



# A longitudinal test of social cognitive career theory's academic persistence model among Latino/a and White men and women engineering students

Hang-Shim Lee <sup>a,\*</sup>, Lisa Y. Flores <sup>b</sup>, Rachel L. Navarro <sup>c</sup>, Marlen Kanagui-Muñoz <sup>d</sup>

<sup>a</sup> Oklahoma State University, USA

<sup>b</sup> University of Missouri, USA

<sup>c</sup> University of North Dakota, USA

<sup>d</sup> Kaiser Permanente, USA

## ARTICLE INFO

### Article history:

Received 3 November 2014

Available online 10 February 2015

### Keywords:

Social cognitive career theory

Academic persistence model

Engineering

Gender and ethnic minority

## ABSTRACT

This study tested Social Cognitive Career Theory's (SCCT) academic persistence model among engineering students from a longitudinal perspective and examined whether relations among the variables in the model differed between Whites and Latinos/as and between men and women engineering majors. Three hundred fifty engineering student participants (172 Latino/as; 155 Whites; 23 mixed race) who were attending a Hispanic-serving institution in the Southwest completed measures of math/science ACT, college GPA, engineering self-efficacy, engineering goals, and persistence. The academic persistence model within the engineering domain provided an excellent fit to the data. Significant group differences between women and men were found; however, there were no group differences across ethnicity. Implication for further research and interventions based on SCCT's academic persistence model are discussed in relation to academic persistence in engineering for women and Latinos/as.

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Attempts to recruit and retain more students within engineering fields have increased in recent years. In spite of these attempts, White women and Latinas/os are still obviously underrepresented in engineering (National Science Foundation, Division of Science Resources Statistics, 2013). Of all undergraduate engineering degrees earned in 2010, 81.9% were awarded to men and 18.4% were awarded to women. Among them, 69% were White men, 5.5% were Latinos, 11.4% were White women and 1.5% were Latinas (National Center for Education Statistics, 2011). It is critical to increase the representation of underrepresented groups in engineering to increase our country's global competitiveness as well as to expand the career options of highly prestigious jobs among women and Latinas/os. To achieve this goal, it is important to assist women and Latinos/as in their academic success and persistence in engineering. Unfortunately, relatively little research has examined the past academic performance and psychological factors that might influence the academic persistence of White women and Latinos/as in engineering from a longitudinal perspective. Additionally, even though vocational scholars have noted the importance of exploring the differences across gender and racial/ethnic groups in engineering (Byars-Winston & Fouad, 2008; Flores et al., 2014), few studies have done so (Flores et al., 2014; Lent, Lopez, Lopez, & Sheu, 2008; Lent et al., 2005; Navarro, Flores, Lee, & Gonzalez, 2014). The current longitudinal study examines the effects of past academic performance and social cognitive predictors on persistence in engineering across a sample of White and Latinas/os undergraduate engineering students.

\* Corresponding author at: School of Applied Health and Educational Psychology, Oklahoma State University, 406 Willard Hall, Stillwater, OK 74078, USA.  
E-mail address: [hangshim.lee@okstate.edu](mailto:hangshim.lee@okstate.edu) (H.-S. Lee).

## 1. Theoretical framework

Vocational psychology theories explain how people make academic choices and pursue career endeavors. Among those theories, Social Cognitive Career Theory (SCCT; Lent, Brown, & Hackett, 1994, 2000) captures the interplay among the cognitive and behavioral factors that influence the development of career interests, choices, and performance behaviors (see Fig. 1). Derived from Bandura's (1997) social cognitive theory, SCCT hypothesizes that career and academic interests develop when individuals have confidence in their ability to perform specific academic or career related tasks (self-efficacy) and when they anticipate positive consequences for engaging in these tasks (outcome expectations). In the model, career interests affect goals and career outcomes such as career satisfaction, engagement, performance and persistence. Both self-efficacy and outcome expectations are hypothesized to have both direct and indirect effects on goals, satisfaction, and persistence via their influence on career interests. SCCT accounts for the performance and persistence behaviors in educational and work settings, however, prior research on the SCCT performance and persistence model has focused more on work outcomes than academic outcomes (Brown et al., 2008). Thus, the current study will test the SCCT persistence model in an educational setting.

