



Gender differences in applying social cognitive career theory in engineering students[☆]



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ABSTRACT

This study tested Social Cognitive Career Theory (SCCT) in predicting engineering interest and major choice goals among male and female college students. Participants were 579 sophomore engineering students who completed measures of self-efficacy beliefs, outcome expectations, interests, goals and social supports and barriers. Findings confirmed that the SCCT model produced a good fit to the data across gender. The findings also corroborated that women have less self-efficacy beliefs and interest than men. However, there are no statistically significant differences in measures relating to outcome expectations and goals. Moreover, women are more likely to perceive support, especially from peers and family, while men are more likely to perceive family barriers than women. For other supports and barriers there are no gender differences. Implications for future research and practice are discussed.

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1. Introduction

Social Cognitive Career Theory (SCCT) is one of the theories used for explaining the formation of academic and vocational interest, the selection and pursuit of career-relevant choices, and people's performance and persistence in educational and occupational fields. The theory was developed by Lent and colleagues, and focuses on several cognitive-person variables and how these interact with other aspects of the person and his or her environment to help shape the course of career development (Lent & Brown, 2006; Lent, Brown, & Hackett, 1994, 2000). The theory proposes four cognitive-person variables: self-efficacy beliefs, outcome expectations, interest and goals. Person variables such as gender, race/ethnicity or age and contextual factors (barriers and support) are outside of the core model. Such variables can affect self-efficacy, interest, goals, and outcome expectations.

Contextual barriers and support are conceived within SCCT as environmental variables that can facilitate the formation and pursuit of individuals' career choices (Lent & Brown, 2006; Lent et al., 2000).

Previous results in cross-sectional studies with engineering students have indicated that SCCT variables (self-efficacy beliefs, outcome expectations) are strongly predictive of academic interest and goals related to engineering and, as also hypothesized by SCCT, interest produced significant direct paths to goals (Lent, Brown, Sheu, Schmidt, Brenner, Gloster, et al., 2005). These findings indicated that participants who perceived themselves to be efficacious in engineering and anticipated positive rewards from it also expressed the engineering-related interest and reported the goals required to complete an engineering degree. Similar conclusions were obtained in Lent, Brown, Schmidt, Brenner, Lyons and Treistman (2003) with participants on an introductory engineering course, insofar as the study found that self-efficacy was predictive of outcome expectations, interest and goals;

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however, outcome expectations did not explain additional significant variation in interest beyond self-efficacy. Also, self-efficacy produced a significant indirect path to goals through interest.

Lent, Lopez, Lopez, and Sheu (2008; see also Lent, Lopez, Sheu, & Lopez, 2011), have cited the utility of the SCCT choice model in accounting for the interests and persistence goals of a sample of students majoring in the computing disciplines. They demonstrated that self-efficacy was strongly predictive of outcome expectations, interest and goals, but outcome expectations did not yield significant paths either to interest or goals.

Lent, Singley, Sheu, Schmidt, and Schmidt (2007) concluded that social-cognitive factors correlated positively with academic satisfaction in engineering students. The results of the structural equation modeling analyses indicated that academic goal progress, self-efficacy and contextual support were individually and collectively predictive of engineering students' academic satisfaction. Also, self-efficacy and contextual supports combined to strongly predict perceived goal progress. Only outcome expectations failed to explain significant variation in either goal progress or academic satisfaction.

With a sample of students in engineering and biological science majors, Byars-Winston, Estrada, Howard, Davis, and Zalapa (2010) found that maths/science-related academic self-efficacy and outcome expectations were associated with academic goals and interest. However, for engineering students, the contribution of academic self-efficacy to goals is only indirect, mediated through outcome expectations and interest. In this group there was also a significant path from interest to goals.

