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Do You Think I'm Worth It? The Self-Verifying Role of Parental Engagement in Career Adaptability and Career Persistence Among STEM Students

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Abstract

Parents contribute a great deal to their children's career development. Despite the central importance of the self-concept to career development, little research has examined the role played by parental engagement in the link between the child's self-concept and career development. Integrating self-verification and career construction theories, we develop and test the prediction that parental engagement indirectly contributes to career adaptability and career persistence by serving as a tacit signal of the child's positive worth. Using a time-lagged survey design, we tested the proposed moderated mediation model in a sample of science, technology, engineering, and mathematics (STEM) university students. The results show full support for the hypothesized model. Consistent with self-verification theory, STEM students' self-esteem was only associated with subsequent career adaptability and career persistence if they also perceived high levels of parental engagement. This result held despite statistically controlling for parent-reported parental engagement. We discuss implications for career development, STEM career persistence, and career counseling.

Keywords

career adaptability, career persistence, self-verification, self-esteem, parental engagement, STEM careers

> How bold one gets when one is sure of being loved
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> Sigmund Freud, *Letters of Sigmund Freud*, edited by E. L. Freud (1960, p. 11)

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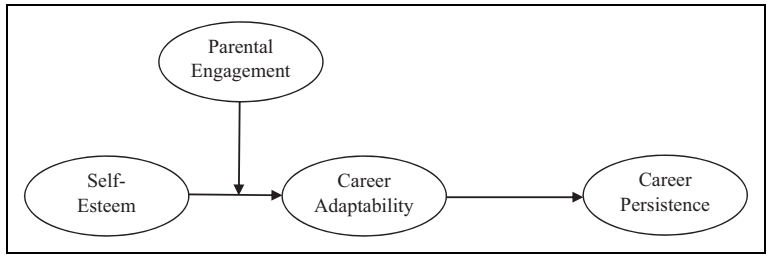

Figure 1. Proposed theoretical model.

Parents play no small role in the career development of their children. Supportive parents give children the resources and know how to engage in career exploration (Dietrich & Kracke, 2009; P. Guan et al., 2016; Y. Guan et al., 2015), build career optimism (Garcia, Restubog, Bordia, Bordia, & Roxas, 2015), and make important career decisions (Ginevra, Nota, & Ferrari, 2015; Restubog, Florentino, & Garcia, 2010). Some parents exert influence or sway over their children's career paths through pressure and expectations or through osmosis of attitudes, beliefs, and values (Fouad et al., 2008). Parents seem to be significant forces in their children's career development.

Despite the clear importance of parents to career development (Middleton & Loughead, 1993), little research has examined the interplay of parental influences and the self-concept. Career construction theory posits that the vocational self-concept serves as the overarching blueprint for career development and that parents play important roles in crafting a child's self-concept (Savickas, 2002, 2013), which is consistent with relational theories of working and careers (Blustein, 2011). Nevertheless, there remains a dearth of research examining how parental engagement interacts with the child's self-concept or self-esteem. Furthermore, little work has examined the role of parents within the rubric of career construction theory (cf. P. Guan et al., 2016; Y. Guan et al., 2015).

Integrating predictions from career construction theory (Savickas; 2002; Savickas & Porfeli, 2012) and self-verification theory (Swann, Wenzlaff, Krull, & Pelham, 1992), we direct attention to a little-examined benefit of parental engagement—verifying the child's sense of self—in a sample of college-age science, technology, engineering, and mathematics (STEM) students. Parental engagement serves as an implicit indicator of how much the child perceives she is worth in the eyes of the parent (Rosenberg, 1989). We conducted a time-lagged study of computer science undergraduate students to test a model examining whether self-esteem interacts with current perceptions of parental engagement to predict subsequent career adaptability, which in turn predicts career persistence. We predicted that the indirect effect of self-esteem on career persistence through career adaptability would be strongest among people who perceived greater parental engagement because parental engagement confirms and verifies their positive sense of self. The proposed theoretical model is presented in Figure 1.

This study contributes to the literature in two important ways. First, we respond to calls for more research on the career–family interface (Keller & Whiston, 2008) by bringing together the literatures on parental involvement and career construction theory to examine how parental involvement contributes to career adaptability and career persistence. We direct specific attention to the child's self-concept as prescribed by career construction theory, which emphasizes the importance of building a strong vocational self-concept (Savickas, 2002). By doing so, we bridge relational theories of careers (Blustein, 2011) with career construction theory by unpacking the underlying relational processes that facilitate career construction. We also build on the burgeoning research program examining the role of self-verification in developing career adaptability (Cai et al., 2015). In line with this thinking, initial work by Cai, Guan, and colleagues has indicated that self-verification processes can give rise to career adaptability resources. We expand on this line of

thinking—following Savickas's assertion that core roles play an important role in the relationship between self-concepts and career development (Savickas, 2002)—by bringing interpersonal influences—specifically the parent—into the picture. In this way, parental engagement can potentially verify or undermine the child's sense of self, which may have important consequences for career development and career persistence.

