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Exploring the Role of Work Volition Within Social Cognitive Career Theory

Ryan D. Duffy[1], Elizabeth M. Bott[1], Blake A. Allan[1], and Kelsey L. Autin[1]

Abstract

The current study examined the role of work volition within social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994) with a sample of 292 undergraduate students in science-related majors. Students with higher levels of volition endorsed higher levels of science self-efficacy, outcome expectations, interests, and goals. Analyses revealed that work volition was a significant moderator in the link of self-efficacy and outcomes expectations and self-efficacy and goals; stronger links were found in students with lower levels of volition. A structural model was tested with all hypothesized SCCT paths and examined whether work volition continued to moderate these two paths. The model was an excellent fit to the data, and all theorized direct and indirect effects were significant. However, in the full model, work volition was no longer a significant moderator, suggesting that the direction and strength of the relations within the SCCT model are equivalent for students at varying levels of work volition. Practical implications are discussed.

Keywords

social cognitive career theory, psychology of working, work volition, moderation

Several major theories of career choice and development have emerged to explain how and why individuals develop vocational interests and goals. From an empirical standpoint, social cognitive career theory (SCCT; Lent et al., 1994) has received the most attention over the last 15 years, with its focus on the potentially malleable variables of self-efficacy and outcome expectations as predictors of vocational interests and, in turn, choice goals. Despite a bulk of evidence supporting SCCT across a variety of academic domains and student populations (see Sheu et al., 2010), some scholars have questioned the theory's assumption that individuals can freely choose their desired careers (Blustein, 2006; Duffy & Dik, 2009). Namely, would the links of self-efficacy, outcome expectations, and interests to choice goals be as strong for individuals across varying levels of volition in their career decision making? In the current study, we attempt to answer this question by blending theoretical propositions from SCCT and the construct of work volition, which is a core component of

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the psychology of working framework (PWF; Blustein, 2006, 2008). More specifically, we seek to study how students' perceptions of volition in their career decision making may affect the applicability of social cognitive predictors to vocational interests and choice goals.

Social Cognitive Career Theory

The current study is grounded in the core, empirically supported principles of SCCT. Empirical findings from the theoretically based SCCT model have been extensively reviewed and supported (see Lent, 2005; Sheu et al., 2010). The model predicts that students develop vocational interests within specific domains due to the development of self-efficacy and outcome expectations within these domains. Self-efficacy refers to "beliefs in one's ability to successfully perform particular behaviors or courses of action," ... and outcome expectations are characterized as, "expectations [that] involve beliefs about the consequences of performing particular behaviors or courses of action" (Sheu et al., 2010, p. 253). In turn, the development of interests within a particular domain is hypothesized to link to choice goals within that domain (e.g., pursuing a science major). Additionally, interests are hypothesized to function as a mediator between efficacy and outcome expectations and choice goals, and outcome expectations are hypothesized to mediate the relation of efficacy to interests and choice goals (see Figure 1). In their meta-analysis of 45 different samples, Sheu et al. (2010) found the core, 4 variable choice model to fit the data well; self-efficacy, outcome expectations, and interests were found to predict choice goals, and the self-efficacy to goal relation was found to be mediated by outcome expectations and interests.

Despite SCCT's strong empirical backing and validity across a variety of populations (e.g., high school, college, and graduate students) and disciplines (e.g., psychology, engineering, science, math, computing), scholars have pointed out that *most studies* using the SCCT framework involve populations of students with high levels of choice in their work lives with little attention paid to their potential choice constraints (Duffy & Dik, 2009). Certainly, studies using SCCT have addressed this concern by studying less privileged groups, such as underrepresented students and women (e.g., Lent et al., 2005; Lent et al., 2011), and also by studying the role of barriers within the larger model (e.g., Flores & O'Brien, 2002; Lent, Brown, Nota, & Soresi, 2003; Lent et al., 2005; Lent, Lopez, Lopez, & Sheu, 2008). Generally, studies have examined barriers as a predictor variable and found them to be weakly, negatively correlated with choice goals (Lent et al., 2005; Lent et al., 2008). However, regardless of the type of population examined or quantity of barriers accounted for, no studies using the SCCT framework have focused specifically on the degree to which students feel free to choose the careers they would like to pursue or how this feeling might act as a moderator within the larger model.

