A Qualitative Exploration of the STEM Career-Related Outcome Expectations of Young Adolescents

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Abstract:

Perceptions developed and choices made during the preadolescent and early adolescent years may restrict or enrich youth's future career aspirations. These years are critical for acquiring and exploring academic and career-related interests. In addition, outcome expectations – what youth believe will happen if they pursue certain interests, tasks, or goals – are important predictors of eventual career choice. With national, state, and local initiatives advocating science, technology, engineering, and mathematics (STEM) knowledge and career goals, there is a need to understand youth's outcome expectations regarding these fields. We present a qualitative study examining the outcome expectations of 95 youth aged 10–14, using focus group data. Several of the identified outcome expectations had negative connotations. Results supported the outcome expectations identified by Bandura (i.e., physical, social, and self), and two additional types of outcome expectations (generativity and relational). These two outcome expectations have special relevance for the underrepresentation of girls, women, and minorities in STEM occupations.

Keywords: outcome expectations | STEM | adolescence | focus groups | qualitative methods

Article:

As youth enter the middle school years, dramatic changes occur in self-concept, self-efficacy, and achievement, especially among girls (American Association of University Women, 1998; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Midgley, Feldlaufer, & Eccles, 1989; Wang & Degol, 2013). Moreover, during these years, young people make decisions about future coursework in math, science, and technology that can have long-term academic and career effects (Dawes, Horan, & Hackett, 2000 Dawes M. E., Horan J. J., Hackett G. (2000). Experimental evaluation of self-efficacy treatment on technical/scientific career outcomes. British Journal of Guidance and Counselling, 28, 87–99. Google Scholar
View Full Reference List; Eccles, 2009). Perceptions developed and choices made during these early years may restrict or enrich youth's future career aspirations. Some of these perceptions may vary by group. Social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994)

provides a framework that is helpful in addressing the career development issues of girls and women (Fitzgerald, Fassinger, & Betz, 1995), members of racial minority groups (Byars & Hackett, 1998; Flores, Navarro, & DeWitz, 2008), and gay and lesbian individuals (Morrow, Gore, & Campbell, 1996). In particular, SCCT has been a useful and consistently supported model in examining the science, technology, engineering, and mathematics (STEM) beliefs and career-related choices of women and minorities.

Derived from Bandura's (1977, 1986) general social cognitive theory, SCCT focuses on the "(a) formation and elaboration of career-relevant interests, (b) the selection of academic and career choice options, and (c) performance and persistence in educational and occupational pursuits" (Lent et al., 1994, p. 79). Most of the published research based on SCCT has focused on high school and college-age populations. There are fewer studies focusing on the application of the SCCT model to the preadolescent and early adolescent years (Fouad & Smith, 1996; Navarro, Flores, & Worthington, 2007), although these years are critical for acquiring early and often exploratory academic and career-related interests. In addition, the model lends itself to quantitative methods, and researchers have primarily used this methodology.

However, researchers studying younger populations may do well to step back from limited operationalization of constructs and ask whether youth perceive these constructs in the same way as do investigators. Consequently, we believe that further study of the beliefs and perceptions that guide youth in the career development process, especially the process involved in pursuing STEM careers, is critical to our understanding of their later career trajectories. In particular, there is a need to understand the outcomes young people expect in pursuing advanced coursework in math, science, and computers. Research suggests that these outcome expectations are important factors in the development of youth's interests in and goals toward future careers (Fouad & Guillen, 2006; Lent et al., 1994), especially if the outcomes are not clearly performance related (Bandura, 1986; Bandura, Barbaranelli, Caprara, & Pastorelli, 2001). Knowledge of the outcomes that youth perceive in taking the advanced coursework necessary to pursue possible STEM careers can guide our intervention efforts. In addition, this knowledge would fill a critical gap in the literature related to early career development, namely that of the perceived STEM outcome expectations of preadolescent and early adolescent youth, as articulated by them.

The purpose of this study was to increase our understanding of one aspect of the early career development of young people, as they form opinions and develop perceptions about career options in STEM. In particular, we were interested in the outcome expectations that youth identify when they discuss the pursuit of higher level STEM coursework and careers in STEM fields. Because of the qualitative nature of our study, we did not hypothesize the types of outcome expectations that might emerge, allowing themes to emerge from the data.