Second, this study contributes to the corpus of literature on career persistence in STEM fields. STEM career persistence has emerged as one of the central problems of career development and career counseling over the past few decades (Graham, Frederick, Byars-Winston, Hunter, & Handelsman, 2013; Price, 2012). Indeed, President Obama recently committed US$3 billion of the 2017 budget to programs to promote STEM education and persistence (Whitehouse.gov, 2016). Despite ongoing scholarly interest in career adaptability (Savickas & Porfeli, 2012), little work has examined how career adaptability might promote career persistence in STEM fields. We advance the literature on STEM career persistence by introducing career adaptability as a crucial career resource. Furthermore, we expand the relatively sparse line of work on the role of parents in STEM career persistence (e.g., Ferry, Fouad, & Smith, 2000; Ing, 2014; Restubog et al., 2010). Much of this research takes a social-cognitive perspective (Lent, Brown, & Hackett, 1994), focusing on the instrumental and emotional benefits of parental engagement. We advance this line of work by examining parental engagement through the lens of career construction theory (Savickas, 2002; Savickas & Porfeli, 2012) to examine its interplay with the sense of self, following suggestions by scholars implying an important role for the self-concept in STEM career development (Graham et al., 2013). While the social-cognitive approach has been both productive and useful, we aim to broaden our understanding of the factors and mechanisms that drive career persistence through our integration of self-verification and career construction theories. By extending the body of knowledge on STEM career persistence to include the crucial mechanisms of career adaptability and self-verification processes, we make important practical and theoretical contributions to career development and career counseling aimed at bolstering STEM career persistence.

Career Development and the Self-Concept

Careers are avenues for self-expression. As Mark Savickas put it, "Career is a story that people tell about the projects that occupy them. They author a story about themselves as actors and as agents in the theater of work" (2013, p. 653). The central position of the self-concept in career development is elucidated in career construction theory (Savickas, 2002). According to career construction theory, careers are ultimately opportunities to enact the vocational self-concept (Savickas, 2013). Put another way, a person's self-concept provides the blueprint for how they construct their careers. In STEM fields, the self-concept has emerged as a particularly powerful explanatory framework for determining who persists in STEM university training (Graham et al., 2013). For instance, students report more commitment to STEM careers and perform better on STEM examinations after interventions (e.g., self-affirmation, exposure to in-group role models) that boost compatibility between STEM and the self-concept, particularly among vulnerable populations (Sherman et al., 2013; Stout, Dasgupta, Hunsinger, & McManus, 2011). Though the ambit of the self-concept is traditionally broad (Shavelson, Hubner, & Stanton, 1976), we direct our attention to two broad evaluative categories of the self-concept—positive and negative self-views, also known as high and low self-esteem.

Self-esteem refers to the individual disposition toward a positive overall view of one's own worth (Coopersmith, 1967). Within the rubric of career construction theory, self-esteem does not encapsulate the vocational self-concept; rather it serves as a "meta-dimension" distinct from but relevant to the vocational self-concept (Savickas, 2002). Self-esteem has a lifelong stable component (Kuster & Orth, 2013) that individuals strive to affirm and verify. Self-verification theory (Swann et al.,

1992) posits that people are motivated to maintain psychological coherence with their self-esteem level. People with high self-esteem strive to enact behaviors that affirm their positive worth, while people with low self-esteem behave in ways that perpetuate their negative worth. Integrating self-verification theory with career construction theory, we might expect that people's career construction proceeds largely in line with their level of self-esteem, where high self-esteem drives adaptive career development in order to achieve a vocational self-concept that matches or affirms the person's positive sense of worth.

Self-esteem may foster adaptive career development through career adaptability resources. Career adaptability refers to the "self-regulation strengths or capacities that a person may draw upon to solve the unfamiliar, complex, and ill-defined, problems presented by developmental vocational tasks, occupational transitions, and work traumas" (Savickas & Porfeli, 2012, p. 662). Career adaptability resources—concern, curiosity, control, and confidence—are crucial resources for life span career development within the rubric of career construction theory (Savickas, 2002). Self-esteem may be an important motivational force by serving as a verification standard; put simply, people with high self-esteem expect more from themselves and are more driven to achieve those high expectations. Self-verification theory suggests that high self-esteem serves as fertile ground for the growth of career adaptability resources because all four resources—concern, control, curiosity, and confidence—are consistent with a positive sense of self (Hartung, Porfeli, & Vondracek, 2008). For example, people with positive self-evaluations report feeling more in *control* of their lives and more *confident* that they can achieve positive outcomes (Campbell, 1990; Erez & Judge, 2001). Similarly, people with high self-esteem are generally optimistic that their future is full of potential and possibility (Heimpel, Elliot, & Wood, 2006; Wood, Heimpel, Newby-Clark, & Ross, 2005), which foster career concern and career curiosity. Consistent with this line of thinking, recent research has confirmed that people with high self-esteem report higher levels of the omnibus career adaptability resource (Cai et al., 2015). In summary, self-esteem may facilitate the development of career adaptability resources because these resources affirm a positive sense of self. Therefore, we hypothesize that:

Hypothesis 1: Self-esteem is positively associated with career adaptability.