Other cross-sectional studies with college students reached similar conclusions. Thus, Lent, Brown, Brenner, Chopra, Davis, Talleyrand, et al. (2001) found that maths/science-related course interest related to both maths/science-related course self-efficacy and outcome expectations, producing bivariate correlations. Interest, self-efficacy and outcome expectations were each found to correlate significantly with goals. Moreover, path analysis showed that the effect of outcome expectations on goals was both direct and indirect, via interest; the effect of self-efficacy on goals was only indirect, via interest and outcome expectations. Gainor and Lent (1998) extended SCCT to maths-related interest and academic choice in black college students. They found that black students' maths self-efficacy and outcome expectations were predictive of their maths-related interest. Moreover, self-efficacy appeared to affect interest indirectly, through outcome expectations. Only self-efficacy and outcome expectations produced significant paths to maths goals.

Byars-Winston and Fouad (2008) tested a path model to investigate the relationship between maths- and science-related self-efficacy beliefs and perceived career barriers to maths/science interest and goals in a sample of undergraduates. They found direct and indirect relationships of outcome expectations to goals, and a direct relationship of interest to goals. Maths/science self-efficacy directly predicted outcome expectations, and there was an indirect relationship of self-efficacy to goals through interest.

In the study by Waller (2006) with a sample of non-traditional African-American college students, maths self-efficacy and outcome expectation variables correlated positively, and provided significant and strong paths to maths interest. Also, maths self-efficacy yielded a significant indirect path to maths interest through outcome expectations. In Waller's study, the direct effect of maths-self efficacy on goals was also significant and strong; however, outcome expectations did not yield a significant direct effect on goals. Maths self-efficacy and outcome expectations produced a significant indirect effect on goals through maths interest. The direct effect of maths interest on goals was also significant.

A study carried out in Spain (Blanco, 2011) explored the usefulness of SCCT for predicting interests and goals in relation to statistics among psychology students. The study found that self-efficacy and outcome expectations directly predicted interest, and self-efficacy also appeared to influence interests through outcome expectations. Moreover, self-efficacy produced a significant indirect path to goals through interest and outcome expectations. In addition, outcome expectations produced both a significant direct path to goals and an indirect path to goals via interest. Interest also directly affected goals.

Relatively few SCCT studies have employed longitudinal designs. Lent, Sheu, et al.'s (2008) path analyses indicated support for a model in which self-efficacy served as a temporal precursor of outcome expectations, interest and goals, but the paths from self-efficacy to the other variables were modest in magnitude. Moreover, there was less support for a model in which the latter variables produced reciprocal paths to self-efficacy. That is, the predominant temporal flow appeared to be from self-efficacy to the other variables, rather than vice versa. In that study the findings do not support SCCT's hypotheses about the unique role of outcome expectations in fostering interest and goals, or about interest as a unique antecedent of goals (see also Lent, Sheu, Gloster, & Wilkins, 2010). Additionally, in other longitudinal study, self-efficacy beliefs served as a temporal precursor of the rest of the cognitive variables and of the contextual support, but in contrast to the findings of Lent, Lopez, et al. (2008), Lent, Sheu, et al. (2008), interest and self-efficacy were found to be reciprocally related (Lent et al., 2010).

Sheu, Lent, Brown, Miller, Hennessy and Duffy (2010) used meta-analytic path analysis to synthesize data (from 1981 to 2008) relevant to SCCT's interest and choice hypotheses, organizing the literature in line with Holland's broad occupational themes. For the realistic, investigative and enterprising themes, they found that contextual support and barriers produce both direct paths to choice goals and indirect paths through both self-efficacy and outcome expectations. Moreover, self-efficacy beliefs yielded a negative path to goals in the enterprising theme. For the artistic, social and conventional themes, they found that self-efficacy, outcome expectations and interest each produced direct paths to goals. Moreover, self-efficacy was linked to goals indirectly through outcome expectations and interest, while outcome expectations were linked to goals indirectly through interest. The meta-analytic path analysis also revealed that outcome expectations and self-efficacy beliefs each contributed usefully to the prediction of interest, and helped to explain variation in choice goals across Holland's themes. Furthermore, "self-efficacy is assumed to function both as an antecedent of outcome expectations (and interest) and as a direct contributor to goals" (Sheu et al., 2010, 262).

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