Social Cognitive Career Theory

The primary constructs of SCCT (Lent et al., 1994) include self-efficacy beliefs, the subjective beliefs that one is able to perform particular tasks; outcome expectations, the beliefs that these behaviors will result in particular outcomes; and goal mechanisms. Lent, Brown, and Hackett (1994) further describe the influence of personal factors, contextual factors, and experiential and learning factors on academic and career development and on choice. Learning experiences shape self-efficacy beliefs and outcome expectations and are influenced by factors such as educational opportunity and family context (Ferry, Fouad, & Smith, 2000; Lent et al.,

1994; Tokar, Thompson, Plaufcan, & Williams, 2007). Self-efficacy beliefs influence choice, actual performance, and persistence (Bandura, 1977, 1986; Lent et al., 1994) and act as moderators between experience and career interests (Lent et al., 1994). Goal aspirations and choices are influenced by interests and by relevant self-efficacy and outcome expectation beliefs. Self-efficacy has a direct influence on the development of outcome expectations, while both influence interests and aspirations. In addition, these aspirations are mediated by perceived barriers, perceived supports, and moderated by contextual factors (Lent, Brown, & Hackett, 2000).

Many researchers examining career development in the context of SCCT focused on the effect of self-efficacy and ability on career interest and choice, with findings providing consistent support for the crucial role of self-efficacy (Betz, 2007; Gainor, 2006). Many studies have also provided support for the role of self-efficacy together with outcome expectations in the career interests and behavior of primarily high school and college student populations (e.g., Betz & Voyten, 1997; Lapan, Hinkelman, Adams, & Turner, 1999). Of particular relevance to our study is the operationalization of outcome expectations as they relate to career development.

Outcome Expectations

Outcome expectations are the results expected from a particular course of action (Bandura, 1977, 1986; Fouad & Guillen, 2006; Lent et al., 1994). Bandura (1986) classified these expectations into categories of physical outcomes (e.g., financial gain or loss, life style, risk, and setting), social outcomes (e.g., societal status, parental or teacher expectations or approval, friends' or peers' approval), and self outcomes (e.g., intrinsic motivation or rewards). Outcome expectations are conceptualized this way in social cognitive theory (Bandura, 1997, 1986; Bandura et al., 2001) and in SCCT (Lent et al., 1994), although they are not operationalized in this way (Fouad & Guillen, 2006).

Although many SCCT studies have included outcome expectations, the operationalization of the construct has varied. Many of the measures used are based on success-related expected outcomes in a specific domain, particularly in the form of physical outcome expectations (Lent & Brown, 2006). Many studies have used modifications and adaptations of the scale designed by Fouad and Smith (1996; Fouad & Guillen, 2006; Fouad, Smith, & Enochs, 1997). In their study, Betz and Voyten (1997) defined outcome expectations as beliefs that specific behaviors would be useful in the future. Ferry, Fouad, and Smith (2000) assessed outcome expectations using an adaptation of the Math/Science Outcome Expectancies Subscale (Fouad et al., 1997) that identifies outcome expectations as beliefs associated with doing well in science and math courses (Ferry et al., 2000; Fouad & Smith, 1996). The operationalization of outcome expectations in these studies has not included all types of outcome expectations as identified by Bandura (1977, 1986; Fouad & Guillen, 2006) nor as identified in SCCT (Lent et al., 1994). Bandura's categories of physical outcomes are well represented (e.g., "If I do well in science, then I will be better prepared to go to college."), and social categories are occasionally included (e.g., "If I do well in math, then my parents will be pleased."). Self outcome expectations do not seem to be included in any of the scales that we examined.

A few studies have specifically focused on career-related outcome expectations and self-efficacy of middle school youth (e.g., Flores et al., 2008; Fouad & Smith, 1996; Navarro et al., 2007). Fouad and Smith (1996) found that self-efficacy significantly influenced career-related interests but did so indirectly through its relationship to interests and outcome expectations, with

strong paths between outcome expectations and self-efficacy and between outcome expectations and intentions. This indicates the importance of outcome expectations for younger students. Middle school males in this sample had higher (more positive) outcome expectations than females, suggesting that males expected better outcomes if they were successful in the particular domain (math and science) than did females. What we know about outcome expectations from SCCT studies using these measures is that those who score high on outcome expectations believe that doing well in math, science, or engineering will allow them to be successful in the future and gain approval for this success and that this, together with self-efficacy, increases the likelihood of their pursuit of and persistence in STEM. However, we still don't have a clear picture, formed by youth, of the outcome expectations which motivate or demotivate these students toward eventual STEM or non-STEM careers.