Work Volition

The perception of choice in one's career decision making is a centerpiece of the psychology of working framework (PWF; Blustein, 2006, 2008). This perception is technically referred to as *work volition*, which is defined as the perception that one can freely make career decisions despite constraints (Duffy, Diemer, Perry, Laurenzi, & Torrey, 2012). Blustein (2006) and Duffy and Dik (2009) argued that most theories of career development assume that individuals are volitional in their decision making; in other words, individuals draw from their own interests, values, skills, and personality to make decisions about the majors or jobs they want to pursue. However, for most individuals, there are a variety of constraints that can limit the perception of volition in their decision making. These constraints include, but are not limited to, poverty, financial stress, physical disabilities, mental disabilities, family pressures, and discrimination. It is hypothesized that the more constraints an individual encounters, the less likely she or he is to feel volitional in her or his career decision making and, in turn, work life (Duffy & Dik, 2009).

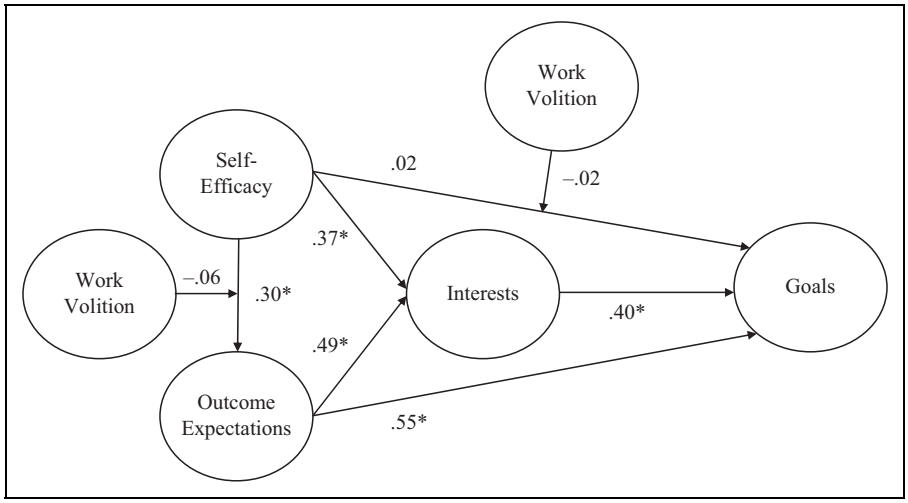

Figure 1. Standardized β-weights reported.
* $p < .01$.

On the surface, using aspects of the PWF to assess undergraduate students may seem like a misfit, because undergraduates may be viewed as a population with privilege and lacking barriers to their career pursuits. However, we believe that the core principle of the PWF—that people's career decisions are impacted by the degree to which they feel volition in their decision making—is a principle that applies to all individuals, including undergraduate students. In developing an instrument of work volition for college students, Duffy, Diemer, and Jadidian (2012) surveyed a large and diverse sample of college students. Scores on the 7-item volition subscale (which is used in the current study) ranged from the minimum to the highest possible scores: 7 (*low*) to 49 (*high*), with a mean of 35.69 (standard deviation [*SD*] = 5.90). Although students were more likely to endorse higher than average levels of volition (the true scale midpoint is 28), there was substantial variability in scale scores, and the vast majority of students did not feel completely volitional in their career decision making.

Studies on the work volition construct have found it to significantly, weakly correlate with career locus of control and career barriers (negative direction), moderately to strongly correlate with career decision self-efficacy, moderately correlate with academic satisfaction, and strongly correlate with core self-evaluations among college students (Duffy, Diemer, et al., 2012; Jadidian & Duffy, 2012). Among adults, work volition has been found to significantly, weakly correlate with optimism, positive affect, work self-efficacy, and career barriers (negative direction); moderately correlate with work locus of control and life satisfaction; and strongly correlate with core self-evaluations, perceived organizational support, and job satisfaction (Duffy, Bott, Allan, & Torrey, 2013; Duffy, Bott, Torrey, & Webster, 2013; Duffy, Diemer, & Jadidian, 2012). In sum, feeling volitional in one's career decision making has been significantly tied to healthy vocational and well-being outcomes for both students and adults and to a lower perception of career barriers. Based on these findings, we hypothesize that students with higher levels of work volition will endorse higher levels of science-related self-efficacy, outcome expectations, interests, and goals (Hypotheses 1–4).

Science-Related Majors

A unique aspect of the current study is its focus on undergraduate students in science-related majors. This sample was chosen for two reasons. First, scholars require that tests of the SCCT model be

conducted in a domain-specific fashion (Lent & Brown, 2006) so that the core variables are tailored to the specific domain (e.g., science self-efficacy, math outcome expectations, etc.). Second, there has been an increasing emphasis on studying factors that relate to interest and persistence in science from a policy (Hossain & Robinson, 2012), educational (Byars-Winston, Gutierrez, Topp, & Carnes, 2011) and research standpoint (Byars-Winston & Fouad, 2008; Cordero, Porter, Israel, & Brown, 2012).