Parental Engagement as Tacit Indication of Worth

In order for us to know ourselves, we must learn to see how others see us (Cooley, 1902). The first and arguably most central of these "looking glass selves" are our parents. People strive for much of their lives for the approval of their parents. Parents often tell their children that they love all their children equally, but parents sometimes will admit—under duress—that they do love certain children more than others. Indeed, numerous studies in the domain of family psychology reveal that parents engage more with the children they particularly care about (see Suitor, Sechrist, Plikuhn, Pardo, & Pillemer, 2008, for a review). In this way, perceived parental engagement reflects how loved the child feels by the parent. Parental engagement refers to the extent to which parents seem invested in the child's career development (Dietrich & Kracke, 2009). When reported by the child, perceived parental engagement may be an indicator of how valued the child feels by the parent. This reasoning is consistent with theorizing and research on relational theories of working and career (Blustein, 2011; Schultheiss, Kress, Manzi, & Glasscock, 2001), which asserts that "interpersonal relationships as well as internalized relational objects play essential roles in the development of a viable and meaningful work life" (Blustein, 2011, p. 5). We draw on self-verification theory to delineate the processes that underpin the relational (specifically parental) influences that facilitate career construction.

Within the rubric of self-verification theory (Swann et al., 1992), parental behaviors transmit tacit signals of worth and value, thus constituting a form of social feedback. Parental behaviors may

inadvertently contribute to the child's meta-perceptions (i.e., how the child thinks she or he is viewed by others). There is robust evidence that people generally hold accurate meta-perceptions (Carlson & Furr, 2009) and that these meta-perceptions are distinct from people's own self-perceptions (Carlson, Vazire, & Furr, 2011). People can infer these meta-perceptions on the basis of how they are treated by others (Elfenbein, Eisenkraft, & Ding, 2009). Self-verification theory posits that these meta-perceptions of parents may either affirm or disconfirm the value of the child. Perceived parental engagement may be an important source of information through which children can infer how they (and their career prospects) are viewed by their parents.

Strong parental engagement provides a signal to the child that she or he is worthy and valuable, affirming a positive self-concept. If the child has high self-esteem, strong parental engagement verifies that sense of worth, leading to greater epistemic certainty in the child's self-concept (Stinson et al., 2010). More certain of his or her worth, the child becomes especially motivated to accrue career adaptability resources and persist in careers as consistent with a positive sense of worth. However, children may receive parental engagement inconsistent with their self-esteem. For instance, children with high self-esteem may receive low levels of parental engagement. These low levels of parental engagement may not directly reduce the child's self-esteem. Self-inconsistent information generally does not reduce self-esteem; rather, it leads to epistemic confusion (Stinson et al., 2010). Self-inconsistent information sows doubt and ambivalence. The result is a muddled and contradictory self-concept (Savickas, 2002). Since career construction is an enactment of the self-concept, the resulting construction may be hazy and unclear, in turn debilitating career development and hindering the accrual of career adaptability resources.

In the case of low self-esteem, intuition suggests that children with low self-esteem may benefit substantially from perceiving high levels of parental engagement. This thinking is consistent with self-enhancement theory (Sedikides & Strube, 1995) and sociometer theory (Leary & Baumeister, 2000), which both suggest that indications of positive worth from others by-and-large bolster feelings of self-worth and drive adaptive behavior consistent with developing career adaptability. Nevertheless, self-verification theory would aver that children with low self-esteem would perceive high levels of parental engagement as inconsistent with their sense of self. In this case, strong parental engagement becomes self-inconsistent information. Children with low self-esteem may discount their parents' engagement in them because "it doesn't feel right." Likewise, self-inconsistent information here generates doubt and muddles the self-concept in the same manner as described in the preceding paragraph, high levels of parental engagement notwithstanding. In summary, self-verification theory would not prescribe any benefits of parental engagement for children with low self-esteem. Parental engagement should only help the children who already have high self-esteem.

There is no doubt that parents contribute a great deal to their children's career development. Numerous studies have linked career-specific parental behaviors to career aspirations (Flores & O'Brien, 2002), career exploration (Dietrich & Kracke, 2009; P. Guan et al., 2016), career optimism (Garcia et al., 2015), career-related stress (Dietrich & Salmela-Aro, 2013), career decision-making self-efficacy (P. Guan et al., 2016; Ginevra et al., 2015), and career persistence (Restubog et al., 2010). However, though many studies have examined main effects of parental involvement on children's career development, there is sparse empirical research that reveal why or when parental behaviors matter (some exceptions include Dietrich & Salmela-Aro, 2013; Ginevra et al., 2015; P. Guan et al., 2016). There is even less research on the interplay between parental engagement and self-concept, though children do reveal in interviews that their parents can play an important "esteem support" role by validating their children's worth (Schultheiss et al., 2001). In summary, we propose an indirect role for parental engagement as a tacit marker of how valuable the children perceive themselves to be in the eyes of their parents. We expect the proposed "verifying" role of

parental engagement to manifest by amplifying the association between self-esteem and subsequent career adaptability as described below in Hypothesis 2.

Hypothesis 2: The relationship between self-esteem and career adaptability is moderated by parental engagement. Specifically, the positive relationship between self-esteem and career adaptability is stronger at high levels of parental engagement.

