Executive Function, Identity, and Career Decision-Making in College Students

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Abstract
This study examined the relationship among executive function, identity, and career decision-making as self-reported by 82 college students. Participants were administered measures of executive function, identity status, career decision-making, and an index of verbal intelligence. After controlling for intelligence, self-reported difficulties with the metacognitive component of executive function were related to lower levels of identity achievement and higher levels of moratorium and diffusion. Difficulties with behavioral regulation were associated with higher levels of moratorium and foreclosure. Hierarchical multiple regressions with backward elimination indicated that individual differences in career certainty was best explained by metacognitive control and identity achievement. In contrast, variation in career uncertainty was predicted by verbal intelligence, behavior regulation, and low and high scores on identity achievement and diffusion, respectively. These preliminary results fill a gap in the current literature on career decision-making, suggesting the importance of executive function skills to this milestone process in the lives of emerging adults.

Keywords
executive function, identity, career decision making, emerging adults

The purpose of this study was to conduct a preliminary examination of the relationships among executive functions, identity, and career decision-making in traditional-aged students in their first two years of college. Executive functions are mediated by the prefrontal cortex of the brain (e.g., Welsh, 2001) and incorporate processes involved in goal-directed behavior (Welsh, Friedman, & Speier, 2006). Recently, authors have speculated that a relationship exists between executive function and identity (Phillips, 2008; Shanahan & Pychyl, 2007), and research identifying the relationship between identity and career decision-making is well established (Blustein, Devenis, & Kidney 1989; Vondracek, Schulenberg, Skorikov, Gillespie, & Wahlheim, 1995). This literature begs the question whether there are relationships between executive function and identity, and career decision-making, and, if so, what is the nature of this relationship? Currently, there is no published research directly examining whether individual differences in executive functions are related to variations in identity status or career decision-making, the latter being a major focus of future-oriented planning in college students. Of particular interest in this study was the degree to which identity and executive functions may jointly predict the levels of career certainty or uncertainty among college students.

Identity Development and Career Decision-Making
The extant literature clearly demonstrates empirical evidence for the theoretical connection between identity and career decision-making, with much of this research based on Marcia’s (1966) extension of Erikson’s original theoretical work on identity development. According to Marcia, an individual may be classified into four identity statuses according to one’s level of exploration and commitment: identity achievement (exploration and commitment), identity foreclosure (commitment with no exploration), moratorium (exploration with no commitment), and identity diffusion (no exploration or commitment). The relationship between identity development and career development is well established. For example, Blustein et al. (1989) studied a sample of college students to examine the relationship between identity

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formation, as measured by the Extended Objective Measure of Ego Identity Status (EOM-EIS; Bennion & Adams, 1986), and career development. Their results suggested a negative relationship between moratorium status and occupational commitment, whereas identity achievement was positively related to occupational commitment. In addition, there was a relationship between career exploration and identity for the moratorium and identity achievement statuses, indicating that processes involved in the establishment of general identity (exploration and commitment) are similar to activities comprising the career development process.

Similarly, Vondracek et al. (1995) found that junior high and high school students who had successfully achieved identity scored lower on all but one career indecision subscale, as measured by the Career Decision Scale (CDS; Osipow, 1987; Osipow, Carney, Winer, Yanico, & Koschier, 1976). Unexpectedly career indecision scores did not differ for students classified as foreclosed, moratorium, and diffused, despite the lack of commitment characterizing the latter two statuses. The authors conclude that differences in career indecision can at best differentiate identity-achieved individuals from those in the other three identity groups.

Although the relationship between identity and career exploration continues to be investigated and refined, current research exploring cognitive contributions to career decision-making is sparse by comparison. One might speculate that by their very nature the processes of exploration and commitment would involve cognitive skills such as planning, decision-making, monitoring, and organization. The empirical question is as follows: To what degree do components of executive function contribute to the career decision-making process?

**Cognitive Factors in Career Decision-Making and the Possible Role of Executive Function**

Current literature exploring the career decision-making process in adolescents and emerging adults has examined various predictors in addition to identity, such as attachment history or style (e.g., Downing & Nauta, 2010; Germeijis, & Verschueren, 2009) and personality traits (e.g., Bullock-Yowell, Andrews, & Buzzetta, 2011; Mojgan, Kadir, & Soheil, 2011). In terms of cognitive contributions to the process of occupational exploration and commitment, reported research examines constructs such as “thinking styles” (Kim, 2011), dysfunctional career thoughts (e.g., Bullock-Yowell et al., 2011; Bullock-Yowell, Andrews, McConnell, & Campbell, 2012), and career decision-making self-efficacy (e.g., Bullock-Yowell et al., 2012; Germeijis & Verschueren, 2009; Tang, Pan, & Newmeyer, 2008). Of these three predictors, career decision-making self-efficacy (Betz & Luzzo, 1996; Taylor & Betz, 1983) shares the most parallels with executive function, a construct that has not been examined explicitly as a predictor of career decision-making.