Using the SCCT framework, a number of studies have examined predictors of science-related interests and goals in undergraduate students. Consistently, self-efficacy and outcome expectations have been found to predict science-related interests and goals (i.e., Byars-Winston & Fouad, 2008; Byars-Winston, Estrada, Howard, Davis, & Zalapa, 2010; Lent et al., 2001; Mau, 2003; Navarro, Flores, & Worthington, 2007). Moreover, self-efficacy beliefs have been found to help individuals persist through challenges in attaining science-related career goals. In line with the SCCT model, even when other predictors of science-related interests and goals have been identified (i.e., perceived parental support, social class, academic achievement), findings suggest the relations between the predictors and interests and goals have been mediated by self-efficacy and/or outcome expectations (Byars-Winston & Fouad, 2008; Mau, 2003; Navarro et al., 2007).

Work Volition as a Moderator

For both college students and adults, making career decisions and the experience of work likely differs for those at different levels of volition. This empirically implies that work volition might act as a moderating variable within models of career development and work satisfaction. In the only existing study to measure work volition as a moderator, Duffy, Bott, Torrey, and Webster (2013) found work volition to significantly moderate the work self-efficacy to job satisfaction and perceived organizational support to job satisfaction links. The relation between work self-efficacy and job satisfaction was only found to be positive for those with high volition, and the relation between perceived organizational support and job satisfaction was found to be most robust for those with low volition.

Using this core principle of the PWF as a foundation along with the findings from Duffy, Bott, Torrey, and Webster (2013), we propose that several of the bivariate relations within the core SCCT model will be stronger for students with higher levels of work volition. Specifically, we hypothesize that work volition will moderate the link between self-efficacy and outcome expectations (Hypothesis 5), interests (Hypothesis 6), and goals (Hypothesis 7); the link between self-efficacy and these three outcomes will be stronger for those with high volition. Additionally, given a lack of research evidence on which to base our hypotheses, we will examine whether and to what extent work volition functions as a moderator in the relation of outcome expectations and interests (Research Question 1), outcome expectations and goals (Research Question 2), and interests and goals (Research Question 3). Like the relations with self-efficacy, it may be that the relation among these variables is stronger for those with high volition.

The Present Study

The hypotheses and research questions of the present study were explored by studying a large group of undergraduate students in science-related majors using structural equation modeling. First, regression analyses were conducted to determine if any of the six bivariate relations within the core SCCT model were moderated by work volition. Second, a confirmatory factor analysis was completed to ensure a good factor structure of the items/parcels used to construct each of the four key SCCT variables and work volition. Third, a structural model was tested based on the hypothesized SCCT model to determine fit. Within this model, we also tested the strength of work volition as

a moderator for paths found in the regression analyses. Finally, indirect effects were computed within the structural model based on numerous past SCCT studies (Sheu et al., 2010) that suggest that the link of outcome expectations and self-efficacy to goals is mediated by interests, and the link of self-efficacy to interests and goals is mediated by outcome expectations.

Method

Participants

A total of 292 participants, with a mean age of 19.35 years ($SD = 1.92$), completed this study. All participants were enrolled at a large public university located within a small city in the southeastern United States. Of this group, 22% were male ($n = 64$) and 78% were female ($n = 227$). Additionally, 64% ($n = 186$) identified as White, 11% as Asian American ($n = 31$), 10% as African American ($n = 29$), 6% as Cuban ($n = 18$), 6% as South American ($n = 16$), 4% as Caribbean ($n = 12$), 3% as Central American ($n = 9$), 2% as Puerto Rican ($n = 7$), 2% as Middle Eastern ($n = 5$), 1% as American Indian ($n = 4$), 1% as Pacific Islander ($n = 4$), and 1% as Mexican ($n = 2$). Participants' parents' combined average yearly incomes were as follows: (in thousands of US$): Less than US$25 ($n = 35$, 12%), US$26–US$50 ($n = 48$, 16.4%), US$51–US$75 ($n = 36$, 12.3%), US$76–US$100 ($n = 38$, 13%), US$101–US$125 ($n = 32$, 11%), US$126–US$150 ($n = 11$, 3.8%), US$151–US$175 ($n = 12$, 4.1%), US$176–US$200 ($n = 7$, 2.4%), US$200+ ($n = 35$, 12%), and "I don't know" ($n = 7$, 13%). Participants were included in the present study only if their major was science related. The five most represented majors were psychology, biology, health sciences, applied physiology/kinesiology, and nursing.

