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Social cognitive career theory at 25: Empirical status of the interest, choice, and performance models

Robert W. Lent[a,*], Steven D. Brown[b]

[a] University of Maryland, United States of America
[b] Loyola University Chicago, United States of America

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ABSTRACT

Social cognitive career theory (SCCT) consists of five interrelated models. Its original models focus on the determinants of educational and occupational interest, choice, and performance (including persistence) (Lent, Brown, & Hackett, 1994). A fourth model is aimed at satisfaction and other aspects of well-being in academic and career-related settings (Lent & Brown, 2006a, 2008), and the fifth model highlights processes whereby people manage common developmental tasks and uncommon challenges across the career lifespan (Lent & Brown, 2013). Each of the models seeks to integrate relevant streams of inquiry, with the larger goal of producing a unifying perspective on educational and career behavior. On the occasion of the 25th anniversary of SCCT's introduction, we consider the empirical status of the original three models as well as inquiry on the sources of self-efficacy and outcome expectations, which undergird the three models. Drawing primarily on meta-analytic findings, we examine the tenability of each of the models, observe the roles of particular social cognitive variables within and across model tests, note moderators of model relationships and anomalous findings, point to hypotheses that have been understudied, and suggest additional directions for future inquiry.

Social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994) is now 25 years old. Building on the foundations of Bandura's (1986) remarkably fertile social cognitive theory and the pioneering theory translation work of Hackett and Betz (1981), SCCT was conceived as a unifying framework that might complement, and forge linkages among, foundational theoretical approaches to career development. It also adopted Bandura's (1986) triadic reciprocal causation framework and emphasized an expanded range of contextual, person, and behavior factors (e.g., self-efficacy, social supports, goal setting) that were assumed to help shape career and educational development across the lifespan. In addition, SCCT was invested in understanding how certain aspects of persons (e.g., gender, culture) and their socioeconomic locations become constructed in ways that make particular career-relevant learning experiences – and subsequent choice options – more or less available to particular individuals (e.g., via differential socialization processes, performance opportunities, modeling, and social encouragement).

Though incorporating such traditional "work personality" variables as interests and values, SCCT offered a novel conceptual perspective on the origins of these variables and on how they change over time via naturally occurring or planned experiences (e.g., counseling). A hallmark of the theory has been a concern with better understanding conditions that facilitate and limit the exercise of human agency in career development, including among persons who had historically been understudied by career researchers. Accordingly, early work on SCCT sought to clarify the nature and functions of contextual influences on career behavior (Lent, Brown,

* Corresponding author at: Department of Counseling, Higher Education, and Special Education, University of Maryland, College Park, MD 20742, United States of America.
E-mail address: boblent@umd.edu (R.W. Lent).

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& Hackett, 2000) and to consider applications to diverse client groups, such as women of color (Hackett & Byars, 1996), gay and lesbian workers (Morrow, Gore, & Campbell, 1996), and persons with disabilities (Fabian, 2000). This focus on diversity has extended over time to encompass, for example, first generation college students (Garriott, Navarro, & Flores, 2017), persons from lower income backgrounds (Flores, Navarro, & Ali, 2017), underrepresented groups in science and engineering (Fouad & Santana, 2017), racial/ethnic minority persons (Fouad & Kantanmeni, 2013; Sheu, Mejia, Rigali-Oiler, Primé, & Chong, 2016), the intersection of race and gender (Byars-Winston & Rogers, 2019), and students and workers from different cultures and countries around the world (Lent & Sheu, 2010; Sheu & Bordon, 2017).

At its introduction, SCCT consisted of three interconnected models that focused on (a) interest development, (b) choice-making, and (c) performance and persistence in educational and vocational domains (Lent et al. 1994). Later additions to the theory included (d) a model of satisfaction and well-being in educational and vocational contexts (Lent & Brown, 2006a, 2008) and (e) a model of career self-management that deals with myriad career process tasks and challenges (e.g., career decision-making, job finding, balancing work-life demands, retirement planning) that occur over the lifespan (Lent & Brown, 2013). The original three models have spawned many productive streams of research (e.g., see Lent, 2013) and, like its older siblings, the satisfaction model has also been generating a good deal of inquiry, both in the U.S. and abroad (Sheu & Bordon, 2017; Sheu & Lent, 2009). The recent career self-management model has been extended to an interesting range of applications as well (e.g., Lent, Ezeofor, Morrison, Penn, & Ireland, 2016; Roche, Daskalova, & Brown, 2017; Tatum, Formica, & Brown, 2017).

In this article, we reflect on SCCT at age 25, with two primary goals in mind. First, we will “look behind” at the status of the research literature on the original three SCCT models, including inquiry on the experiential sources of self-efficacy and outcome expectations, which are a part of all of the SCCT models. Given space considerations and the size of the literature – for example, a recent Google Scholar search indicated that the original SCCT monograph (Lent, Brown, & Hackett, 1994) has received over 6000 citations – our look-behind will primarily rely on meta-analyses (rather than individual studies) of SCCT's original three models, and we consider progress in studying the two newest SCCT models in a separate article (Brown and Lent, in press). Second, we will “look ahead”, considering directions for future research and theory extension on the original models. Although we believe research on these models offers useful implications for practice, we refer readers to other sources that have discussed the models' practical applications (e.g., Brown & Lent, 1996; Ezeofor & Lent, 2015; Lent, 2013; Lent & Fouad, 2011).

1. A review of meta-analytic findings

In this section, we review meta-analytic findings that are relevant to many of SCCT's original hypotheses. Such a compendium of research syntheses may offer several benefits beyond examination of the separate meta-analyses. First, we hope to make it convenient for researchers and students to gain a big picture view of the empirical status of the interest, choice, and performance models. Second, it will allow us to compare the results of different meta-analyses of the same models, using somewhat different methods and timeframes. Third, it will enable examination of patterns of findings to explore the varying roles that particular variables play across the three SCCT models (e.g., do self-efficacy and ability function similarly or differently in relation to interest development and performance behavior?). Such nuances are difficult to detect when viewing the findings regarding each model in isolation.

SCCT contains both bivariate and multivariate predictions. The former reflect the relation of two variables, such as self-efficacy and outcome expectations, to one another. The latter include hypotheses about how two or more predictor variables relate to a common outcome, or dependent, variable, such as interests and choice goals. In general, the meta-analyses have summarized the accumulated bivariate findings across individual studies; in many cases, they have also combined multivariate findings. Both types of meta-analytic findings are valuable because they present a more accurate picture of variable relationships than can be gleaned from an individual study. However, we will generally place greater weight on multivariate predictions because, by controlling for the presence of multiple predictors, they tend to provide a more conservative estimate of the utility of each individual predictor relative to the other predictors of a given outcome. In addition, they allow for an assessment of the extent to which a set of predictors accounts for meaningful amounts of variation in a given outcome variable (e.g., interest, choice goals) as well as the extent to which the network of relationships in the data set conform to (or fit) theoretical expectations. We will assume that readers have a basic familiarity with meta-analytic methods and with SCCT and its concepts, though we will offer a brief description of each of the three models.