Consequences for STEM Career Persistence

Positive career development is especially important in the context of STEM careers (Graham et al., 2013). There are currently not enough STEM university graduates to meet demand in the labor market. One estimate from 2012 indicates a shortfall of 3 million STEM job candidates (Price, 2012); projections suggest that the shortfall in supply of STEM professionals is likely to continue growing over the next several years (Tovey, 2014). Given the importance of STEM professions to innovation and economic growth (Rothwell, 2013), the STEM career gap may have staggering consequences for economies worldwide. Research on STEM career persistence may be particularly important to developing inroads toward a solution to the STEM career gap problem and preventing devastating failure of the STEM professional labor market.

Career construction theory would suggest that one avenue for alleviating the STEM career gap would be to foster career adaptability among future STEM professionals such as university students. Career adaptability may enable STEM university students to navigate educational challenges and stay the course (Savickas, 2002; Savickas & Porfeli, 2012). Career adaptability resources ought to promote persistence through positive expectancies of career success (control and confidence) as well as through active exploration and goal setting (concern and curiosity). Indeed, career persistence is consistent with a positive sense of self. Hence, both self-verification and career construction processes link career adaptability to career persistence.

The overall pattern of reasoning suggests a first-stage moderated mediation framework (Edwards & Lambert, 2007; model displayed in Figure 1) in which perceived parental engagement moderates the relationship of self-esteem with subsequent career adaptability, which is in turn associated with career persistence. Thus, we present the following hypothesis:

Hypothesis 3: The indirect effect of self-esteem on career persistence is mediated by career adaptability. This indirect effect is conditional on parental engagement such that the high levels of parental engagement strengthen the indirect effect.

Method

Participants

Our proposed model was tested among computer science undergraduate students in a large university in Manila, Philippines. The final sample of students ($n = 232$) had a mean age of 17.34 years and was 34% female. The majority of the students were enrolled in the BS in Computer Science program (61%), while about a one third (39%) were enrolled in the BS in Information Systems program in the university.

Procedure

At Time 1 (T1), student questionnaires were distributed to 500 first-year students for completion. The student questionnaire contained demographic information as well as scales that assessed self-esteem and parental engagement. An information sheet was also included in the survey packet

describing the purpose of the study and assurance that participation is completely voluntary. Participating students nominated a parent or legal guardian to whom they provided an envelope containing the parent information sheet and parent rating form. Parents were instructed to sign across the flap of the sealed reply envelope containing the completed form, which was then returned to the researchers by the participating students. A total of 444 student–parent matched questionnaires were received yielding a response rate of 88.80%. At Time 2 (T2), 1 year after T1 data collection, the remaining 444 participants were requested to complete a follow-up survey containing demographic information and scales that assessed career adaptability and persistence. With the students' consent, the research team also obtained information on each student's cumulative grade point average (CGPA) as a measure of current performance. For this round of data collection, a total of 350 completed questionnaires were returned. Some questionnaires were discarded ($n = 118$) because of either (a) large number of missing responses ($n = 75$) or (b) missing ID numbers, which prevented the research team from matching T1 and T2 survey responses ($n = 43$). The final sample size was 232 students.

Measures

Survey items were prepared in English because this is the medium of instruction commonly used in Philippine higher education (Bernardo, 2007) and in the specific university where the survey was conducted. Unless otherwise specified, the response format for all items, excluding demographic variables, was a 7-point Likert-type scale (1 = *strongly disagree*; 7 = *strongly agree*), with items coded such that a higher score indicated a greater amount of the focal construct (except for reverse-coded items).

Self-esteem. Self-esteem was measured at T1 using the 10-item Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1979). The scale continues to be the most widely used measure of global self-esteem with previous studies reporting strong α reliabilities ranging from .72 to .88 (Gray-Little, Williams, & Hancock, 1997). In cross-cultural studies, the RSE shows consistent positive associations with extroversion and negative associations with neuroticism, indicating robust evidence for convergent and construct validity (Schmitt & Allik, 2005). A sample item is, ''On the whole, I am satisfied with myself.'' In this study, Cronbach's α was .82.

Parental engagement. Student-reported parental engagement was measured using the 5-item scale developed by Dietrich and Kracke (2009). Items were reverse coded since the original scale assessed lack of parental engagement. Prior work yielded strong reliability estimates for the scale ranging from .85 to .87 (Dietrich & Salmela-Aro, 2013). The measure shows convergent validity through its associations with career exploration (Y. Guan et al., 2015) and career-related difficulties (Dietrich & Kracke, 2009). A sample item is, ''My parents are not really interested in my future vocation (reverse coded).'' In this study, Cronbach's α was .94.