Instruments

Work Volition. The perceived capacity to make occupational choices despite constraints was assessed using the volition subscale of the Work Volition Scale–Student Version (WVS-SV; Duffy, Diemer, et al., 2012). The volition subscale of the WVS-SV is composed of 7 items, examples of which include, "I will be able to do the kind of work I want to, despite external barriers" and "I will be able to choose jobs that I want." Participants answered items on a 7-point, Likert-type scale ranging from *strongly disagree* to *strongly agree*. With a large sample of college students, Duffy, Diemer, et al. (2012) found the volition subscale score to be reliable (.70) and to correlate in the expected directions with similar constructs including career decision self-efficacy, core self-evaluations, and career barriers. In the present study, the estimated internal consistency reliability of the scale scores was $\alpha = .87$.

Self-efficacy. The degree to which participants felt confident in performing scientific tasks was measured by 3 items used in the study by Ferry, Fouad, and Smith (2000), which tested the SCCT model within the math and science domain among undergraduate students. In the current study, items were only used that measured science self-efficacy. Participants were asked to use a 6-point, Likert-type scale ranging from *very strongly disagree* to *very strongly agree* to rate their agreement with the following three statements, "I feel confident with the proper training I could: earn an A in a science course, design and describe a science experiment that I want to do, and construct and interpret a graph of rainfall amounts by state." Ferry et al. (2000) found both math and science self-efficacy scale scores (items were combined into one scale) to have good internal consistency reliability ($\alpha = .84$) and correlate in the expected direction with outcome expectations, math/science interests, and math/science goals. In the current study, using only the science self-efficacy items, the estimated internal consistency of scale scores was $\alpha = .83$.

Outcome Expectations. The degree to which participants felt positive about the future consequences of performing science-related behaviors was measured by 3 items used by Ferry et al. (2000). The 3 items were "If I do well in my science courses, then I will be better prepared for the work world," "If I do well in science classes in college, then I will do better in life," and "If I get good grades in science, then my parents will be pleased." Participants answered these items on a 6-point, Likert-type scale ranging from *very strongly disagree* to *very strongly agree*. Using both math and science outcome expectations items in their scale, Ferry et al. found the scale scores to have good internal consistency reliability ($\alpha = .81$) and correlate in the expected direction with self-efficacy, math/science interests, and math/science goals. In the current study, only three science outcome expectations items were measured, and the estimated internal consistency of scale scores was $\alpha = .77$.

Interests. The degree to which participants were interested in science-related activities was measured by 9 items used in the Ferry et al. (2000) study. Participants were asked to use a 6-point, Likert-type scale ranging from *very strongly disagree* to *very strongly agree* to rate their level of agreement with the following nine statements, "I feel interested in: taking classes in science, visiting a science museum, listening to a famous scientist talk, touring a science lab, joining a science club, reading about science discoveries, participating in a science fair, working in a science laboratory, and watching a science program on TV." Using both math and science interest items in their scale, Ferry et al. found scale scores to have good internal consistency reliability ($\alpha = .93$) and correlate in the expected direction with self-efficacy, outcome expectations, and math/science goals. In the current study, only the nine science interest items were measured, and the estimated internal consistency of scale scores was $\alpha = .94$.

Goals. The degree to which participants had science-related goals was measured by 3 items used by Ferry et al. (2000). Participants were presented with three statements: "I plan to take more science courses in college than will be required of me," "I am determined to use my science knowledge in my future career," and "I intend to enter a career that will use science." Participants answered these items on a 6-point, Likert-type scale ranging from *very strongly disagree* to *very strongly agree*. Using both math and science goal items in their scale, Ferry et al. found scale scores to have good internal consistency reliability ($\alpha = .84$) and correlate in the expected direction with self-efficacy, outcome expectations, and math/science interests. In the current study, only three science goal items were assessed, and the estimated internal consistency of scale scores was $\alpha = .88$.