1.1. Interest and choice models

We present findings on the interest and choice models in the same section because, technically, the interest model is a built-in component of the choice model, though it can be studied independently. In brief, the interest model holds that self-efficacy beliefs are predictive of outcome expectations and that the two variables each account for unique variation in interests. These hypothesized relationships are displayed in Fig. 1. In the interest model (as in other SCCT models), the primary theoretical focus is on predictors and dependent variables within the same conceptual domain and at the same approximate level of content specificity. SCCT, like general social cognitive theory, assumes that better predictions will be obtained when predictors match dependent variables optimally in terms of content, context, level of specificity, and temporality (Bandura, 1986; Lent & Brown, 2006b). Measurement recommendations call for assessing social cognitive constructs with task-specific and domain-specific measures (e.g., pairing a measure of interest in engineering with corresponding measures of engineering self-efficacy and outcome expectations rather than, say, measures of generalized self-efficacy or trait optimism), with an emphasis on clearly defined, practically relevant, and potentially modifiable dependent variables (Lent & Brown, 2006b).

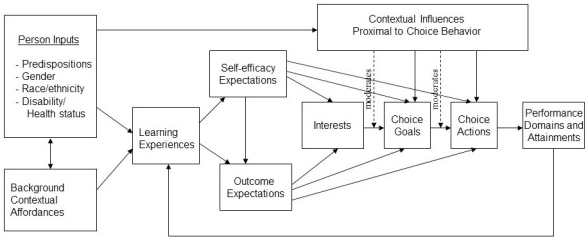

Fig. 1. Integration of SCCT's models of career-related interest development and choice-making. *Note*: Direct relations between variables are indicated with solid lines; moderator effects (where a given variable strengthens or weakens the relations between two other variables) are shown with dashed lines.
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1.1.1. Interest model

The earliest meta-analytic findings were presented in the original SCCT monograph. Lent, Brown, and Hackett (1994) reported bivariate correlations based on at least three studies, with total sample sizes ranging from 339 to 1829. They found that self-efficacy was, as expected, substantially related to outcome expectations (r = .49) and that the bivariate relations of both self-efficacy and outcome expectations to interests were large and of similar magnitude (r = .53 and .52, respectively). Also consistent with SCCT predictions, Lent et al. reported that the relation of ability to interests was fully mediated by self-efficacy beliefs. This suggests that it is confidence in one's ability to succeed, rather than measured or objective ability alone, that is most likely to drive educational and occupational interests.

In a later and more extensive meta-analysis of self-efficacy/interest bivariate relations, Rottinghaus, Larson, and Borgen (2003) reported a somewhat larger overall correlation of self-efficacy to interests (r = .59) than did Lent, Brown, and Hackett (1994), based on 53 samples and 37,289 participants. They also found that the two constructs remained substantially related when broken down by Holland theme, basic activity domain (e.g., math, art), gender, age, and the specific measures used to operationalize the constructs — though there was some effect size variability within each of these conditions. For example, Holland theme correlations ranged from .50 for the Enterprising theme to .68 for the Investigative theme.

Sheu et al.'s (2010) meta-analysis included data from 45 independent samples that allowed tests of both interest and choice model predictions across the six Holland themes. They calculated true score bivariate correlations, taking into account sampling error, sample size, and measurement unreliability (k and sample size varied by Holland theme and variable pair). Regarding the interest model, they found that the relations among self-efficacy, outcome expectations, and interests were generally large (ranging from .47 to .78) and theory-consistent across the themes. Collectively, self-efficacy and outcome expectations accounted for between 37% (Realistic theme) and 67% (Social theme) of the variance in interests, with both predictors explaining significant unique variation in each interest theme, though the size of their relative contributions varied from theme to theme. In addition to its direct path to interests, self-efficacy was linked to interests indirectly via its substantial path to outcome expectations in each theme.

In the most recent meta-analysis of both the interest and choice models, Lent et al. (2018), focusing on science, technology, engineering, and mathematics (STEM) domains, synthesized findings from 196 independent samples. Consistent with prior meta-analyses, true score bivariate correlations of self-efficacy to outcome expectations (.49) and interests (.60) and of outcome expectations to interests (.58) were large in magnitude. Together, self-efficacy and outcome expectations explained 46% of the variance in STEM interests and both variables contributed similarly to the prediction of interests (path coefficients, respectively, of .42 and .37). The unique path from self-efficacy to outcome expectations was also substantial (.36).

1.1.2. Choice model

SCCT's choice model (see Fig. 1) maintains that interests, self-efficacy, and outcome expectations are major contributors to the choice goals that people develop (e.g., one's desire to pursue a particular occupational path). It also posits that choice actions (the effort to transform goals into concrete behaviors, such as job applications or declared major choices) are predicted by goals as well as (directly or indirectly) by the same variables that predict goals. In addition, contextual supports and barriers are portrayed as promoting choice goals and actions (a) via direct paths, (b) by moderating the relations of interests to goals and goals to actions (Lent, Brown, & Hackett, 1994), and (in later renderings of the choice model) (c) indirectly, via self-efficacy and outcome expectations (e.g., Lent et al., 2001; Sheu et al., 2010). It should be noted that the latter, indirect pathways are not shown in Fig. 1 but are captured in Fig. 2, which presents meta-analytic path analysis findings.

Lent, Brown, and Hackett (1994) reported that choice goals are reliably related to interests (.60), self-efficacy (.40), and outcome expectations (.42). Later, more comprehensive meta-analyses have continued to find substantial correlations. For example, true score correlations of interest to goals were reported as .60 in STEM fields (Lent et al., 2018) and as ranging from .52 to .81 across Holland themes (Sheu et al., 2010). Self-efficacy and outcome expectations were generally also found to relate highly (typically, above .50) to choice goals in these studies.

Contextual supports and barriers tend to relate more modestly with goals compared to the other social cognitive predictors, and barriers tend to yield smaller correlations with goals than do supports. For example, support-goal and barrier-goal correlations were, respectively, reported as .36 and −.22 in STEM fields by Lent et al. (2018); similar correlations were reported across three Holland themes by Sheu et al. (2010). (Insufficient data were available at the time to calculate context-goal correlations in the other three

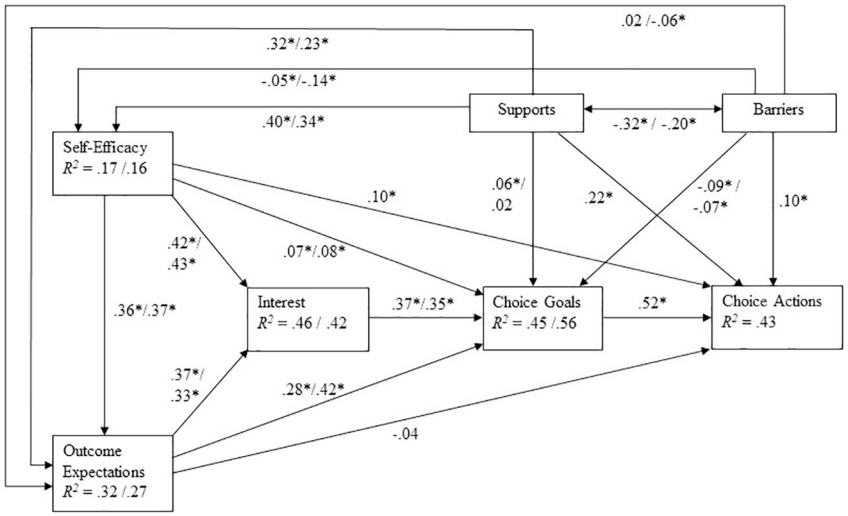

Fig. 2. Omnibus effect sizes (standardized parameter estimates) from meta-analyses of the SCCT choice model by Lent et al. (2018), STEM domain, and Sheu et al. (2010), Investigative theme. *Note*: The first value on each path and in each box is from Lent et al.; the second set of values are from Sheu et al. Prediction of choice actions was included only in the Lent et al. study.