Career adaptability. Career adaptability was assessed using the Career Adapt-Abilities Scale (CAAS-International; Savickas & Porfeli, 2012). The scale consisted of 24 items divided equally into four subscales (i.e., Concern, Control, Curiosity, and Confidence) and when combined yield a total score indicating career adaptability. The CAAS has been validated for use in the Philippines with evidence of a replicated factor structure and convergent validity from its significant correlations with tenacious and flexible goal adjustment (Tolentino, Garcia, Restubog, Bordia, & Tang, 2013) as well as proactive personality and career optimism (Tolentino et al., 2014). Participants were asked the extent which they have strongly developed abilities such as ''preparing for the future'' (concern), ''counting on myself'' (control), ''exploring my surroundings'' (curiosity), and ''overcoming

obstacles'' (confidence). Prior work obtained a high reliability estimate for the overall scale ($\alpha =$ .97; Tolentino et al., 2013). In this study, Cronbach's α was .94.

STEM academic persistence. Using a measure of intentions to leave (adapted from Colarelli, 1984), students were asked to rate the extent to which they intend to drop from their computer science program in the next 2 years. The 3 items were ''If I have my own way, I will drop from my computer science program,'' ''I am planning to drop out of my computer science program in the next 2 years,'' and ''I frequently consider dropping from my computer science program.'' Our adapted measure resembles Lent's 4-item measure of academic persistence goals which is more commonly used in the careers literature (e.g., Navarro, Flores, Lee, & Gonzalez, 2014), but which also frequently suffers from non-normal distributions (Lent et al., 2013, 2016). All items were reverse coded to reflect academic program persistence. Cronbach's α for this scale was .88.

Control variables. We controlled for student gender and current performance because of their possible influence on T2 academic program persistence. For instance, research has shown that there is an underrepresentation of women in STEM-related majors in college (Allen-Ramdial & Campbell, 2014). Prior work has also implicated academic achievement as a predictor of career persistence (Restubog et al., 2010). Students' CGPA acquired at T2 was used as an index of academic achievement. Grade point averages range in value from 0.0 to 4.0 with a higher average indicating higher achievement.

We also controlled for parent-reported parental engagement (Dietrich & Kracke, 2009) to demonstrate that the proposed relationships depend on the student's perception of parental engagement in particular. Our theorizing is hinged on children's inferences about how they think their parents see them (i.e., meta-perceptions), so we strengthen inference for our theorizing by controlling for parent-reported parental engagement. Indeed, prior research has demonstrated that student versus parent perceptions of parent career-related behaviors can have divergent effects on career development (Garcia, Restubog, Toledano, Tolentino, & Rafferty, 2011). Hence, controlling for parent reports of parental engagement confirms that the student's perception of parental engagement (as opposed to more ''objective'' parental engagement) drives the proposed mechanisms. We used the 5-item scale developed by Dietrich and Kracke (2009) to assess parent-reported parental engagement. A sample item is ''I am not really interested in my child's future vocation (reverse coded).'' In this study, Cronbach's α was .92.

Results

Preliminary Analyses, Descriptive Statistics, and Reliability

In order to determine the adequacy of the sample size, power analysis was conducted using Daniel Soper's a priori sample size calculator for multiple regression (available at http://www.danielsoper.com/statcalc/calculator.aspx?id=1). Given a medium anticipated effect size, six predictors, $\alpha = .05$, and power = .80, the minimum required sample size was 97. Our sample size of 232 exceeds these requirements for sufficient power.

Means, standard deviations, and intercorrelations are summarized in Table 1. Zero-order correlations were all in the predicted direction. We also tested for the possibility of common method bias influencing the relationships in our proposed model. We did this using the common latent factor test as recommended by Podsakoff, MacKenzie, Lee, and Podsakoff (2003). Results revealed that none of the self-reported factors in our model were significantly influenced by the common latent factor (i.e., less than 20% of the variance is accounted for by the common latent factor).

Table 1. Means, Standard Deviations, and Zero-Order Correlations Among the Study Variables.

Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11
1. Gender	0.34	0.48											
2. T2 grade point average	2.41	0.42	.15*										
3. T1 self-esteem	4.51	0.92	.01	.08	(.82)								
4. T1 self-reported parental engagement	5.52	1.38	.15*	.17*	.44**	(.94)							
5. T1 parent-reported parental engagement	6.33	1.09	.01	.07	.18**	.28**	(.92)						
6. T2 career adaptability	5.30	0.78	−.06	.05	.24**	.21**	.13*	(.94)					
7. T2 concern	5.30	0.96	−.03	.03	.27**	.21**	.09	.84**	(.86)				
8. T2 control	4.92	0.97	−.08	.04	.21**	.12	.16*	.65**	.62**	(.80)			
9. T2 curiosity	5.33	0.91	−.08	.02	.13*	.17*	.13*	.87**	.64**	.54**	(.83)		
10. T2 confidence	5.20	0.93	−.05	.07	.16*	.15*	.06	.86**	.58**	.51**	.71**	(.88)	
11. T2 persistence	5.32	1.65	.01	.19**	.10	.13	.11	.18**	.14*	.24**	.12	.14*	(.88)

Note. $n = 232$. T1 = Time 1; T2 = Time 2.
*$p < .05$. **$p < .01$.

Table 2. Summary of Hierarchical Regression Results.