There may be important dimensions of outcome expectations not being measured that may help us better understand, beyond self-efficacy, why more youth are not pursuing STEM. Therefore, given that we don't know how pre- and early adolescent youth delineate STEM outcome expectations, that the current theoretically based measures are limited in content selection (not using items that assess all of the theoretically posited types), and that outcome expectations are an important construct in career development, there is a need to investigate outcome expectations using methodology that elicits rich description of the dimensions and valence youth associate with pursuing STEM. For this reason, it is important to use qualitative methodology for this study, thus allowing participants to richly describe expected STEM outcomes. This may provide much-needed additional information for broadening participation in STEM.

In this article, we present a study using focus group methodology that examined the outcome expectations of pre- and early adolescents. More specifically, we wanted to ascertain young people's outcome expectations related to advanced coursework in science, math, and computers. A qualitative approach to exploring outcome expectations avoids researcher-imposed definitions and structure regarding this critical component of career development. The research questions that guided this study were as follows: What do young people, ages 10–14, describe as the potential outcomes of pursuing higher level math, science, and computer courses? Do youth identify both positive and negative outcome expectations? Are there differences in the potential outcomes identified by girls and boys? The questions were based on the premise that these higher level courses are often prerequisites for eventual entry into STEM fields and that young people are more likely to think about their immediate future than their distal future.

Method

Participants

Sixteen focus groups of students, eight of girls and eight of boys, were conducted during a 3-month period. Groups, organized according to gender and grade level, were composed of three to seven participants. All students came from a public middle school and a public high school in a medium size school district in the Southeast. Of the 95 students (48 boys and 47 girls) who participated in these groups, 52 were African American (54.7%), 36 were Caucasian (37.9%), 5 were Hispanic (5.3%), 1 was Asian American, and 1 was an international student. Students, all 10 to 14 years old, were in Grades 6 (two groups of boys and three groups of girls), 8 (three groups of boys and three groups of girls), and 9 (three groups of boys and two groups of

girls) and varied in academic ability level and socioeconomic backgrounds. We believed that this inclusion of academically and socioeconomically diverse students would result in a broad range of outcome expectations.

Focus Group Protocol

Focus groups are designed to explore a particular set of issues in a way that facilitates discussion among group members (Krueger & Casey, 2009). Before collecting data, the two researchers, one an expert on career development, team members, and experts on preteen development reviewed the content of the focus group protocol for relevance to the targeted age group, career developmental level, difficulty level of discussion prompts, and clarity. Training and mock focus group sessions allowed interviewers to practice using the protocol, receive feedback on facilitation, and ensure consistency, before conducting focus groups with participants.

The protocol, designed to last one hour, included an introduction and information period, followed by a brief icebreaker. After the icebreaker, students were asked about school subject interests to orient them to the study topic. The moderator then provided an example of a concrete task typical in the lives of youth, followed by a short definition of outcome expectations. Students were encouraged to state expected outcomes related to the task example. Once it was clear that students understood the concept, the moderator asked the protocol questions, including the key question: What might be the outcomes if you decided to take higher level courses in (science, math, or computers)? For this question, the moderator asked each student to list all the outcome expectations that they could think of. Students then shared their ideas with the group. As they shared, the moderator wrote the outcome expectations on chart paper and used these as impetus for continued, deeper discussion. Once students had exhausted their ideas, the moderator asked students which outcomes they thought were the most and least important. This provided a catalyst for more discussion, rethinking, disagreement, and further discussion as group members decided how to rank the listed outcome expectations, added additional ones, or removed others from the list. This ongoing discussion formed the qualitative data analyzed for this study.

Procedures

Informed consent forms were sent home to all sixth and eighth grade students at a middle school and to ninth grade students participating in Life Skills classes at the high school (a required course for all ninth graders in the state). Participants included all those students who agreed to participate and whose parents signed the informed consent form. Because teachers provided and collected all permission slips, we do not know the participation rate. For each focus group, participants were identified by teachers to reflect a range of academic abilities and socioeconomic backgrounds.

Focus groups were facilitated by the two researchers (both female) and three graduate assistants (two female and one male). For each focus group, a moderator facilitated the discussion and a scribe took notes on interactions, body language, and key points. The two researchers facilitated three of the groups and the graduate research assistants facilitated the other groups. All moderators followed the pre-established protocol and used nondirective, reflective techniques to avoid leading participants and to facilitate further exploration. All sessions were audiotaped.

Data Analysis

The verbatim transcripts of the focus group sessions were analyzed by the three graduate research assistants, with one serving as coding team leader. Prior to the analysis, the primary researcher met with the coding team leader to discuss techniques for isolating items of analysis, documenting discussion, and identifying concepts, categories, and patterns that would lead to the development of a coding scheme using constant comparative analysis. The primary researcher had intentionally provided only the brief definition of outcome expectations to coders which was also provided to the research participants. She emphasized to the coders the importance of refraining from acquiring further information about Bandura's definitions of outcome expectations, about SCCT, or about the primary construct of the study.