Holland themes.) In a meta-analysis that combined data across different career and educational domains, Brown et al. (2018) reported overall bivariate relations of supports and barriers to goals, respectively, of .30 and −.09. They also found that supports correlated moderately with self-efficacy (.33) and outcome expectations (.42); corresponding correlations for barriers were smaller (−.13 and −.18).

In the one meta-analysis to include choice actions (Lent et al., 2018), the largest correlation with actions was produced by choice goals (.61); other predictors generally yielded moderate (.36 to .40) correlations with actions, with the exception of barriers (−.09). The large goal-action correlation is consistent with social cognitive theory as well as with other theories that highlight the motivational properties of personal goals (e.g., Ajzen, 1988; Locke & Latham, 1990). That is, goals make it more likely that people will summon the effort and persistence necessary to pursue challenging courses of action.

Turning to multivariate analyses of the choice model, Lent, Brown, and Hackett's (1994) findings offered support for the assumption that interests partly mediate the relations of self-efficacy and outcome expectations to choice goals. Both Sheu et al. (2010) and Lent et al. (2018) subjected their correlation matrices to meta-analytic path analyses, finding that the data generally provided good fit to model predictions. However, these model tests also suggested that the predictors varied in their relative contribution to the dependent variables both within and across choice content domains. A common finding was that interests and outcome expectations tended to yield larger direct paths to choice goals than did self-efficacy. The latter mainly contributed to the prediction of goals indirectly via outcome expectations and interests. Supports and barriers tended to yield small paths to goals (path coefficients < .10). Both meta-analyses also found that barriers and, especially, supports also contributed to predictions indirectly, via their paths to self-efficacy and outcome expectations.

To compare the findings of these two meta-analyses more closely in relation to similar interest and choice domains, Fig. 2 displays path coefficients and R^2 values from the Lent et al. (2018) and Sheu et al. (2010) studies, respectively, for STEM fields and Holland Investigative (I) theme fields. STEM fields, which have received the lion's share of SCCT inquiry, include I-content, typically as a primary or secondary Holland theme. As can be seen in the figure, with very few exceptions (e.g., the path from outcome expectations to goals was somewhat larger in Sheu et al.), both studies obtained largely similar results in the STEM context, though they were based on quite different numbers of independent samples (for Sheu et al., $k = 29$, which was subsumed within Lent et al., $k = 196$).

Somewhat more variability was observed, however, in the relative predictive utilities of the social cognitive predictors when comparing the path analyses for the six Holland themes in Sheu et al. (2010). For example, the direct path from self-efficacy to choice goals was generally larger in the Artistic (A) theme (.26) than in the other themes and, in one instance (Enterprising), was negative in direction (−.11); the latter finding was assumed to reflect statistical suppression given that the bivariate relation between Enterprising self-efficacy and goals was positive and large in size, .56. Sheu et al. reported that the model explained between 46% (Realistic theme) and 75% (Conventional [C] theme) of the variance in goals. (It should be noted that some of the *k*s per theme were relatively small, e.g., 7 and 8, respectively, for the C and A themes). Lent et al. (2018) found that the predictors accounted collectively for 45% of the variance in goals in the STEM domain.

Sheu et al. (2010) had been unable to extend the model test to choice actions because of the nature of the literature at the time of their review. Lent et al. (2018) had been able to examine the multivariate prediction of choice actions, though their findings were considered as tentative given the relatively small number of samples that had included choice actions along with goals and the other predictors. Goals produced the largest path to actions (.52), though self-efficacy (.10), supports (.22), and barriers (.10) also contributed significantly to predictions. (The latter path, which was opposite in direction from what had been expected, was assumed to reflect the effects of statistical suppression.) The authors reported that the model accounted for 43% of the variance in actions within

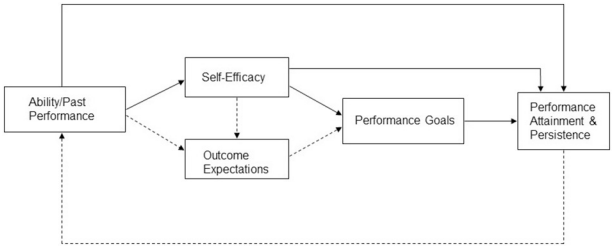

Fig. 3. Social cognitive model of career-related performance and persistence. Adapted from R.W. Lent, S.D. Brown, and G. Hackett (1993). Reprinted by permission. Note: The dashed paths were not included in the meta-analytic path analyses by Brown et al. (2008) and Brown et al. (2011).

the STEM domain. Unfortunately, the hypothesized moderating effects of supports and barriers on interest-goal and goal-action relations have not been tested meta-analytically. In one of the few individual studies testing these hypotheses, Lent et al. (2001) found, consistent with expectations, that interests related more strongly to choice under low versus high barrier conditions. Interest-goal relations did not, however, differ among low and high support conditions. In another relevant study, Garriott, Flores, and Martens (2013) did not find evidence indicating that either barriers or supports moderated interest-goal relations.

1.1.3. Gender and race/ethnicity as moderators

Lent et al. (2018) had examined the prediction of STEM choice goals separately by gender and racial/ethnic (i.e., majority and minority) groups. The model produced good fit to the data across both sets of grouping variables. At the same time, some specific parameter estimates differed by group based on both statistical and practical criteria. For example, barriers were more strongly, negatively related to self-efficacy in males than females and in racial/ethnic majority than minority samples. Supports were more strongly and positively related to outcome expectations and goals in majority than in minority samples; outcome expectations were more highly related to interests in majority samples, though outcome expectations were more strongly linked to goals in minority samples. The authors considered several possible reasons for these complex differences, including recent efforts to offset the historical disparities faced by certain groups in STEM field entry.

1.2. Performance model

SCCT's performance model, shown in Fig. 3, maintains that ability and quality of past performance (e.g., as reflected by test scores, grades, and job productivity indices) predict future academic or occupational performance and persistence both directly and indirectly, through self-efficacy and performance goals. According to Bandura (1986), self-efficacy helps determine what people can achieve with their abilities, partly by encouraging performance goals that focus and motivate their efforts toward goal attainment. SCCT envisions outcome expectations as contributing to future performance and persistence indirectly via the level of performance goals that people set for themselves. A number of meta-analyses have examined the relations of social cognitive variables to performance in academic and work settings, reflecting interest in this topic across multiple specialties in psychology (e.g., counseling, educational, organizational) and related fields (e.g., education, management).

In a relevant study that predated the formal introduction of SCCT, Multon, Brown, and Lent (1991) synthesized findings on the relation of self-efficacy to academic performance and persistence. Based on 38 samples containing 4998 participants, the authors reported an unbiased correlation of .38 between self-efficacy and academic performance; the relation of self-efficacy to academic persistence (e.g., time spent on task, number of items completed), based on 18 studies and 1194 participants, was .34. Both effect sizes were, however, shown to vary based on participant characteristics and methodological considerations. For example, higher effect sizes between self-efficacy and performance were found in lower than in higher achieving students, in high school and college versus elementary school samples, and when using classroom versus standardized achievement measures.

In the original SCCT monograph, Lent, Brown, and Hackett (1994) reported that self-efficacy correlated both with measures of ability/past performance (e.g., test scores, .38) and future performance (e.g., grades, .38). As expected, ability was also related to future performance (.34) and the ability-performance relationship was partially mediated by self-efficacy (i.e., ability/past performance was linked to future performance directly as well as indirectly, via self-efficacy). Though this meta-analysis did not include performance goals, outcome expectations were found to yield a small correlation with future performance (.10).