Predictor	T2 Career Adaptability		T2 Career Persistence	
	B	*SE*	*B*	*SE*
Gender	−.11	.11	.08	.17
Grade point average	.04	.12	−.11	.20
T1 self-esteem	.12*	.06	.14	.10
T1 self-reported parental engagement	.09*	.04	.04	.07
T1 parent-reported parental engagement	.05	.05	.08	.08
T1 Self-esteem × Self-reported parental engagement	.09*	.04		
T2 career adaptability			.25*	.11
R^2	.09**		.06**	
Change in R^2	.02*		.02*	

Note. T1 = Time 1; T2 = Time 2.
*$p < .05$. **$p < .01$.

Hypothesis Testing

We conducted hierarchical linear regression to test our hypotheses. The regression estimates are presented in Table 2. After partialling out control variables, T1 self-esteem was positively correlated with T2 career adaptability, $B = .15$, $SE = .06$, $p < .05$, 95% confidence interval [CI] [.02, .28), which lends support to Hypothesis 1. Next, we tested the simple moderation and moderated mediation hypotheses by generating 5,000 bias-corrected bootstrap estimates as prescribed by Hayes (2012). This approach enabled us to test the significance of both moderated and conditional indirect effects without relying on the assumption that these effects were normally distributed (Hayes, 2012). The regression estimates are presented in Table 2. Hypothesis 2 states that T1 parental engagement amplifies the relationship between T1 self-esteem and T2 career adaptability. Just as hypothesized,

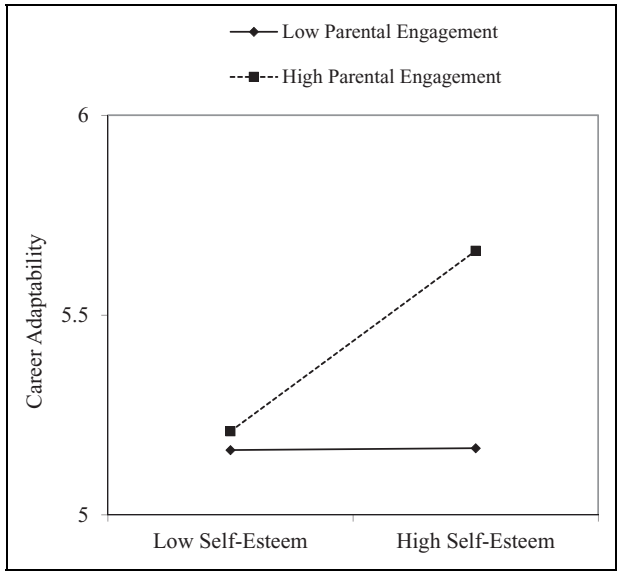

Figure 2. Interactive relationship between self-esteem (Time 1) and parental engagement (Time 1) in predicting career adaptability (Time 2).

the proposed interaction term was statistically significant ($B = .09$, $SE = .04$, $p < .05$, 95% CI [.003, .18]). Hypothesis 2 was fully supported. As expected, self-esteem was positively related to career adaptability more strongly among students with high levels of parental engagement ($B = .25$, $SE = .08$, $p < .01$, 95% CI [.09, .40]), whereas no relationship was found among those with low levels of parental engagement *$B = -.004$, $SE = .09$, *ns*, 95% CI [−.19, .18]). In order to probe the interaction, we plotted the simple slopes of the relationship between T1 self-esteem and T2 career adaptability at high and low levels (± 1 *SD*) of career adaptability, respectively. These simple slopes are presented in Figure 2.

In Hypothesis 3, we predicted that the indirect effect of T1 self-esteem on T2 persistence would be conditional on the level of parental engagement. In line with our predictions, the conditional indirect effect of T1 self-esteem on T2 persistence via T2 career adaptability was significant for high (indirect effect = .06, $SE = .04$, 95% CI [.01, .16]) as opposed to low (indirect effect = −.001, $SE = .03$, 95% CI [−.07, .06]) levels of T1 parental engagement. Overall, Hypothesis 3 was fully supported.

Supplementary Analyses

Our results showed full support for the proposed theoretical model despite statistically controlling for parent-reported parental engagement. Indeed, the child's perception of parental engagement is more germane to the model than relatively more objective parent reports of parental engagement. Though we did partial out variance from parent-reported parental engagement, we present here a more thorough test of whether parent-reported parental engagement nevertheless interacted with self-esteem to influence career adaptability. We tested two alternative models: (1) we substituted parent-reported parental engagement for self-reported parental engagement in the full model then tested the conditional indirect effect and (2) we conducted parallel moderation to simultaneously examine the moderating roles of self- and parent-reported parental engagement in the relationship between self-esteem and career adaptability. In alternative Model 1, the interaction term for parent-

reported parental engagement was not statistically significant ($B = -.08$, $SE = .07$, *ns*, 95% CI [−.21, .06]). Hence, alternative Model 1 was not supported. In alternative Model 2, the interaction term for self-reported parental engagement remained statistically significant ($B = .10$, $SE = .04$, $p < .05$, 95% CI [.01, .19]), but no interaction was found with parent-reported parental engagement ($B = -.10$, $SE = .07$, *ns*, 95% CI [−.23, .04]). Hence, alternative Model 2 was not supported.