Coders used the first eight focus groups to compile a list of all phrases (items of analysis) that conveyed an outcome expectation, a result that might happen if the speaker were to pursue math, science, or computer courses or careers (e.g., "a better house for me and my mom to stay in"). Detailed notes of team discussions and coding decisions were kept as part of an audit trail (Hewitt-Taylor, 2001; Taylor & Bogdan, 1998).

Open Coding

Coders noted preliminary emerging concepts and constructed a series of categories and defining criteria (a coding scheme) to capture the meaning conveyed in the items of analysis. When discrepancies or difficulties were experienced in the coding of an item, the team discussed options (revise a category or add another category). Such discussion facilitated identification of necessary revisions to the coding scheme to ensure that defining criteria were clear, all items could be accommodated, and categories were mutually exclusive. The team synthesized these into a tentative coding scheme, combining categories when appropriate. Interrater reliability was calculated on the first eight focus groups, with coders achieving complete agreement on 85.9% (269/313) of the open coding of items and two-thirds agreement on another 13.4%. For items where there was not complete agreement, coders recoded each item on their own, after revisiting the coding scheme. This increased agreement to 94.2% (295/313). Team members discussed the final coding for each item still lacking consensus until 100% consensus was reached. The coding scheme was modified as needed to accommodate the difficulties (lack of clarity, specificity, etc.) in gaining consensus. This process resulted in a refined coding scheme. Coders next extracted items for analysis from the remaining focus groups, and each team member coded the items on their own. For the coding of items from these final eight groups, interrater reliability was 82.6% (256/310) for complete agreement and 14.8% for two-thirds agreement. Re-ratings of nonconsensus items increased interrater reliability to 91.0%. Again, members discussed coding for all contested items until 100% agreement was reached and modified the coding scheme as needed. The result was a final coding scheme for the items.

To ensure that the coding scheme would be meaningful and useful to someone outside the coding group (Hill, Thompson, & Williams, 1997), a fourth graduate assistant independently rated all of the items, using the final coding scheme and definitions. Agreement between this graduate assistant's coding and that of the coding team was initially 89.1%. The coding team leader met with the independent rater to discuss coding differences until they reached consensus.

Coders next determined the valence of each type of outcome expectation by reviewing the original transcripts and audiotapes of each focus group, the concepts and categories in the

coding scheme, and connections made between types of outcome expectations. The coders assigned each category of outcome expectation a valence of positive, neutral, or negative. In case of disagreement, the rating was discussed until consensus was reached.

Finally, coders returned to the transcripts and the coding process and noted which categories of outcome expectations were discussed by each of the 16 focus groups. They created a graphic representation of this. The coders determined which of the categories were discussed only by girls' groups or only by boys' groups or which categories were discussed in more girls' than boys' or more boys' than girls' groups.

Results

Analysis (open coding) of the 623 identified items resulted in 16 exhaustive and mutually exclusive categories containing outcome expectations. Without any previous knowledge of the literature on outcome expectations, except for the definition given to the research participants, coders combined these 16 categories of outcome expectations into five types of general outcome expectations. The categories and types of outcome expectations are included in Tables 1 and 2.

Table I. Abbreviated Coding Definitions by Category and Type of Outcome Expectation

Outcome type		Category	Abbreviated definition
Physical	A	Potential to succeed academically	Being prepared and excelling in class and/or passing through educational requirements
	B	Potential to fail academically	Struggling with and/or failing due to demands or inability to comprehend material
	C	Immediate investment of time and energy	Amount of time and effort required to fulfill class obligations
	D	Time in school	Amount of time in years spent pursuing an education
	F	Influence of college opportunities	Impact on college admissions and scholarship opportunities
	G	Facilitation of employment opportunities	Possibility of obtaining specific careers and potential for better/different jobs
	H	Financial impact immediate or in future	Impact on one's current or future financial situations or earning potential
	I	Relevance and application to practical life issues	Influence of application of knowledge on ability to function and understand common life tasks
	J	Generalizations regarding a positive future	Projections of a more positive future not specifically related to employment or finances
Social Approval	K	External motivation	Influence on social status, recognition from others, and/or concrete awards
Self-Satisfaction	N	Psychological effects	Positive or negative impact on one's internal experience (perceptions of self, internal well-being, and feelings of competence/inferiority)
	O	Internal motivation and intellectual stimulation	Improvements in expertise and critical thinking ability along with intrinsic enjoyment of learning and being challenged
Generativity	E	Impact on immediate educational environment	Impact of personal success on the image, curriculum, and conditions of the immediate school environment
	J	Creation, invention, and discovery	Potential to create, discover, or invent things or ideas that improve upon current technologies and capabilities
	L	Altruistic motivation	Altruistic repayment, giving back, helping out, and contributing to the overall well-being of community
Relational	M	Interpersonal and social impact	Influence on ability to participate in social activities and engage in interpersonal relationships