Subsequent meta-analyses have confirmed that self-efficacy tends to correlate moderately to strongly with measures of ability as well as with academic and work performance indices (Richardson, Abraham, & Bond, 2012; Robbins, Lauver, Le, Davis, & Langley, 2004; Sadri & Robertson, 1993; Stajkovic & Luthans, 1998). However, a variety of effect size moderators, such as task complexity have been observed, and the relationship of self-efficacy to performance is reduced when controlling for ability, task experience, and personality traits, such as conscientiousness (Judge, Jackson, Shaw, Scott, & Rich, 2007; Stajkovic, Bandura, Locke, Lee, & Sergent, 2018). Performance goals (e.g., aiming for a particular grade) also relate reliably to performance, with effect sizes ranging from small (Robbins, Lauver, Le, Davis, & Langley, 2004) to large (Richardson, Abraham, & Bond, 2012).

Two meta-analytic path analyses of the SCCT performance model have been reported (Brown et al., 2008; Brown, Lent, Telander, & Tramayne, 2011). Using correlation matrices assembled by Robbins, Lauver, Le, Davis, and Langley (2004), Brown et al. (2008) applied the model to the academic performance and persistence (retention) of college students, finding good fit to the data in

predicting both outcomes. College GPA was well-predicted by self-efficacy and indicators of ability and high school GPA, though not by academic goals. Ability and prior performance were, as hypothesized, linked to college GPA both directly and indirectly, through self-efficacy. By contrast, persistence was significantly predicted by self-efficacy, both directly and indirectly via goals; however, ability/high school GPA predicted college persistence only indirectly through self-efficacy and goals.

These findings suggest that ability confers two benefits in relation to performance. First, peoples' skills and knowledge are applied directly to ongoing performance challenges. Second, especially when they are attributed to the self and encoded in memory, people's abilities and past mastery experiences help to boost their self-efficacy which, in turn, facilitates ability use in a variety of ways (e.g., by neutralizing self-critical thinking during performance). On the other hand, self-efficacy may be a necessary conduit between ability and persistence because people are prone to cease their pursuit of difficult courses of action when they doubt their competence to succeed, regardless of their objective capabilities. As noted earlier, self-efficacy may also play a key role in translating abilities into interests (e.g., ability is most likely to spark enduring interest to the extent that people perceive themselves as efficacious in a particular activity domain; Lent, Brown, & Hackett, 1994).

Brown, Lent, Telander, and Tramayne (2011) employed bivariate correlations drawn from eight previous meta-analyses as input for their test of the performance model in the context of work performance. Similar to Brown et al.'s (2008) findings with college students, they found that cognitive ability was predictive of workers' performance both directly and indirectly, through self-efficacy. Goal difficulty (a proxy for performance goals) did not contribute to the prediction of performance independently of ability or self-efficacy. Brown, Lent, Telander, and Tramayne (2011) also tested an expanded version of the SCCT performance model, adding conscientiousness, a personality trait, as a complement to the other predictors. (Though personality had not been explicitly included within the original rendering of the performance model, Lent, Brown, & Hackett, 1994 did acknowledge that predispositions and other person inputs may play various roles as precursors of interests, choice, and performance behavior). They found that conscientiousness was linked to performance both directly and indirectly, via self-efficacy. It should be noted that neither the Brown et al. (2008) nor Brown, Lent, Telander, and Tramayne (2011) meta-analyses had been able to include outcome expectations because of the nature of the accrued literature when these meta-analyses had been conducted.

Finally, Talsma, Schüz, Schwarzer, and Norris (2018) conducted a meta-analytic cross-lagged panel analysis of the relations between self-efficacy and academic performance. Such a design is valuable because, unlike cross-sectional meta-analyses, it is capable of examining whether the relationship between the two variables is likely to be unidirectional or reciprocal in nature. Pooling correlations from 11 samples containing 2688 participants, Talsma et al. found that there was support for a reciprocal effects model in that both directional path coefficients were significant; however, the path from performance to self-efficacy ($\beta = .21$) was significantly larger than the path from self-efficacy to performance ($\beta = .07$).

Though these effect sizes are modest, they take into account auto-regression. Such designs generally produce more conservative path estimates than do cross-sectional studies, especially when dependent variables are relatively stable over time. For example, in this case, the prediction of performance at time 2 reflects the incremental contribution of time 1 self-efficacy beyond time 1 performance. The authors also reported that self-efficacy/performance relationships were moderated by the age of participants as well as by several methodological conditions, such as the length of the time lag and the degree of match between the two variables. Similar to Multon, Brown, and Lent (1991), Talsma, Schüz, Schwarzer, and Norris (2018) observed that effect sizes were generally larger among older than younger participants. However, some of the moderator analyses were based on relatively small sample sizes and numbers of independent samples (e.g., for children, $k = 2$). Thus, these findings should be viewed as provisional, pending future research.

1.3. Experiential sources of self-efficacy and outcome expectations

Given the prominent roles that self-efficacy and outcome expectations play within SCCT's various models, it is important to consider the theoretical determinants of these two variables. Indeed, an understanding of their origins and how they can be modified may hold valuable implications for career interventions. General social cognitive theory (Bandura, 1997) maintains that self-efficacy beliefs derive largely from four types of experience: (a) previous personal performance accomplishments (e.g., recall of how one has performed in relevant prior situations), (b) vicarious learning (or modeling), (c) social persuasion, and (d) physiological and affective states. It also posits that outcome expectations are predicted by self-efficacy beliefs because people often expect to receive positive outcomes (or to avoid negative ones) when they feel confident about their capabilities within a given behavioral domain. SCCT maintains that outcome expectations are also predicted by the same sorts of direct and vicarious experiences that inform self-efficacy beliefs (Lent, Brown, & Hackett, 1994).

These four experiential sources, collectively labeled “learning experiences”, are seen as key mediators of person and contextual influences on academic and career development. They are an implicit part of each of the individual SCCT models (e.g., they are displayed near the left side of the combined interest-choice model in Fig. 1), though they are often studied in their own right. In a recent meta-analysis of research on the sources of self-efficacy beliefs, Byars-Winston, Diestelmann, Savoy, and Hoyt (2017) combined the findings of 61 individual studies ($N = 8965$) of academic self-efficacy. At the bivariate level and across performance domains, they found that self-efficacy was related strongly to performance accomplishments (.51), moderately to vicarious learning (.30) and social persuasion (.37), and only weakly (and non-significantly) to affective arousal (.06). At the multivariate level, the four sources together accounted for 28% of the variance in self-efficacy, with performance accomplishments serving as the primary contributor to the regression equation. Byars-Winston et al. also observed several effect size moderators. For example, the source variables collectively explained more variance in self-efficacy in non-STEM than STEM domains and, within the STEM domain, the predictors accounted for more variation in self-efficacy among pre-college than college samples.