Procedure

After the institutional review board approved the study, the survey was made available to students in psychology courses at a large, Southeastern university via two online methods; students participating in introduction to psychology courses participated via the psychology research participant pool system, and students in upper level psychology courses completed the same survey on Qualtrics, an online survey system. Students were first directed to a page containing the informed consent form. Only after giving consent were the students allowed to access the survey. Students from the participant pool were given research credits for completing the survey, and students in upper level courses were given course credit, the value of which was decided by the specific course instructor. In total, 444 students completed the survey. Of this group, 122 were removed, who were in nonscience-related majors. These majors predominantly included the humanities (e.g., English, art, music) and business. Missing data were found for 30 of the remaining participants. Given this low amount of missing data and large sample size, we decided to simply remove these participants from analyses. This resulted in a final total sample of 292 participants.

Table 1. Descriptive Statistics and Correlations for Work Volition and SCCT Model Variables.

	1	2	3	4	5
1. Work volition	–				
2. Self-efficacy	0.35	–			
3. Outcome expectations	0.18	0.23	–		
4. Science interests	0.36	0.48	0.51	–	
5. Science goals	0.32	0.33	0.70	0.63	–
M	35.43	14.63	13.64	35.01	14.44
SD	7.89	3.23	3.20	11.68	3.69

Note. SCCT = social cognitive career theory; SD = standard deviation. All correlations significant at $p < .01$.

Results

Preliminary Analyses

Prior to conducting the formal analyses, a number of preliminary analyses were completed. First, the normality of each of the five variables was assessed. Only self-efficacy had Skewness (−1.10) or Kurtosis (1.08) values over 1; and upon inspection of the histograms, all of the variables appeared evenly distributed. As such, all variables were kept in their original format. Importantly, scores on the volition scale were normally distributed with the curve being slightly negatively skewed (Skewness = −.42, Kurtosis = .35). The mean of scale scores was 35.43 ($SD = 7.89$; range 7–49), indicating that, on average, students felt more volitional than not; yet, the normal skew suggests that, as a whole, the group varied along the dimension of volition. This is an important finding, suggesting that even college students who might be considered very privileged vary in the degree to which they feel volitional in the careers they pursue. This finding matches previous research using this instrument with other samples of college students (Duffy, Diemer, et al., 2012).

Second, based on prior research suggesting that feelings of choice in one's career decision making could be impacted by discrimination, marginalization, and lack of financial resources (Duffy & Dik, 2009), we investigated potential covariates that may affect students' levels of work volition. In the current study, volition was not found to be significantly correlated with parental income ($r = .06$, not significant) nor were significant group differences found in volition scores by gender (male: $M = 36.45$; female: $M = 35.18$; $t = 1.14$) or minority status (White: $M = 35.57$; non-White: $M = 35.24$; $t = .35$). Given these findings by parental income, gender, and minority status, we continued with all remaining analyses by examining the sample as a whole.

Third, we assessed the correlations among the four SCCT model variables and work volition. As seen in Table 1, all SCCT model variables positively correlated with one another. Of particular note, work volition was found to weakly correlate with outcome expectations and moderately correlate with self-efficacy, interests, and goals. These relations suggest that the greater a student's feeling of volition, the greater her or his science-related self-efficacy, outcome expectations, interests, and goals.

Moderation Analyses

Six regression analyses were conducted to examine the moderating effect of work volition on each of the paths within the SCCT model. Following the steps proposed by Frazier, Tix, and Barron (2004), six hierarchical regressions were run. In the first step of these equations, standardized scores of volition and of the predictor variables were entered within the model. In the second step, the interactions between volition and the predictor variables were entered. As seen in Table 2, of the six interactions tested, volition acted as a significant moderator between self-efficacy and two

Table 2. Volition as a Moderator for Six Bivariate SCCT Relations.

	β	*B*	*SE B*	95% CI	*R*	R^2	$R^2\Delta$	$F\Delta$
Outcome expectations								
Step 1: Self-efficacy and volition								
Self-efficacy	.19*	0.61	.19	[.23, .99]				
Volition	.12*	0.38	.19	[.001, .77]	.26	.07		
Step 2: Self-efficacy × volition	−.12*	−0.28	.14	[−.56, −.003]	.28	.08	.01	3.96*
Interests								
Step 1: Self-efficacy and volition								
Self-efficacy	.40*	4.67	.63	[3.44, 5.90]				
Volition	.22*	2.62	.63	[1.39, 3.85]	.52	.27		
Step 2: Self-efficacy × volition	−.07	−0.63	.46	[−1.52, .27]	.53	.28	.01	1.89
Step 1: Outcome expectations and volition								
Outcome expectations	.46*	5.31	.57	[4.19, 6.44]				
Volition	.28*	3.26	.57	[2.13, .438]	.58	.33		
Step 2: Outcome expectations × volition	.03	0.26	.47	[−.67, 1.18]	.58	.33	.00	0.30
Goals								
Step 1: Self-efficacy and volition								
Self-efficacy	.25*	0.93	.21	[0.51, 1.35]				
Volition	.23*	0.86	.21	[0.45, −1.28]	.40	.16		
Step 2: Self-efficacy × volition	−.13*	−0.37	.15	[−.67, −.07]	.42	.18	.02	5.80*
Step 1: Outcome expectations and volition								
Outcome expectations	.66*	2.44	.15	[2.14, 2.74]				
Volition	.20*	0.73	.15	[0.43, 1.03]	.72	.53		
Step 2: Outcome expectations × volition	.03	0.08	.13	[−.16, .33]	.73	.53	.00	0.45
Step 1: Interests and volition								
Interests	.59*	2.19	.18	[1.06, 1.70]				
Volition	.11*	0.39	.18	[1.56, 2.19]	.64	.41		
Step 2: Interests × volition	−.05	−.16	.15	[−.45, .06]	.64	.41	.00	2.30