Table 2. Types of Outcome Expectations With Categories by Group

		Phy	A	B	C	D	F	G	H	I	J	Soc	Self	N	O	Gen	E	J	L	Rel
Girls	6th		X					X	X					X				X		
Girls	6th			X				X				X		X	X			X	X	X
Girls	6th						X	X							X				X	
Girls	8th		X					X				X		X						X
Girls	8th						X	X	X			X		X	X				X	
Girls	8th				X		X	X				X			X					
Girls	9th			X						X					X		X			X
Girls	9th				X	X	X					X		X					X	X
Boys	6th							X				X			X			X	X	
Boys	6th						X	X	X						X				X	
Boys	8th			X			X					X			X					X
Boys	8th						X	X				X		X				X		
Boys	8th						X		X			X		X	X					X
Boys	9th						X		X	X		X			X				X	X
Boys	9th										X	X			X			X		X
Boys	9th		X					X							X				X	

Note. Phy = physical outcomes; Soc = social approval outcomes; Self = self-satisfaction outcomes; Gen = generativity outcomes; Rel = relational outcomes.
X = discussed.

Categories and Types of Outcome Expectations

Physical outcome expectations were key topics of discussion in each of the 16 focus groups. These were defined as related to bodily needs, work, education, finances, and living in the world. Students talked about proximal outcome expectations such as those related to academic success or failure, and investment of time and energy, as well as more distal outcomes such as those related to college, employment, and financial opportunities. The Physical outcome categories of academic failure and immediate investment of time and energy were negative, with the remaining seven categories primarily positive. Examples of negative statements were "Harder to work and stay up" (eighth grade girl) and "you might be stuck at home doing homework" (eighth grade boy).

The type of outcome expectation labeled *Social Approval* consisted of a single category related to approval (or disapproval) of important others. Although some students expressed concerns about being labeled a "nerd" by peers, most students expressed beliefs that successful completion of advanced coursework in math, science, and computers would bring them positive attention and recognition. The valence of Social Approval outcome expectations was mostly positive (e.g., "be looked up to" [ninth grade girl]) and was most often discussed in terms of family and peers.

Self-Satisfaction outcome expectations included the two categories of psychological effects and of internal motivation and intellectual stimulation. This type was defined as internal results related to stress, challenge, excitement, and stimulation. Discussion regarding the impact of STEM coursework on students' psychological well-being was usually passionate and often reflected negative beliefs (e.g., "you're going to get overloaded and kind of overwhelmed with all your school stuff" [eighth grade girl]). Students questioned their ability to handle stress; some even mentioned the possibility of depression and psychosomatic symptoms. Many students also indicated a desire to be challenged, as evidenced by an eighth grade girl's comment, "I like it when I'm challenged because then I have to really work to achieve what the challenge is." Other

students commented on the effect that taking higher level coursework would have on their intellectual growth (e.g., "your mind will get stronger which, um, means you will be able to think more rationally" [ninth grade boy]). The category of psychological effects was primarily negative (72% of responses) (e.g., "Stressing yourself" [ninth grade girl], and "it could lower your self-esteem" [eighth grade boy]). For boys and girls, the predominant valence for the category of internal motivation and intellectual stimulation was positive (e.g., "my most important thing is challenge to keep going" [eighth grade girl]).

Students in 12 of the groups talked about expected outcomes of creating or inventing something useful or giving back to their school, community, family, neighborhood, or general humanity in some other way. This was labeled *Generativity* outcome expectations. The valence for Generativity outcomes was primarily positive (92%) (e.g., "You could invent your own website" [sixth grade girl], "help make the next generation better" [ninth grade boy], and "help people out instead of making money" [another ninth grade boy]). Students felt that taking higher level coursework in math, science, and computers would allow them to improve their school climate and school reputation. Many related responses demonstrated participants' commitment to community beyond the school. Students discussed hopes for the future and were able to envision the good that they could do for others; some students specifically articulated expected outcomes that would then enable them to help others. Creative expected outcomes of taking higher level coursework or pursuing STEM careers were often identified.