Employing a somewhat different methodology and focusing only on the STEM domain, Sheu et al. (2018) examined the prediction

of both self-efficacy and outcome expectations. Their data base included 141 independent samples, with sample sizes per variable pair ranging from 1386 to 29,371. The findings predicting self-efficacy differed from those of Byars-Winston, Diestelmann, Savoy, and Hoyt (2017) in several respects. For example, comparing findings of the two studies at the bivariate level, correlations of STEM self-efficacy with each of the source variables tended to be larger in Sheu et al. than in Byars-Winston et al.; respective correlations were .52 and .46 for performance accomplishments, .54 and .35 for social persuasion, .35 and .26 for vicarious learning, and −.51 and .12 for affective state. At the multivariate level, Sheu et al. found that three of the four source variables (all but vicarious learning) contributed significantly to the regression equation, accounting for 36% of the variance in self-efficacy, compared to the 22% that Byars-Winston et al. reported in the STEM domain.

Sheu et al. (2018) also reported that, at the bivariate level, outcome expectations were moderately to strongly related to self-efficacy beliefs (.49), performance accomplishments (.32), vicarious learning (.47), social persuasion (.54), and affective state (−.33). As a set, the predictors accounted for 42% of the variation in outcome expectations. Social persuasion (including feedback and support from significant others) produced the largest unique direct path to outcome expectations (.57); only affective state did not produce a significant direct path to outcome expectations. Oddly, the path from performance accomplishments was negative in direction (−.41), even though its bivariate correlation with outcome expectations had been positive and moderate in size. The authors attributed this anomaly to the effects of statistical suppression. In addition, except for vicarious learning, the source variables were also linked to outcome expectations indirectly via self-efficacy beliefs.

Following earlier findings by Lent, Lopez, Brown, and Gore (1996), Sheu et al. (2018) tested a model portraying performance accomplishments, social persuasion, and affective state as indicators of a common latent direct learning experiences factor, with vicarious learning (i.e., observing the experiences of other persons) reflecting a related but distinct source of self-efficacy and outcome expectations. At a theoretical level, this two-factor representation of the source variables seems warranted given that markers of performance adequacy rarely occur in a vacuum; rather they are likely to be accompanied by social reactions (e.g., from parents and teachers) and by affective states (e.g., task-related anxiety) that are more or less consistent with performance attainments. This two-source (direct and vicarious) model yielded good fit to the data. Each of the three direct experience indicators loaded highly on a common factor, which correlated strongly with vicarious learning experiences.

Using the two-source representation, Sheu et al. (2018) examined several demographic and methodological variables as moderators of model relationships in the prediction of self-efficacy (there were insufficient numbers of independent samples to examine the differential prediction of outcome expectations by moderator). Though some modest differences in factor loadings and path coefficients were observed, the general pattern of the source/self-efficacy relationships was similar across gender, racial/ethnic, and age groups. In addition, the set of source variables explained about 36–40% of the variance in self-efficacy in male, female, racial/ethnic majority and minority, and younger and older (precollege vs. college and adult) groups.

The findings were affected by the ways in which performance accomplishments were operationalized. In particular, the set of source variables accounted for substantially more variance in self-efficacy (44% vs. 28%) when performance accomplishments were assessed subjectively (e.g., via recall of past mastery experiences) than objectively (e.g., via use of test scores and grades). Such differences are consistent with assumptions that mastery experiences are most likely to inform self-efficacy beliefs when they are cognitively salient and encoded in memory (Bandura, 1997). In other words, self-efficacy is more likely to be affected by peoples' appraisals of how well they have performed in the past rather than reflecting their performance quality in an objective sense (Usher & Pajares, 2008). Thus, the superior predictive utility of subjective versus objective performance indices relative to self-efficacy is consistent with general social cognitive theory.

2. Summary of meta-analytic and additional findings

In this section, we offer our assessment of meta-analytic findings regarding the original three SCCT models. This assessment considers both omnibus results (i.e., findings aggregated over all available samples) as well as demographic and methodological moderators of model relationships. We note limitations of these analyses and highlight predictions that have not as yet been tested meta-analytically or that warrant added inquiry. We also review longitudinal findings that offer a key perspective on the viability of SCCT's directional predictions.

2.1. Omnibus findings

We offer several sets of observations based on our review of the meta-analyses. First, the accumulated data are generally consistent with hypothesized relations among the variables in the three original SCCT models as well as with assumptions about the experiential sources of self-efficacy and outcome expectations. The various model tests also explain substantial amounts of variation in the dependent variables. In particular, the social cognitive predictors, together, account for 37% to 67% of the variance in interests and 46% to 75% in choice goals, depending on Holland theme (Sheu et al., 2010); 43% in choice actions (in the STEM domain; Lent et al., 2018); and 20% in work performance (Brown, Lent, Telander, & Tramayne, 2011), 19% in academic performance, and 28% in academic persistence (Brown et al., 2008) across behavioral domains. The learning experience variables explain up to 36% and 42%, respectively, of the variance in self-efficacy and outcome expectations. Though the predictors appear to account for less of the variation in performance than in the other dependent variables, those effect sizes are still in the moderate to large range. On the other hand, certain path coefficients have been more modest in size than expected (e.g., direct paths from self-efficacy and contextual variables to choice goals) and some anomalous findings have been observed (e.g., negatively-valenced paths that appear to be due to statistical suppression).

A second general observation is that, as early meta-analyses have been followed by later ones, the general pattern of findings has been fairly consistent, at least with respect to the interest and choice models. For example, the earliest reported bivariate relations among self-efficacy, outcome expectations, interests, and goals (all around .50 to .60; Lent, Brown, & Hackett, 1994; Rottinghaus, Larson, & Borgen, 2003) are often similar to, and sometimes exceeded by, later estimates based on larger *k* and sample sizes (e.g., Lent et al., 2018; Sheu et al., 2010). As tests of SCCT hypotheses accumulate over time, one would expect newer meta-analyses to subsume earlier findings and to produce increasingly stable results that more closely approximate population parameters, especially where it has been possible to adjust for measurement unreliability. In some instances, different meta-analyses of the same relationships have yielded somewhat discrepant findings, though these may be linked to methodological variations, such as in the behavioral domains under study (e.g., STEM vs. non-STEM activities) or in the application of different methods of data aggregation (e.g., Byars-Winston, Diestelmann, Savoy, & Hoyt, 2017; Sheu et al., 2018).

A third observation is that later meta-analyses have increasingly allowed for tests of SCCT's multivariate predictions. As we had noted earlier, such tests generally produce a more complete picture because they demonstrate the collective utility of a set of predictors as well as the incremental contribution of each individual predictor beyond the others. Multivariate meta-analyses also allow for meaningful assessments of goodness of fit, or the degree to which the data are consistent with theorized relationships among the variables. In addition, viewing the findings within a multivariate framework yields more nuanced perspectives on the different (e.g., direct vs. indirect) roles that particular variables may play in the models.

Related to this last observation, though some writers single out self-efficacy as the key element of SCCT (or even discuss it as if it were a one-factor theory), multivariate findings clearly indicate that it does not operate alone; neither does it necessarily produce the largest direct path to a given dependent variable. Instead, its indirect role can be more notable than its direct role, particularly in the prediction of choice goals. That is, higher self-efficacy may prompt more positive outcome expectations and stronger interests, which, in turn, facilitate choice goals. At the same time, multivariate findings suggest that outcome expectations play important, if sometimes unheralded roles, in the choice model, contributing to goals both directly and indirectly through interests. In other words, people tend to develop interests in, and wish to pursue, activities through which they might obtain desirable outcomes for themselves and others. Moreover, available multivariate findings suggest that goals are important predictors of choice actions, though other variables also contribute to predictions, either directly (e.g., self-efficacy, contextual supports) or indirectly (e.g., interests). Likewise, ability and conscientiousness appear to contribute to the prediction of work performance, along with self-efficacy. In essence, SCCT is much more a team sport than a solo performance by a single variable.