Note. CI = confidence interval; SCCT = social cognitive career theory; SE = standard error.
* $p < .05$

of its three hypothesized outcomes: outcome expectations and goals. Specifically, *counter to the hypotheses*, the slope of relation of self-efficacy to each of these outcomes was *more pronounced* for individuals with low levels of volition.

Simple slopes analysis (Frazier, Tix, & Barron, 2004) revealed self-efficacy was a significant predictor of outcome expectations for students with levels of volition 1 *SD* below the mean ($\beta = .36, p < .05$), whereas this relation was nonsignificant for students with mean levels of work volition ($\beta = .11, p = .13$) or levels of work volition 1 *SD* above the mean ($\beta = .15, p = .28$). Additionally, self-efficacy was a significant predictor of interests for students with levels of volition 1 *SD* below the mean ($\beta = .41, p < .01$) and for students with mean levels of work volition ($\beta = .22, p < .01$), whereas this relation was nonsignificant for students with levels of work volition 1 *SD* above the mean ($\beta = .05, p = .74$).

Measurement Model

To run the latent structural equation model, we first had to determine the fit of our variables with confirmatory factor analysis. For the self-efficacy, outcome expectations, and goal variables, individual items were used as observed indicators for each latent construct. For volition and interests, item parcels were created by conducting an exploratory factor analysis using principle axis factoring

for the items in each scale, then rank ordering these items according to the strength of their factor loading. Items were then grouped together in countervailing order to maximize the equality of average factor loadings across parcels. Scores for each item parcel were created by averaging the scores of the items within that parcel and summing them. These procedures resulted in three observed indicators for each model variable: self-efficacy (3 items), outcome expectations (3 items), goals (3 items), interests (three, 3 item parcels), and work volition (two, 2-item parcels and one, 3-item parcel). Scores on each parcel were standardized. The estimated internal consistency reliabilities for the three interest parcels were as follows: Parcel 1 ($\alpha = .84$), Parcel 2 ($\alpha = .85$), and Parcel 3 ($\alpha = .84$). The correlations/estimated internal consistency reliabilities for the three volition parcels were as follows: Parcel 1 (2 items, $r = .64$), Parcel 2 (2 items, $r = .65$), and Parcel 3 (3 items, $\alpha = .76$).

In order to examine whether work volition functioned as a moderator within the larger model, extra steps were needed to create an interaction term that could be tested within a latent model. Following the guidelines proposed by Little, Bovaird, and Widaman (2006), we first created nine product terms from each possible combination of the three work volition parcels and the three self-efficacy items. Only the interaction of self-efficacy and work volition was included in the structural model, as this was the only interaction found to be significant in the bivariate moderator tests. Second, we regressed the three work volition parcels and three self-efficacy items onto each of the nine product terms; and for each of these regressions, we saved the unstandardized residuals that became our new, orthogonal product terms. This step was necessary to remove the variance in the interactions that was contributed by volition and self-efficacy. These nine product terms were used as indicators for the work volition by self-efficacy latent interaction construct ($\alpha = .94$). Third, for this analysis, it was necessary to allow the error terms that used the same parcel or item to correlate (Little, Bovaird, & Widaman, 2006). As such, we allowed all appropriate errors in the latent interaction construct to correlate in the following measurement and structural analyses.