The impact of pursuing STEM, both in future coursework and as a career, was perceived to have the potential to isolate students from friends and family, and the potential to provide students opportunities to establish new relationships. *Relational* outcome expectations were defined as those expected results pertaining to interpersonal connectedness. The valence for Relational outcomes was typically negative (77%; e.g., "I'll spend less time with friends" [sixth grade girl]). Some discussed not having as much time to spend with their family and how hard that would be. Others talked about separation from friends who might no longer be in their classes or pursue the same career.

In summary, Physical outcome expectations included the most categories (9 of the 16 categories) and focused on academic success or failure, commitment of time and energy, college, employment, and financial opportunities, relevance to life, and a positive future lifestyle. The second and third types of outcome expectations were labeled as Social Approval (external motivators) and Self-Satisfaction (psychological effects, internal motivation, and intellectual stimulation). The fourth type was termed Generativity outcome expectations and included students' positive future impact on their immediate school environment, altruistic motivation, creation, invention, and discovery. The final type of outcome expectation was Relational and included expected results that centered on students' interpersonal and social relationships. Overall, outcome expectation statements were more positive (61.2%) than negative (29.6%); there were few neutral statements (9.2%).

Group Differences by Gender

It is not possible in qualitative research to make definitive statements about differences. However, we were able to note the topics that were discussed in some groups and not others, and the gender composition of those groups. Only girls (three groups) discussed the two Physical outcome expectation categories of immediate investment of time and energy and time in school. The Self-Satisfaction category of psychological effects, mostly negative, was more often

discussed by girls than by boys (five of the eight girls' groups, compared to two of the eight boys' groups). Finally, only girls (one group) talked about increasing the reputation of their school and giving back in this way.

Discussion

In this study, we used SCCT (Lent et al., 1994) and Bandura's (1986) theory as frameworks for our understanding of the research findings. The categories and types of outcome expectations, in conjunction with the valence of the themes, exemplify the views that these youth have regarding advanced science, math, and computer coursework and potential STEM careers. There was support for the three types of outcome expectations outlined by Bandura (1986). Physical outcome expectations correspond to Bandura's type of outcome expectations of the same name; Self-Satisfaction outcome expectations correspond to the self outcomes of Bandura; and Social Approval outcome expectations to the social. In addition, several of the identified categories fell into two additional types of outcome expectations, Generativity outcome expectations and Relational outcome expectations.

Investigating STEM career development based on SCCT (Lent et al., 1994), researchers to date have conceptualized outcome expectations as success-based, positive expected results related to doing well in mathematics, science, engineering or information technology (Betz & Voyten, 1997; Fouad & Guillen, 2006; Fouad et al., 1997) or related to success in career decision-making. This predicates the operationalization of outcome expectations as based on domain specific, positive self-efficacy. According to Bandura (1986), self-efficacy is a stronger predictor than outcome expectations, especially when outcomes are not performance based. However, some of the outcome expectations identified in this study were not entangled with success but based only on performing the behavior.

The most discussed type of outcome expectation was Physical. Developmentally, many youth between the ages of 10 and 14 still tend to think concretely, making it more likely for them to focus on tangible outcomes, such as income, scholarships, and college. Although both boys and girls talked about distal outcomes (e.g., getting a scholarship and being financially secure), girls were more likely than boys to focus on proximal outcomes, such as doing well in school, failing, or needing to spend a lot of time on homework. Reasons for this difference warrant continued investigation.

The majority of Physical outcome expectations identified by participants were positive. However, respondents also discussed the potential for negative outcomes. Some respondents seemed concerned about the amount of time and energy that would be required, while others discussed potential for losing touch with the "real" world or losing common sense (e.g., "You forget what everyday life would be" [eighth grade girl].) This relates to the physical outcome category of "relevance…to practical life issues" (see Table 1) but may also be influenced by expected Relational outcomes.

Self-Satisfaction outcomes, discussed by all 16 groups, included psychological effects (primarily negative) and internal motivation and intellectual stimulation (primarily positive). These negative outcomes may represent a combination of students' fears, sometimes based on misinformation or irrational beliefs, regarding the expected stress of the work involved (related to Physical outcomes), as well as their ability to cope with this stress (coping self-efficacy; Bandura et al., 2001; Lent et al., 1994). On the other hand, outcome expectations of internal motivation and intellectual stimulation, mostly positive, may act to counterbalance this.