We also tested alternative Model 3 in which self-reported parental engagement moderates the relationship between career adaptability and career persistence. If this alternative model was significant, then the results may have been rendered spurious by an omitted common cause (associated with parental engagement) that is shared by self-esteem, career adaptability, and career persistence—instead of being due to the hypothesized theoretical model. In alternative Model 3, the interaction term for self-reported parental engagement with career adaptability did not predict career persistence ($B = -.09$, $SE = .07$, *ns*, 95% CI [−.23, .05]). Alternative Model 3 was not supported, thus lending further support to the hypothesized model. Finally, we repeated the original analysis without including any control variables; there were no appreciable differences in the results.

Discussion

Drawing on premises of self-verification (Swann et al., 1992) and career construction theories (Savickas, 2002), we predicted that parental engagement amplifies the positive relationship between self-esteem and career adaptability, leading ultimately to career persistence. We tested this model in a time-lagged sample of university students in computer science. The results fully support the hypothesized model. The relationship between self-esteem and career adaptability was stronger among students who perceived high levels of parental engagement. Indeed, the relationship between self-esteem and career adaptability was null at low levels of parental engagement; this result is consistent with predictions from self-verification theory. Furthermore, the students with higher levels of career adaptability reported stronger intentions to persist in their STEM programs. Notably, these results held even after controlling for parent-reported parental engagement—indicating that the students' perception of parental engagement is specifically relevant—consistent with self-verification theory. In summary, the results are consistent with the notion that parental engagement—serving as a tacit indicator of how much one is valued by very important others—indirectly contributes to career development and career persistence among STEM students.

Theoretical and Practical Implications

This model contributes to the literature on parental influence in career development. Previous approaches have emphasized that parents are primarily sources of instrumental and emotional support for career development—an approach consistent with social cognitive career theory (Lent et al., 1994). Our approach drew from self-verification (Swann et al., 1992) and career construction theories (Savickas, 2002) to highlight the child's sense of self and the role played by parents in validating that sense of self. Indeed, the pattern of results we present fit very closely with a self-verification account of parental engagement. Parental engagement did not promote career adaptability among participants with low self-esteem. This counterintuitive finding suggests that parental engagement does not always foster career development. Indeed, we contribute to a growing body of research suggesting that parental involvement in their children's career development is not unilaterally supportive of career development (Garcia et al., 2011; Ginevra et al., 2015; P. Guan et al., 2016). We add to this knowledge base that parents also exert indirect influence by expressing tacit signals of the child's worth and value.

We also contribute to the career adaptability literature by responding to the call to develop our understanding of how aspects of the self-concept—such as self-esteem—drive career development

(Savickas, 2002). Psychologists have long suggested that parental behaviors in their children's early years shape their self-concepts (Rosenberg, 1965). In this study, we present indicative evidence that, even when these children are university students, parents maintain an indirect influence through the tacit signals they send to their children. This approach further contributes to the career adaptability literature by adding to the sparse body of work examining the role played by parents in career adaptivity (P. Guan et al., 2016; Y. Guan et al., 2015) despite prescriptions of the importance of these relationships in career construction theory (Savickas, 2002) and the relational theory of careers (Blustein, 2011). In keeping with these theories, we hope to see further work examining the nexus between people's interpersonal relationships and their vocational self-concepts.

This study was conducted in a sample of college-age students in Manila, Philippines, so the Filipino cultural milieu merits some consideration. Filipino students generally report a mix of independent and interdependent self-construals, suggesting a balance between traditionally Eastern and Western construals of self (Puyat, 2004). Family values are also generally strong in the Philippines (Miralao, 1997), and Filipino parents tend to be more involved in their children's education than are American parents (Blair, 2014). Given these cultural influences, we might expect weaker effects among traditionally Western (e.g., American) families where self-construals tend to be more independent and family values could be less salient. However, we might also expect stronger effects among traditionally Eastern (e.g., Chinese) families where self-construals tend to be more interdependent and families may be more salient in the relational self. We tentatively propose that the results with this Filipino sample may be capturing a middle ground between two cultural extremes. Since career counseling is enjoying a renaissance in the Philippines (Salazar-Clemeña, 2002), our results shine a spotlight on the influence family has in shaping students' career narratives.

Finally, this study presents important implications for STEM career persistence. Initial theoretical work has suggested an important role for the self-concept in STEM career persistence (Graham et al., 2013). We further develop this line of thinking by grounding these initial arguments in the premises of self-verification theory (Swann et al., 1992) and career construction theory (Savickas, 2002) to examine the interplay between STEM student's sense of self and their interpersonal relationships with their parents in their career persistence. This line of thinking expands on work in other disciplines implicating the STEM student's self-concept such as stereotype threat and gender (dis)identification in STEM career development (Schmader, 2002; Spencer, Logel, & Davies, 2016). While these programs of research have highlighted the importance of content domains of the self-concept to STEM career development, we highlight the evaluative domain of the self-concept (i.e., self-esteem). Furthermore, we also introduce career adaptability as an important mediating mechanism. Perhaps another mechanism by which stereotype threat and gender (dis)identification threaten STEM career persistence is by dampening STEM student's development of career adaptability resources. The interface of the self-concept and career development offers a promising lens through which to examine supports and blocks in STEM career persistence.