Using EQS 6.2, we constructed the measurement model. The measurement and structural models were each judged on the following fit indices: chi-square (χ^2), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). A nonsignificant χ^2 suggests good fit, but χ^2 is almost always significant in sample sizes over 200 (Tabachnick & Fidell, 2007). The CFI compares the proposed model to an independent model that considers all study variables to be uncorrelated. Values greater than .95 represent good fitting models (Hu & Bentler, 1999). The RMSEA evaluates how well the proposed model would fit population covariance matrices if the optimal parameter estimates were available. Because the RMSEA accounts for degrees of freedom, it is sensitive to model complexity. Values $\leq .06$ suggest good fit (Hu & Bentler, 1999), and values $>.10$ signify poor-fitting models (Browne & Cudeck, 1993). The measurement model was a good fit to the data $\chi^2(161, N = 292) = 341.85$, $p < .001$, CFI = .97, RMSEA = .06. All observed indicators had factor loadings on their latent construct of at least .45.

Structural Model

Next, we ran the hypothesized structural model. In this model (see Figure 1), goals were hypothesized to be predicted by self-efficacy, outcome expectations, and interests. Interests were hypothesized to be predicted by self-efficacy and outcome expectations, and outcome expectations were hypothesized to be predicted by self-efficacy. Additionally, based on our bivariate findings that work volition was a significant moderator in the relation of self-efficacy to outcome expectations and goals, this interaction term was also included in these two model paths. This model was an excellent fit with the data: $\chi^2(163, N = 292) = 342.05$, $p < .001$, CFI = .97, RMSEA = .06. As seen in Figure 1, outcome expectations and interests were each significant predictors of science goals. Outcome expectations and self-efficacy were each significant predictors of interests, and

self-efficacy significantly predicted outcome expectations. Additionally, work volition was *not found* to be a significant moderator in the relation of self-efficacy to outcome expectations ($\beta = -.06$, *ns*) or goals ($\beta = -.02$, *ns*). In total, the predictor variables accounted for 72% of the variance in science goals.

Indirect Effects

In order to examine the significance of the indirect effects, we followed the bootstrapping recommendations by Shrout and Bolger (2002). We created 1,000 bootstrap samples using EQS 6.2, ran the four-factor model 1,000 times with each of these randomly generated samples, generated the indirect effects for each mediation path, and calculated product terms to determine significance. More specifically, the mediation paths included (1) self-efficacy to interests as mediated by outcome expectations, (2) self-efficacy to goals as mediated by outcome expectations, (3) self-efficacy to goals as mediated by interests, and (4) outcome expectations to goals as mediated by interests. Significance was determined by noting whether zero was included in the 95% confidence interval (CI) for the indirect effect of the product term; if zero was not included, the indirect effect was deemed significant ($p < .05$; Shrout & Bolger, 2002).

Supporting the SCCT model, all four indirect effects were found to be significant, self-efficacy on interests as mediated by outcome expectations ($c' = .11$, standard error [*SE*] = .03, 95% CI [.04, .18]), self-efficacy on goals as mediated by outcome expectations ($c' = .15$, $SE = .04$, 95% CI [.07, .24]), self-efficacy on goals as mediated by interests ($c' = .24$, $SE = .05$, 95% CI [.15, .33]), and outcome expectations on goals as mediated by interests ($c' = .14$, $SE = .03$, 95% CI [.07, .21]).

Discussion

We hypothesized that the three self-efficacy paths within the model would be stronger for those with high volition. Support was not found for these hypotheses; the relation of self-efficacy to interests was not significantly moderated by work volition, and the relation of self-efficacy to outcome expectations and goals was moderated by work volition but in the opposite direction than hypothesized. In fact, although work volition positively correlated weakly to moderately with each SCCT variable, several relations were more pronounced for students with *lower levels* of volition.

However, findings from the structural model tests provide more comprehensive information on the role of work volition within the larger SCCT model. We constructed a latent moderator construct with the interactions of the three self-efficacy items and three work volition parcels. Guided by our moderator findings, this interaction was included as a hypothesized predictor of outcome expectations (along with self-efficacy) and goals (along with self-efficacy, outcome expectations, and interests). The model, as a whole, was an excellent fit, which pointed to three important findings. First, it supported the basic propositions of SCCT: self-efficacy significantly predicted outcome expectations, self-efficacy and outcome expectations significantly predicted interests, and interests and outcome expectations significantly predicted goals. Second, the relation of self-efficacy to interests was significantly mediated by outcome expectations, and the relation of self-efficacy and outcome expectations to goals was significantly mediated by interests.