Whereas both boys and girls talked about internal motivation and intellectual stimulation, girls were more likely to discuss psychological effects (e.g., self-esteem). Earlier research (e.g., Wigfield & Eccles, 1994) indicates that female students often experience a decline in self-esteem in the transition to middle school and during the subsequent middle school years (Wang & Degol, 2013). These young women appear to be in touch with this and concerned about it in their future. Finding ways to help girls articulate their concerns about performance and fears of failure, and approaches to facilitate all students' coping skills, may make it more likely for them to consider enrolling in advanced courses in science, math, and technology.

Social Approval outcomes, which relate to recognition and social status, were discussed by 11 groups. Although students discussed being seen as "nerdy" or "too smart" (eliciting social disapproval), most of these items were positive. This may be a small shift in perception from 10 to 20 years ago, although this is not clear. Social Approval, a developmental focus of adolescence, tended to be discussed by both boys' and girls' groups.

Generativity outcomes included three categories. One category, impact on the immediate educational environment, was most striking due to its lack of empirical attention in the literature as a STEM-related outcome expectation. However, this has been used to interest young women in STEM fields through project-based programs in which girls or young women create something useful and helpful to their community using technology, mathematics and science, or engineering design. Relational outcomes focused exclusively on the impact that taking higher-level courses in math, science, or computers would have on students' interpersonal relationships. These outcomes are different from Social Approval outcomes in that they do not represent the impact of others' opinions but instead represent the salience of connectedness and relationships in these youth's lives. Given the increased importance older children and adolescents place on peer interaction and social arenas outside the family, this finding is not surprising. Past research has highlighted the importance of relationships and connectedness to identity development in girls and young women (e.g., Gilligan, 1982; Josselson, 1987). There is less research on the importance of connectedness for males, although males in this study also discussed concerns about the effect of pursuing STEM on their relationships. The majority of the Relational outcomes were negative. In looking at the results from a relational viewpoint (Blustein, Palladino Schulteiss, & Flum, 2004), these types of outcome expectations may provide a key to understanding why many capable students choose not to enroll in more challenging courses.

Summary/Conclusion

Researchers to date have focused on positive, success-related outcome expectations (Betz & Voyten, 1997; Fouad et al., 1997). Our results suggest that many students endorse outcome expectations consistent with these views. However, several of the outcome expectations identified in this study had negative connotations, and many were not based on successful performance. So, while many students may hold views that successful advanced coursework in math, science, or computers will facilitate greater opportunity and enjoyment, some students seem to feel that attempting this coursework will result in additional outcomes (both positive and negative) not based on their success or failure. Some also doubted their likelihood of success (self-efficacy) but could still envision positive outcomes. The fact that several girls' groups identified categories with primarily negative valence in the Physical and Self-Satisfaction outcome types warrants additional study. In addition, although students identified physical, social, and self outcome expectations as defined by Bandura (1986), they also identified

Generativity and Relational outcome expectations. All five types of outcome expectations should be considered when revising existing or designing new measures of outcome expectations.

Limitations

There are several limitations to this study. Because of the challenges in collecting data, especially qualitative data, in K–12 schools, we were not able to have as much direct involvement in the recruitment process as we would have liked. Teachers and school administrators delivered and collected all consent and assent forms. They also identified the individuals who would participate in particular groups, as they created groups of students with varying academic achievement levels and from varying socioeconomic backgrounds. We did not have data on our group compositions, other than minimal demographics (gender and race/ethnicity) and grade levels of our sample of 95 participants.

Audiotaping, rather than videotaping, group discussions did not allow us to identify individual speakers. Although we attempted to do so during the transcribing process, accuracy in determining speakers by voice alone was not possible. Had we been able to do so, we would have been able to analyze changes in students' voiced perceptions and to identify the role of social context in these changed beliefs. This would also have shed light on both the strengths and weaknesses of using focus group methodology when collecting qualitative data.

One of the strengths of this study was its inclusion of culturally and academically diverse students, which allowed us to obtain a broad range of outcome expectations. However, this could also be viewed as a limitation, because socioeconomic background and academic achievement influence the ultimate choices that students make. We did not explicitly encourage exploration of these factors in the focus groups, choosing instead to let the themes development. Future qualitative research using focus groups could address these issues. This might allow us to get a more complete picture of the role that students believe these factors have on STEM outcome expectations.