Finally, there are interesting variations in the roles of self-efficacy and ability across the interest and performance models. Specifically, the available meta-analytic findings suggest that self-efficacy fully mediates the relation of ability to interests but only partially mediates the relation of ability to performance. In other words, objective ability or past performance may spark interests only to the extent that people internalize such information as indicators of their capability within a given performance domain. Ability/past performance was also found to be linked to college persistence indirectly, through self-efficacy and academic goals. However, the relation of ability to performance criteria (apart from persistence) appears to be both direct and indirect, via self-efficacy. That is, consistent with social cognitive assumptions (Bandura, 1986), self-efficacy, which is informed by ability/past performance, may help determine how well students are able to deploy their skills. Success at complex academic tasks profits both from ability and from the confidence that one can harness it well to meet performance challenges.

2.2. Moderators of model fit or effect sizes

Though the interest and choice models tend to fit the data reasonably well within the different Holland themes, Sheu et al. (2010) found that they account for more variance in some themes than in others (e.g., 30% more of the variance in Social theme than in Realistic theme interests). The interest and choice models have also been found to fit the data adequately across gender and racial/ethnic groups, specifically in the STEM domain (Lent et al., 2018). This is a noteworthy observation given that a large part of the warrant for SCCT was the desire to account for the educational and career outcomes of women and racial/ethnic minority persons, extending the purview of earlier career inquiry. That the interest and choice models have been found to offer predictive utility with each of these groups suggests that a good portion of SCCT's basic predictions have broad relevance, at least across the range of individual difference dimensions that permit meta-analytic tests to this point.

At the same time, particular predictors have been found to vary in effect size across certain grouping variables (e.g., see Byars-Winston, Diestelmann, Savoy, & Hoyt, 2017; Lent et al., 2018; Sheu et al., 2018). We do not believe that these differences have produced a consistent enough pattern to this stage to draw definitive conclusions about the differential utility of specific predictors for particular groups. Unfortunately, multiple group comparisons are, in most cases, limited by the number of independent samples relevant to a particular model test (and invariance across gender and race/ethnicity has yet to be tested meta-analytically for the performance model). Tests of invariance across racial/ethnic groups, in particular, have often been based on modest *k* and sample size, raising questions about the stability of findings. Some meta-analytic studies have tried to compensate for this problem by aggregating the data from different racial/ethnic minority groups into a single group (e.g., Lent et al., 2018), but this practice sacrifices information about within-group variation. This same problem of limitations in the available data has, to this point, prevented the more complex meta-analytic study of intersectionality (e.g., how well does a particular model fit the experiences of women nested within particular cultural groups?).

Apart from grouping variables, certain methodological considerations, such as how predictor and dependent variables are operationalized, have been shown to moderate model relationships. For example, Sheu et al. (2018) found that a greater proportion of the variance in self-efficacy (44% vs. 28%) was explained when performance accomplishments were based on subjective rather than

on objective measures of past mastery experiences. Such a finding is consistent with social cognitive assumptions that it is how people interpret, encode, and recall their performances, rather than the objective level of a particular performance alone, that is most relevant to the construction of efficacy beliefs (Bandura, 1986). Other effect size moderators that have been studied – and that warrant additional study, particularly regarding self-efficacy-performance relationships – include the age and ability level of participants, task complexity, the domain and context-specificity of performance (e.g., classroom tests vs. standardized exams), and the amount of time lag in the assessment of predictor and criterion variables (Multon, Brown, & Lent, 1991; Talsma, Schüz, Schwarzer, & Norris, 2018).

2.3. Consideration of longitudinal findings

An important caveat is that meta-analytic tests of the original SCCT models are largely based on cross-sectional findings and, thus, tend to yield inflated parameter estimates relative to longitudinal studies. Also, such findings cannot be used to confirm assumptions about causal effects or about the temporal predominance or bidirectional pathways among particular variables. Talsma, Schüz, Schwarzer, and Norris's (2018) recent meta-analysis is noteworthy in its use of a cross-lagged (longitudinal) design to test reciprocal relations among self-efficacy and performance. Their findings supported bidirectional assumptions, though the path from performance to self-efficacy was shown to be predominant. (These findings also buttress assumptions about performance experiences as a source of self-efficacy.) Another positive feature was the examination of relevant effect size moderators, such as temporal lag and degree of match between self-efficacy and performance measures. A key limitation, however, was the very small number of studies used in some of the moderator analyses, leading to uncertainty about the stability of findings.

Fortunately, longitudinal tests of SCCT's hypotheses are becoming more common, with some studies providing data relevant to one, two, or all three of the models. Many of these studies have involved college students. For example, Nauta, Kahn, Angell, and Cantarelli (2002) found evidence of reciprocal relations between self-efficacy and interest over time, though the specific pattern of temporal precedence (i.e., reciprocal vs. unidirectional) varied over different time lags. Lent et al. (2008) found that, over a 5-month interval, the predominant paths were from self-efficacy to outcome expectations, interests, and goals, rather than the reverse. Also using a 5-month lag, Lent, Sheu, Gloster, and Wilkins (2010) similarly found evidence of unidirectional paths from self-efficacy to outcome expectations and goals; however, they reported that self-efficacy and interests were reciprocally related over time. They also found that supports contributed to the prediction of goals across time though, contrary to expectations, time 1 supports and barriers did not significantly predict time 2 self-efficacy. Navarro, Flores, Lee, and Gonzalez (2014) found significant unidirectional paths from self-efficacy (but not outcome expectations) to interests, and from supports (though not self-efficacy) to outcome expectations, over a 12-month period. Findings of the latter two studies highlight the value of supports to goals or to the favorable outcome expectations that enable goal-setting.

In a longitudinal study involving younger students (6th through 10th grade) and a 6-month interval, Grigg, Perera, McIlveen, and Svetleff (2018) reported that interests and goals were reciprocally related over time and self-efficacy was predictive of future academic performance. They also observed a unidirectional path from interests to self-efficacy but not a reciprocal path. Contrary to prior findings, self-efficacy did not predict goals. Cupani and Pautassi (2013) examined the prediction of academic performance over a semester in high school students. Consistent with hypotheses, they found that ability was linked to performance both directly and indirectly through self-efficacy. In addition, stronger self-efficacy and outcome expectations predicted more ambitious performance goals, which were linked, in turn, to grades. Also studying high school students, Garriott and Flores (2013) found that self-efficacy and barrier perceptions (but not interests) at time 1 significantly predicted educational goals and grades at time 2, two years later (when most of the students were in college).

Nauta and Epperson (2003) found that high school students' science interests predicted their choice of science-related college majors four years later. Self-efficacy predicted major choice indirectly, via interests, and the link from ability to major choice was mediated by self-efficacy and interests. DiBenedetto and Bembenutty (2013) reported that change in college students' science self-efficacy, but not in science outcome expectations, over a semester was positively related to their final course grades. Wright, Jenkins-Guarnieri, and Murdock (2013) found that self-efficacy regarding academic capabilities was a good predictor of subsequent academic status and persistence in college beyond the first semester. (Persistence in academic majors and career paths is relevant both to the SCCT choice and performance models because it can reflect choice stability as well as performance quality.)