Within SCCT's persistence model, Lent et al. (1994, 2000) hypothesized that academic persistence is a function of the interaction among general cognitive ability, past performance, self-efficacy beliefs, outcome expectations, and goal mechanisms. Specifically, they posited that general cognitive ability (e.g., SAT or ACT scores) can predict current academic performance in college (e.g., college grade point average) and persistence via social cognitive variables (e.g., students' self-efficacy, outcome expectations and goals). According to the SCCT academic persistence model, students with past academic accomplishments and strong cognitive aptitudes are more likely to persist in their academic majors via robust self-efficacy beliefs, positive outcome expectations, and clear goals.

Brown et al. (2008) conducted a meta-analysis of SCCT's performance and persistence models. One SCCT model hypothesized both general cognitive ability (ACT-SAT) and past academic performance [high school grade point average (GPA)] predicted academic performance in college (college grade point average) via academic self-efficacy and academic goals. The second SCCT model hypothesized both general cognitive ability (ACT-SAT) and past academic performance (high school GPA) predicted academic persistence via academic self-efficacy and academic goals. Findings of the meta-analysis study provided strong support for SCCT's model of academic performance and persistence. Using SCCT's academic persistence model (Brown et al., 2008), the current study was designed to include general cognitive ability related to engineering (math/science ACT) and Time 1 college GPA to predict Time 3 academic persistence in engineering via Time 2 engineering academic self-efficacy and engineering academic goals (See Fig. 1 for the SCCT variables and paths tested in this study). SCCT's developers highlight the importance of domain specific measures, thus we used engineering-related variables including ACT math/science scores; college GPA, self-efficacy, goals, and persistence in engineering. Given that standard curricula for engineering majors include various math, science, and engineering courses when they first enter college, we believe that college GPA is a good estimate of major GPA for engineering students.

## 2. Review of studies related to SCCT's academic performance and persistence model

In this section, previous studies related to the main variables of SCCT's academic persistence model are reviewed. First, the positive relationship between past performance and college performance has been established in the literature, underscoring the importance of pre-college readiness (Kahn & Nauta, 2001; Lent, Brown, & Larkin, 1986). A comprehensive meta-analyses study reported the relatively strong bivariate relations ( $r = .45$ ) between college GPA and college entrance examinations, such as the ACT and/or SAT scores (Robbins et al., 2004). Also, ACT scores and high school GPA combined to explain approximately 25% of the variance of first year college GPA (ACT, 1997; Boldt, 1986; Mouw & Khanna, 1993). Another meta-analysis reported that general cognitive ability had a stronger direct effect on college performance (GPA) than past performance (Brown et al., 2008) in general academic domains. Studies also have found similar findings within the engineering field. A longitudinal, multi-institution study found that high school

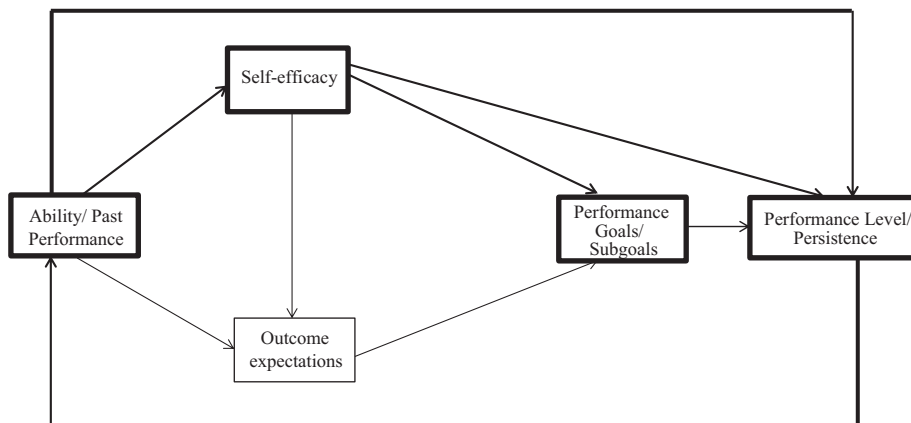


Fig. 1. Hypothesized SCCT academic persistence model (Brown et al., 2008; Lent et al., 1994, 2000). Bold paths were tested in the current study.

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