Implications

It is important to avoid attempts to generalize qualitative study results. Nonetheless, the findings of this research offer useful information and implications for SCCT constructs and research. Our results also have implications for counseling and for broadening participation in STEM. There is a depth in the results of qualitative data that do not exist with quantitative data. Yet, in order to generalize and explain academic and early career choices, quantitative methods are needed. The most complete way to increase our understanding of factors influencing young people's career development is to include both qualitative and quantitative methodologies.

Results of our research imply that the construct of outcome expectations, a key construct of SCCT, may include more dimensions than those currently being measured and perhaps more than the three types (physical, social, and self) originally posited by Bandura (1986). Focus group discussion elicited two additional types of outcome expectations (generativity outcomes and relational outcomes) that have not been identified or measured in social cognitive or SCCT research. Clearly, further investigation is needed to ascertain how outcome expectations are similar or different for varying groups of people and whether the findings in this study similarly emerge in other investigations. Specifically, examination is needed to determine whether these

five types of outcome expectations are salient for samples varying in age, gender, race, ethnicity, gender identification, sexual orientation, and geographic location.

Further research is needed to understand the role of positive and negative outcome expectations in career interests, development, and choice. Are negative, neutral, and positive outcome expectations on a continuum? Do positive and negative outcome expectations play different roles in STEM career development and motivation? Do they counterbalance each other or do they have differential influence? How do they work in synergy with self-efficacy?

Researchers using quantitative methods could use these findings to develop an instrument that measures STEM-related outcome expectations in a multidimensional manner. In designing such an instrument, it will be important to include items that reflect both positive and negative outcome expectations, all three of Bandura's (1986) outcome expectations and the two additional types of outcome expectations that emerged in this study. Conceivably, the instrument could be used to reexamine SCCT as it is applied to STEM career development. Another potential area of research using such an instrument would be investigations of the salience of various outcome expectations for pre- and early adolescent youth, including a comparison of the relative importance of proximal versus distal outcomes.

Research on outcome expectations with students having moderate self-efficacy or "mixed" self-efficacy (e.g., low in math self-efficacy, while high in science self-efficacy) who choose to undertake advanced STEM coursework in spite of doubts and fears may facilitate intervention models for students who are reluctant to engage in challenging STEM coursework. Research examining the role of coping self-efficacy in motivating students with negative outcome expectations may also be an important step in broadening STEM participation to include more women, minorities, and people with disabilities.

Results of this study have several implications for practice. It is important for counselors and educators to be aware of the negative outcome expectations that may be driving students' choices, because many of these expectations may be irrational or misinformed. When students express concern over juggling important relationships with higher level coursework or demanding careers, counselors can help them with life balance and time management skills. Counselors can also structure opportunities for students to interact with STEM role models and mentors (Lapan & Kosciulek, 2001) who can address realistic outcomes by discussing situations they encountered during their career pursuits. Helping students to increase their STEM self-efficacy while focusing on positive outcome expectations may help tip the balance in their decision making. Career and school counselors working with youth often discuss the role of values in choosing a career. Connecting these values to identified expected outcomes may be a powerful intervention in the counseling process.

Through the focus group format, students articulate their subjective perceptions, provide support and challenge to each other when appropriate, and consider different viewpoints and options. Thus, the group process itself, and not merely the resultant qualitative data, may be important. However, we did not measure the effect of our focus groups on STEM social cognitive factors. This may be a fruitful area for future research. Counselors and educators working in schools can design and implement small group and individual counseling interventions to help students think about the expected consequences associated with future STEM coursework and careers. Questions such as the ones that guided the focus groups can be used to facilitate discussion of students' perceptions of outcome expectations. Card sorting activities may also be used to explore students' perceptions of both positive and negative outcome expectations associated with pursuing specific academic coursework or careers. These

interactions then provide a context through which those perceptions can be explored and validated or challenged.

Although it did not emerge as a category of outcome expectations, several students indicated that the positive and negative messages they heard from teachers influenced their expectations about advanced coursework in math and science. Teachers are important conveyers of information and attitudes. Both their explicit and implicit messages can have powerful effects upon young people's ultimate choices. Teachers can help youth to have positive outcome expectations, guiding their students toward accurate, unstereotyped beliefs and facilitating their self-efficacy in academic and career pursuits.

The pre- and early adolescent years encompass a critical time in the development of realistic beliefs about self, academic pursuits, and work. Early perceptions can mitigate against specific career choices and against advanced coursework in science, math, and computers (Bandura et al., 2001). Our goal is to provide youth with the tools needed to ensure as large a set of options as possible, not to force them into STEM (Bandura et al., 2001). It is during these years that we may have the greatest chance of success in helping young people to reexamine their beliefs, thereby broadening their career horizons.

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