research might examine more objective supports and resources, such as access to mentoring programs. Other forms of subjective proximal supports also warrant further investigation. For example, subjective support from peers and teachers could be investigated as factors that may enhance the link between math/science interests and goals for Mexican American students. Although general support from peers and teachers has been examined in prior research with Mexican Americans (Navarro et al., 2007), domain-specific support from these sources for math/science career choice has not been investigated.

Similarly, proximal barriers warrant greater attention in future research on the math/science career goals of Mexican American high school students. This research could aid in determining factors that impede Mexican American students with high educational aspirations from reaching their career goals. Both interpersonal (e.g., lack of support from family) and structural (e.g., lack of finances and immigration documentation status) barriers could add to the literature in this area. Additional research with Mexican American high school students is also needed to determine whether the greater amount of variance explained in this study could be attributable to the variables examined, characteristics of the sample (i.e., high school students), or specificity of the domain investigated (i.e., math and science).

Findings from the present study suggest that teachers, administrators, and other high school personnel should consider the role of family in Mexican American students' career development in math and

science. Family-focused outreach and informational programming related to STEM career areas could be one method of supporting Mexican American students and their families. STEM recruitment efforts should also incorporate family-centered interventions to promote Mexican American students' interests in math and science. Examples could include inserting positive testimonials from Latina/o parents into STEM career recruitment materials, including messages of family pride into testimonials from Latina/o individuals working in STEM careers, and inviting parents to accompany their children to STEM career fairs. Career counselors should also explore perceived support from parents for setting STEM-related career goals when working with Mexican American students. The cultural value of *familismo* (Santiago-Rivera et al., 2002) could also be used strategically in a counseling context to promote performance-based learning experiences and perceived support for career decision-making in math and science.

Given the strong, positive path coefficients between performance accomplishments and self-efficacy, as well as self-efficacy and goals, interventions that target these variables should be a focus of work with Mexican American high school students. Specifically, providing Mexican American students with early success experiences in high school and promoting their confidence to accomplish the tasks and demands of math and science subjects appear to be critical to fostering their math/science career interests and goals.

## Limitations and Conclusion

While results of the present study advance the SCCT literature on Mexican Americans' math/science career goals, several limitations should be noted. First, the full SCCT model was not tested in this study. Notably, outcome expectations, proximal barriers, and other forms of learning experiences (i.e., vicarious influence, verbal persuasion, and physiological arousal) were not assessed.

Findings from SCCT studies including outcome expectations have been mixed. For example, research with undergraduate engineering majors found outcome expectations were a stronger predictor of goals than self-efficacy (Lent et al., 2003). In contrast, research on the math/science interests of racially/ethnically diverse high school students found self-efficacy, but not outcome expectations, predicted interests (Garriott et al., 2013, 2014). Future research with Mexican American high school students should evaluate the relative contribution of math/science outcome expectations. This research might include both positive (e.g., earning a high salary) and negative (e.g., not having enough time for familial relationships) outcome expectations to broaden research in this area. Although performance accomplishments have consistently been shown to be the most robust predictor of math/science self-efficacy out of the various forms of learning experiences (Garriott et al., 2014), including other forms of learning experiences might elucidate alternative sources of math/science self-efficacy for Mexican American students. Vicarious influence and verbal persuasion might be particularly worthy of future study within the context of ethnically similar teachers, mentors, or role models.

Further, it should be noted that all measures in this study were self-report, resulting in shared method variance that may have had an impact on associations between variables. Relatedly, the study's cross-section design precludes conclusions about causality. Given SCCT suggests temporal relationships between variables, additional longitudinal research is warranted. Future research could explore the extent to which goals predict actions for Mexican American adolescents in STEM domains, such as future choice of an STEM-related college major. Finally, participants were recruited from one high school in a single region of the United States, which may limit generalizability of results. Despite these limitations, findings from this study may be used to enhance Mexican Americans' participation in math/science careers through recognition of the importance of family in their math/science career development.

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## Author Biographies

**Patton O. Garriott** is an assistant professor in the Counseling Psychology Department at the University of Denver. He holds a PhD in Counseling Psychology from the University of Missouri. His research interests include the academic and career development of underrepresented students in higher education and STEM fields. In his free time, he enjoys running, spending time with his family, and sampling from the many local Denver breweries.

**Trisha L. Raque-Bogdan** is an assistant professor in the Counseling Psychology Department at the University of Denver. She holds a PhD in counseling psychology from the University of Maryland. Her research focus is on the intersection of career development and chronic illness, with a specific focus on women's health issues and psycho-oncology. In her free time, Trisha enjoys spending time with her family, planning parties, and watching live music.

**Lorraine Zoma** holds an MA in counseling psychology from University of Denver and a BS in family studies and human development from the University of Arizona. Her research interests include STEM career goals and minority students, minority populations within the mental health field as well as the impact of nutrition on health. Lorraine enjoys running, hiking, and other outdoor activities. When not enjoying the outdoors, she is usually getting creative in the kitchen by cooking and baking various dishes.

**Dylan Mackie-Hernandez** received her BA in psychology from Colorado College and her MA in counseling psychology from The University of Denver. Her research addresses issues of multicultural competence in counseling and the impact of race/ethnicity on the working alliance. Her research interests include diversity within higher education, intergenerational trauma, resiliency, as well as the formation of social attitudes, moral judgments, and political beliefs. In her spare time, Dylan enjoys exploring the Rocky Mountains by foot or skis.

**Kelly Lavin** received her undergraduate degree from the University of Denver with a double major in psychology and criminology and a minor in communication studies. Currently, Kelly is a second year masters student with a clinical mental health concentration in the Counseling Psychology program at the University of Denver. Kelly is interested in treatment effectiveness research and multiculturally informed community-based interventions to treat children and adolescents who have experienced trauma and other stressful events. In her leisure time, Kelly enjoys hiking, skiing, and spending time with family and friends.