Several studies have examined the longitudinal prediction of persistence in college engineering majors. Schaefers, Epperson, and Nauta (1997) reported that persistence was predicted by ability, self-efficacy, contextual variables, and interest congruence. Lent et al. (2003) found that goals (intended persistence) mediated the relations of self-efficacy, interests, and supports and barriers to actual persistence. Lee, Flores, Navarro, and Kanagui-Muñoz (2015) likewise found that self-efficacy was linked to persistence indirectly via goals; they also found that the relation of prior achievement (college grades) to persistence was both direct and indirect (via the pathway from self-efficacy to goals). In a study combining elements of several SCCT models (including the satisfaction model), Lent, Miller et al. (2016) found that goals were predicted by self-efficacy and outcome expectations, though not by interest or support. Goals served as a good predictor of persistence behavior, along with self-efficacy, satisfaction with the major, and social support (the latter was negatively related to persistence in the presence of the other predictors). Lent et al. also reported that self-efficacy and ability jointly predicted future grades. The longitudinal prediction of academic performance by self-efficacy has been corroborated in other studies with samples at different educational levels (e.g., Roick & Ringeisen, 2018; Zuffianò et al., 2013).

In longitudinal research with working adults, Abele and Spurk (2009) examined the roles of goals and self-efficacy as antecedents of objective career success, indexed in terms of salary and organizational status. Such measures are proxies for work performance in that they reflect organizational rewards for productivity rather than directly indexing level or quality of one's performance per se.

Participants completed measures immediately after college graduation and then again after three and seven years. Initial self-efficacy ratings were found to be predictive of salary and status three years later as well as change in salary by the seventh year. Initial career advancement goals were also linked to salary and status after three years as well as to status change by year seven. Spurk and Abele (2014) tracked self-efficacy and salary at four time points over a 9-year period, finding that self-efficacy was consistently predictive of later salary levels, controlling for autoregression in salary over time.

In sum, longitudinal (along with experimental) findings offer a necessary complement to the preponderance of cross-sectional studies. It is challenging to summarize results of the longitudinal studies given their considerable methodological diversity, for example, in terms of type and developmental level of participants, mix of variables included, length and number of temporal lags, and whether autoregression or reciprocal relations had been taken into account. Despite this complex picture, when taken as a whole, the available studies do provide a fair degree of support for SCCT's main directional hypotheses, though the number and nature of significant pathways varies from study to study. For example, in some studies, self-efficacy relates to persistence only indirectly through goals and, in others, the link is direct as well as indirect. Likewise, findings vary in terms of whether the relation of self-efficacy to interests is unidirectional or bidirectional.

Although much more research is needed to clarify the relative strength and temporal precedence of particular longitudinal linkages in the interest-choice and performance models, a few general observations seem warranted. First, goals tend to be reliably linked to persistence behavior and to indicators of objective career success. Second, both self-efficacy and supports seem to be related to ongoing goal-setting activities and to the development of positive outcome expectations. Third, longitudinal studies support the important roles that self-efficacy beliefs and abilities play in academic and work success. Thus, longitudinal evidence suggests that helping people set challenging work- and school-related goals may be a key avenue to their persistence and later success; and goal-setting may be facilitated by development of robust goal- and task-related self-efficacy beliefs and adequate supports. (Also see Sheu & Lent's, 2015, review of SCCT-related longitudinal, experimental, and intervention studies).

2.4. Additional caveats

The available bivariate and multivariate meta-analyses allow for more comprehensive and precise assessments of the viability of SCCT hypotheses than would be possible when relying only on narrative literature reviews. At the same time, meta-analytic reviews are not infallible. They require many methodological decisions that can affect the validity of their findings. They also ultimately depend on the quantity and quality of the data from which individual samples have been drawn. Meta-analyses cannot adequately test hypotheses or examine moderating conditions when too few independent samples are available or when the designs of individual studies limit analytic options. As implied above, the uneven availability of findings with particular groups limits conclusions about the theory's range of cultural applicability. Likewise, that SCCT tends to be studied most often in STEM domains hampers the assessment of its generalizability across a fuller range of academic subjects and occupational paths. Though the interest and choice models have been tested meta-analytically in non-STEM domains (Sheu et al., 2010), the small numbers of independent samples used in some of these tests suggests that their findings be viewed as preliminary pending aggregation of additional independent samples.

Finally, we have noted, above, the limits of cross-sectional relative to longitudinal and experimental studies of SCCT's hypotheses. Interestingly, in a few instances, the findings of studies employing different designs appear to tell somewhat different stories. For example, whereas the direct path from self-efficacy to goals is quite modest in most cross-sectional meta-analyses, it has often shown temporal predominance relative to goals in longitudinal studies. Thus, while cross-sectional studies have the potential to inflate parameter estimates, they may also fail to fully capture relationships that play out complexly over time.

3. Directions for future inquiry

In this section, we will consider several directions for future research related to the original three SCCT models.

3.1. Expanding the range of groups and issues studied

The examination of meta-analytic findings allows detection of understudied aspects of the models, highlighting gaps that might be addressed in future research. We will cite several examples. First, it would be valuable to perform additional tests of the interest and choice models (as well as sources of self-efficacy and outcome expectation hypotheses) in non-STEM domains, complementing the STEM-intensive focus of many SCCT model tests. Second, it would be useful to examine the various ways in which self-efficacy and outcome expectations may interrelate with respect to interests and goals. Lent, Brown, and Hackett (1994) had suggested that, apart from combining additively to predict interests, the two variables may interact such that self-efficacy beliefs relate more strongly to interests when people possess more versus less favorable outcome expectations (e.g., when they expect their activity involvement to be rewarded rather than ignored or dismissed). Similar interaction possibilities may be relevant to goal-setting, though such scenarios have been studied only infrequently to this point (e.g., Lent, Lopez, & Bieschke, 1991, 1993). Third, additional research is needed on the longitudinal prediction of choice actions (e.g., efforts to implement choice goals, choice persistence over time).

Fourth, tests of the performance model might (a) examine the roles of outcome expectations and performance goals vis-à-vis performance achievements and persistence outcomes and (b) assess model invariance across gender, race/ethnicity, and other relevant group dimensions (e.g., age, ability level). Fifth, it would be useful to devote added study to the roles of contextual supports and barriers during active phases of choice making, in particular, testing their hypothesized moderation of interest-goal and goal-action relations. Sixth, tests of all of the models would profit from extending the range of groups that are typically studied, for

example, by including more lower socioeconomic, non-college, and working adult samples, including persons with intersectional identities. It is possible that the choice-relevant roles of barriers and supports are heightened in contexts where people are most likely to encounter social or financial challenges to their persistence (e.g., first-generation college students, underrepresented racial minority persons in STEM fields).

In addition, while SCCT-based research has been responsive to cultural differences, particularly among racial/ethnic groups within the U.S., it would be useful to compare model fit across diverse cultures and national contexts outside of the U.S. There has, in fact, been notable progress in studying the SCCT models internationally. For example, analyzing a portion of the meta-analytic data from Lent et al. (2018), Sheu and Bordon (2017) found good support for the SCCT choice model among international samples, though they did not specifically test model invariance across national boundaries. More such research could help to assess the utility of the SCCT models across cultural and linguistic dimensions, thereby enhancing understanding of the models' cross-cultural generalizability or limitations.

There is also a need to extend the range of topics to which the SCCT models might be applied, such as occupational choice after retirement (e.g., in encore careers), after work disruptions caused by health conditions or technological displacement, or where the ability to make interest-based choices is restricted by economic, geographical, or educational limitations. Theoretically, the interest, choice, and performance models could also be extended to non-vocational (or non-paid work) life domains, such as the pursuit of hobbies, leisure activities, caring work, and volunteer opportunities.