Third, neither of the interactions of self-efficacy and work volition were significant. This indicates that, when accounting for all other variables (not simply examining bivariate relations), the relation of variables within the SCCT model was equal across the levels of volition. This finding supports basic assumptions proposed by Lent and colleagues (Lent, 2005; Lent, Sheu, Gloster, & Wilkins, 2010) that the strength and directions of the relations within the SCCT model may be applicable for students with varying levels of privilege. Regardless of the degree to which students feel volitional in their career decision making, science-related interests are predicted by science self-efficacy

and outcome expectations, and science-related goals are predicted by interests, outcome expectations (directly and indirectly via interests), and self-efficacy (indirectly via interests).

In summary, findings from this study serve to demonstrate how the increasingly studied construct of work volition fits within SCCT. Work volition positively related to higher levels of efficacy, outcome expectations, interests, and goals and was a significant moderator in the relation of self-efficacy to outcome expectations and goals. However, within the overall SCCT model, these moderators were no longer significant, suggesting that the relations among the social cognitive variables are similar regardless of a student's work volition.

Practical Implications

The results of this study may have important implications for counselors working with various groups of college students. Mirroring previous research (Duffy, Diemer, et al., 2012; Jadidian & Duffy, 2012) having a greater sense of volition was tied to more positive career outcomes, suggesting the importance of feeling in control of one's career decision making. In line with Duffy and Dik's (2009) recommendations, it is suggested that counselors assess a client's volition at the start of counseling (rather than assuming it to be high) and examine which factors might be limiting the perception of choice in decision making. Importantly, the data suggest that SCCT is an appropriate model for a broad spectrum of students in science-related majors, even those who feel little control over their occupational choices. As such, SCCT may be a useful framework when working with students having varying degrees of work volition.

The attractiveness of SCCT from a practice perceptive is due to the potential malleability of self-efficacy and outcome expectations (Brown & Lent, 1996). Albeit experimental methodology is needed in order to verify the validity of the following suggestions, when working with students with science-related interests and goals, counselors are advised to assess how efficacious students feel in science-related tasks. A wide array of techniques, such as performance accomplishment exercises in which clients can exhibit mastery in domain specific tasks, have been found to be effective in boosting self-efficacy, science-related majors; these should be considered when working with students having low efficacy (Lent, 2005). Outcome expectations refer to students' beliefs in the consequences of performing specific activities or following specific courses of action. More simply, if I do this, will positive or negative consequences follow? Counselors are encouraged to help bolster a client's belief that engaging in science-related tasks and activities will eventually lead to positive outcomes. This type of confidence in the future, versus self-efficacy which pertains more to confidence in the present, may serve to strengthen science-related interests and goals for students across all levels of work volition.

Limitations and Future Directions

The results of this study must be considered in light of several limitations, which can be used to guide future research in this area. First, the study was limited in that the data was cross-sectional, ruling out suggestions of causality. Future research should include longitudinal data to confirm assumptions about the direction of model paths. Second, the current study was limited in the extent to which it can be generalized. Future research is needed to determine whether the current findings are generalizable to the actual population of science majors, which is more heavily comprised of males. Moreover, especially considering the greater barriers women face entering science careers, it is important to gather a large enough sample to understand how these relations may differ by gender. Future research should also investigate whether this model can be extended to other higher education systems (e.g., community colleges) and may apply to working adult populations. Third, very brief measures were used of the core SCCT variables. Although they were each reliable, it

is important that, from an assessment standpoint, these constructs are measured in a more robust fashion. For example, it would be interesting to know how volition relates to demonstrated confidence and behaviors in science as opposed to just self-report.

Fourth, the majority of our sample was White, and this is problematic, given the past research which shows that minority groups experience more barriers and constraints in their career development. Although the current study and the instrument development study (Duffy, Diemer, et al., 2012) found nonsignificant differences in work volition between majority and minority racial groups, it remains important to examine whether these findings hold equally as well for primarily non-White populations. Finally, a wide range of science majors was considered in the current study, and it is possible that other differences may be found between students within science, technology, engineering and mathematics (STEM) subfields. As such, future studies should concentrate on more specific majors and utilize measures that more specifically address the unique major so as to determine whether the current findings are generalizable to all specific STEM domains.

Conclusion

The findings from this study offer an important contribution to research on SCCT, specifically how the model holds for students with varying degrees of work volition. Although students with higher levels of volition endorsed stronger science-related self-efficacy, outcome expectations, interests, and goals, the relation among the variables did not differ according to a student's work volition in the full model test. For undergraduate students in science-related majors, the ability of social cognitive variables to predict interests and choice goals appears just as robust for students across levels of work volition.

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