STEM career persistence is especially important in the Philippine context. Despite considerable underemployment (around 19% of the labor market), the Philippines maintains labor market shortages in STEM industries (Asia-Pacific Economic Cooperative [APEC], 2013). Reports by the Department of Labor and Employment indicate that the vast majority of in-demand and hard-to-fill occupations in the Philippines are in STEM fields (e.g., fishery technologist, electrical engineer, mining engineer, chemist, software developer; Technical Education and Skills Development Authority, 2013). The Philippines is one of the leading exporters of electronics and semiconductors in the sector and is a local hub for agriculture research and technology (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2016). There is little hard data on STEM academic persistence in the Philippines. We do know that—in the health sciences at the undergraduate level—the ratio of graduates to enrollees was only about 25% in 2009; in contrast, the ratio among vocational education students was closer to 90% (APEC, 2013). The local Commission on Higher

Education has taken action by designating a number of STEM university programs as priority programs (e.g., information technology, agriculture, and engineering; Commission in Higher Education, 2014). On the bright side, the Philippines is one of the few countries in the world that have achieved some measure of gender parity in the sciences. Approximately half of STEM university graduates in the Philippines are women (skewing closer to 70% in the health sciences and closer to 30% in engineering) and over half of the researchers in the country are women (UNESCO, 2016). Overall, efforts to promote STEM career persistence in the Philippines may have important economic and labor market implications for the sector.

This study has important implications for career counseling. Recent approaches to career counseling and intervention have emphasized "life designing" and narrative frameworks that shape people's career development (Savickas, 2013). Our research suggests that both fundamental attitudes to the self as well as perceptions of valued others—such as parents—interact to shape people's career narratives. Even among older adolescents and adults, parents may continue to contribute to the "autobiographical bricolage" (Savickas, 2002) of people's life stories and narratives.

Following self-verification theory, career counselors may enable STEM students to build career adaptability by identifying cracks or inconsistencies across the intrapersonal and interpersonal contributors to the vocational self-concept. Career counselors must grasp the gestalt of the client's self-concept in order to identify points of leverage for building career adaptability resources. This approach jibes nicely with work suggesting that the self-concept is a crucial factor to STEM career success and persistence (Graham et al., 2013).

This study also suggests important implications for diversity in STEM careers. Scholars have continued to lament the lack of diversity in gender, race, and socioeconomic status in STEM fields (Allen-Ramdial & Campbell, 2014). While access to education plays a role in this disparity, many have attributed the STEM diversity gap to a mismatch between the person's self-concept and their perceptions of STEM fields (Stout et al., 2011). Our results echo the overall sentiment that career counselors ought to be especially sensitive to the client's self-concept in fostering STEM career persistence in this vulnerable population. Indeed, clients may underperform in STEM courses in order to verify a self-concept that does not match common stereotypes of STEM professionals. One solution is for career counselors to remind these clients that doing STEM might initially feel "wrong" because of their assumptions about STEM (i.e., epistemic confusion), but that the feeling of "wrongness" may subside over time as the client develops career-related resources and fosters an STEM identity through continuous learning and growth (Graham et al., 2013). The drive to self-verify is strong but certainly not insurmountable (Taylor, Neter, & Wayment, 1995).

Limitations and Future Research Directions

We note some limitations to this study. First, common method variance may influence the results we observed (Podsakoff et al., 2003). However, it is unlikely that common method variance explains the full pattern of results because (1) we introduced a time lag between assessments of self-esteem and career adaptability, (2) the relationships among indicators were not explained by a common latent factor (Podsakoff et al., 2003), (3) statistically significant interactions tend not to be artifacts of common method variance (Siemsen, Roth, & Oliveira, 2010). Nevertheless, future research may further mitigate common method bias by assessing objective indicators of career persistence.

Second, reverse causality may partially explain the results. It is possible that career adaptability may lead to higher levels of self-esteem. However, this result is unlikely because reverse causality would not explain the interaction effects observed and because we introduced a time lag between assessments of self-esteem and career adaptability. Though career construction theory strongly implies that career adaptability ought to be a causal antecedent of career persistence (Savickas & Porfeli, 2012), it remains plausible that career persistence intentions may have led to increased

career adaptability in our sample. Further research is needed to clarify the relationship between career adaptability and STEM career persistence. Experimental designs and cross-lagged designs may disentangle the patterns of causation across career adaptability and career persistence.

Third, we assessed students' career persistence intentions rather than objective career persistence. Generally, though intentions to quit tend to be associated with actual quitting, the relationship between intentions and actual behavior depends on people's motivations for leaving (Vandenberg & Nelson, 1999). Even in the case of objectively assessed career persistence, people may have little control over the decision to stay or leave (Hom, Mitchell, Lee, & Griffeth, 2012). Following recent trends in the employee turnover literature (Hom et al., 2012), future research could distinguish between enthusiastic career persisters, reluctant career persisters, enthusiastic career changers, and reluctant career changers.

Parents may exert more influence over their children's career development than they realize. Engaging in their children's career development not only instills the knowledge and values needed to build a solid careers but also signals to their children that they—as parents—believe their children are worthy and deserving of a high-quality career.

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