The models may, for example, help to explain activity choices when people have limited freedom to pursue their primary interests through paid work or where work is simply less central to an individuals' identity than are other life domains. Under such conditions, it is possible that people look to translate their primary interests into non-vocational spheres or that work choices become more reliant on relatively pragmatic self-efficacy and outcome considerations than on pursuit of one's primary interests. That is, choices may be based largely on appraisals of what work is readily available, whether one has the capabilities to do it tolerably well, and whether the outcomes are worth the effort (Lent, Brown, & Hackett, 1994). Indeed, it is important to account for situations in which people must do work that bears little resemblance to their interests (Bandura, personal communication, March 1, 1993), particularly at a time when technological and economic trends are limiting many workers' preferred occupational paths (Lent, 2018). It is also important to examine cultural conditions (e.g., acculturation and family influences), that have the potential to render interests less salient than other predictors, such as self-efficacy, in career selection (Hui & Lent, 2018; Tang, Fouad, & Smith, 1999).

3.2. Combined study of the segmental models

The SCCT models have been conceptualized as segmental yet overlapping in their explanation of various aspects of educational and occupational behavior (Lent, Brown, & Hackett, 1994). It would thus be useful to study them in combination rather than only as separate models that account for discrete outcomes. An exception to the separate study of the models is the common practice of merging tests of SCCT's interest and choice hypotheses. Other model combinations, or hybrid models, also warrant empirical attention. For example, Lent et al. (2013) examined interests and satisfaction (a key component of the SCCT well-being model) as joint predictors of persistence intentions. Their findings suggested that interests may attract students to particular majors, while satisfaction with the academic and social conditions they subsequently encounter may promote choice persistence. In this way, the two models may offer complementary views on choice behavior.

Likewise, joint examination of content (choice model) and process (career self-management model) aspects of choice behavior may help to explain why people with similar interests, talents, and choice preferences approach decision-making differently. For example, one person who is oriented toward artistic endeavors may be firmly committed to becoming an artist, while another may be quite uncertain and anxious about art as a career path. Though the two may be equally talented, they may differ in their sense of efficacy regarding their artistic skills and/or their career decision-making skills more generally (i.e., the perceived ability to make a sound career decision, no matter the specific field). These two possibilities fall within the purview, respectively, of the choice (content) and self-management (process) models. Though they operate simultaneously during career decision-making, problems may occur in either behavioral realm, with potentially different implications for career intervention (e.g., efforts to promote artistic vs. decisional self-efficacy). Combined study of the choice content and process models might further benefit from consideration of the rich literature on decision-making in cognitive psychology and behavioral economics (e.g., Kahneman, 2011).

3.3. Methodological and theoretical extensions

It would be useful to devote additional attention to methodological conditions, such as measurement variations, that may affect model results. For example, a key assumption of social cognitive theory is that explanatory variance will be maximized when predictors and dependent variables are well-matched in terms of content, context, level of specificity, and temporality (Bandura, 1986; Lent & Brown, 2006b). It is also assumed that domain-specific measures of social cognitive constructs (e.g., algebra self-efficacy) are likely to better predict domain-specific outcomes (e.g., performance on an algebra exam) than are more global or non-domain-specific measures, such as generalized self-efficacy. Meta-analysts have employed differing rules for the inclusion of social cognitive studies, with some taking very wide latitude (e.g., see Bandura's, 2015, critique of Sitzmann & Yeo's, 2013, meta-analysis containing objectionable self-efficacy measures) and others hewing more closely to accepted measurement guidelines (e.g., Lent et al., 2018). It seems reasonable to us that meta-analyses of social cognitive hypotheses should screen for studies that properly define and assess key theoretical constructs. At the same time, there is value in examining measurement variations (e.g., different but technically adequate measures of self-efficacy) that may moderate predictor-criterion effect sizes.

Another measurement issue involves the ways in which outcome expectations have been operationalized. As Fouad and Guillen (2006) observed, common career-related measures of this construct often sample only a portion of the different types of outcome expectations described by Bandura (1986, i.e., self-evaluative, physical, and social outcomes). Moreover, they typically focus only on positive expectations. It is possible that negative outcome expectations serve to lower interest in particular occupational possibilities and to lessen the likelihood that favorable self-efficacy beliefs will translate into career-relevant choices — conditions that may apply to many women and minority group members who are underrepresented in occupations such as engineering. Examples of negative outcome expectations include anticipation of lack of support from co-workers or difficulties in managing work and family responsibilities. It is reasonable to assume that, while positive expectations help to draw people toward particular educational and occupational options, negative expectations tend to repel them, in some cases potentially limiting otherwise good-fitting options (cf. Brown & Lent, 1996).

In terms of research designs, as our earlier comments suggest, more longitudinal tests, particularly those that examine cross-lagged paths and control for autoregressive effects, are needed to gain a clearer picture of how the theoretical constructs relate to one another and to particular outcome variables over time. Inclusion of studies with more than two time points offer several advantages, such as the ability to test temporal precedence and the mediated pathways posited by SCCT (e.g., does self-efficacy relate to choice in part via outcome expectations and interests?). Experimental studies are also needed to assess the malleability and determinants of social cognitive variables and to test whether manipulation of particular independent variables (e.g., self-efficacy, outcome expectations) produces the expected effect on criterion variables (e.g., interest, choice). The SCCT literature does contain good examples of experimental studies (e.g., see Sheu & Lent, 2015). However, more such research would be useful, ranging from analogue studies – designed, for example, to bolster self-efficacy, interests (e.g., Hackett, Betz, O'Halloran, & Romac, 1990; Silvia, 2003), outcome expectations (e.g., Diegelman & Subich, 2001), and contextual supports (Dahling & Thompson, 2010) – to multi-component intervention studies (e.g., Luzzo, Hasper, Albert, Bibby, & Martinelli, 1999; Weisgram & Biger, 2006). Such research is capable of testing causal assumptions and building durable bridges from research to practice. Intervention research can also strengthen the empirical foundations for SCCT-based models of career choice and performance counseling.

4. Conclusions

The three original SCCT models (interest, choice, and performance) have generated a good deal of inquiry in the 25 years since their introduction (Lent, Brown, & Hackett, 1994). In addition to research specifically designed to test the models' predictions, there has been a substantial amount of conceptually related research on educational, career, and organizational behavior that has been sparked by general social cognitive theory (Bandura, 1986). In this article, we have considered the empirical status of the three models, emphasizing meta-analyses of (mostly) cross-sectional findings. In general, we observed substantial support for the models' bivariate and multivariate predictions, both in omnibus tests and when the data could be disaggregated by grouping variables, such as gender, race/ethnicity, and age. At the same time, we noted that some specific parameter estimates differ by group status or by other moderating conditions, such as task complexity, ability level, and the ways in which key variables have been operationalized.

Recognizing the limits of cross-sectional studies, we supplemented our meta-analytic summary with a brief qualitative review of studies that have tested SCCT's directional paths with longitudinal designs. Although the latter are quite diverse in terms of the mix of variables studied and other design features, they do offer support for many of SCCT's assumptions about the relations among the predictors and dependent variables over time. We followed our review with suggested directions for future research, highlighting predictions, issues, and groups that warrant additional empirical attention. On balance, we believe there has been much progress in studying SCCT's models over the past 25 years and we look forward to seeing what the next 25 years will bring.

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