Career decision-making self-efficacy is defined as an individual’s beliefs about his or her capability to successfully carry out a variety of tasks related to the career decision-making process (Taylor & Betz, 1983). The construct has been demonstrated to be positively related to decision-making certainty (Bullock-Yowell et al., 2012; Germeijis & Verschueren, 2009) and negatively related to dysfunctional career thoughts (Bullock-Yowell et al., 2012). More importantly, the Career Decision Self-Efficacy Scale (CDSE-SF; Betz, Klein, & Taylor, 1996) assesses individual differences in self-appraisal, gathering occupational information, goal selection, making plans for the future, and problem solving. It is here that the parallels with components of executive functions of self-monitoring, goals setting, planning, and strategic problem solving become apparent. Despite the potential that executive functions could underlie career decision-making self-efficacy, to our knowledge there has not been any published studies that have explicitly linked executive functions to career decision-making processes, such as certainty and uncertainty. There is, however, a small emerging literature exploring the association between executive function and identity development in adolescents and emerging adults and, given that career exploration and commitment is a major element of identity development, this literature is of interest, as well.

**Executive Functions and Identity Development**

The role of executive function in identity formation has been the focus of theoretical speculation in several studies; however, the empirical evidence is indirect, at best. For example, Phillips (2008) proposed that brain development should play a role in the development of identity, and he interprets increases in identity achievement with age by stating, “Identity scholars can no longer ignore the role played by brain maturation on identity. New knowledge about brain development must be integrated into models of identity if the models are to accurately describe identity processes” (Phillips, 2008, p. 214). However, Phillips (2008) did not incorporate any direct or indirect measures of brain function in his study, or a single measure of executive function, for that matter. The fact that brain development and function underlie identity development, as it does every other human behavior, should not be in dispute; however, whether frontal brain systems are most integrally involved in this process remains an empirical question that can only be addressed by including measures of executive function in these studies.

The indirect findings linking executive function with identity are exemplified by studies such as that of Norvilitis and Reid (2002), which identified associations between executive function and gender identity. Their finding that executive functions related to the masculine characteristics of leadership and independence might suggest a connection between executive functions and identity achievement;
However, the Marcia identity statuses were not measured in this study. Similarly, Shanahan and Pychyl (2007) examined the relationships among identity, procrastination, and agency, and found the construct of procrastination correlated negatively with achievement scores and positively with moratorium scores. The authors proposed relationship between identity and procrastination after controlling for verbal intelligence in a sample of traditional-aged, first- and second-year college students. Although past research has hinted at such associations, typically direct measures of executive function and identity statuses are not included in the same study. We hypothesized that individuals reporting lower levels of executive function difficulties will report higher levels of identity achievement, specifically, due to the commitment and exploration required for identity achievement and the putative contribution of executive functions to the goal-directed behaviors that would be required. We also hypothesized that individuals reporting greater executive function difficulties would indicate higher levels of diffusion, a stage characterized by a lack of exploration and commitment. It was unclear whether executive function would be associated with the other identity statuses of moratorium and foreclosure.

Second, we examined the prediction of career decision-making certainty and uncertainty by identity and executive function. Based on prior research suggesting a relationship between identity and career decision-making (Blustein et al., 1989; Vondracek et al., 1995), it was hypothesized that there would be a relationship between identity achievement and career certainty (i.e., confidence in future career plans) and a negative relationship between diffusion and career uncertainty (i.e., indecision about future career plans). As discussed previously, there is no literature exploring the contribution of executive function, per se, to the career decision-making process. However, the strong evidence for the contribution of career decision-making self-efficacy (e.g., Bullock-Yowell et al., 2012; Germejs & Verschueren, 2009) suggests the involvement of executive function processes. This exploratory study examined for the first time whether components of executive function, metacognition and behavior regulation, as well as identity jointly predict career certainty and uncertainty.

**Method**

**Participants**

The sample consisted of 82 college students (42 Males and 40 Females) in their first two years of school, drawn from the introduction to psychology courses at a midsized university located in the Rocky Mountain region of the United States. The mean age of the participants was 18.87 years ($SD = 0.868$). Although we did not record ethnicity of our participants, the students were recruited from a general education course that most likely reflects the ethnic make-up of the university as a whole. The university has 22% of the undergraduate students who identify as ethnic minorities: 3% African American, 2% Asian, 13% Hispanic, and less than 1% Native American. According to Green (1991), the sample size of 82 provides adequate power to detect a large effect size. Such an effect size could be anticipated on the basis of a substantial empirical literature linking identity with career decision-making and a strong theoretical base to predict associations between executive function and identity and career decision-making. Participants completed the study as one method of fulfilling a requirement for the introductory psychology course.

**Measures**

*Extended Objective Measure of Ego Identity Status–Revised (EOM-EIS-R).* The EOM-EIS-R (Bennion & Adams, 1986; Downing & Nauta, 2010) was used to measure the students’ identity status. The EOM-EIS-R is a measure comprising 64 items (with Likert-type responses ranging from 1 to 6) with 16 items pertaining to each of the four identity statuses (diffusion, foreclosure, moratorium, and identity achievement) as defined by Marcia (1980). Total scores for identity achievement, foreclosure, moratorium, and diffusion were created by combining the total scores for the interpersonal ideological subscales (Blustein et al., 1989). Results of over 20 studies demonstrated internal consistency from .30 to .91 with a median of .66. Results appear to be stable over time with an average test-retest reliability of .76 (Adams, 1998). According to Adams (1998), the instrument demonstrates construct, discriminant, and convergent validity in studies involving samples consisting of college students. The predictive and concurrent validity of the EOM-EIS-R has been established by examining correlations between the identity subscales and measures of self-acceptance, intimacy, and authoritarianism (Adams, 1998). These correlations were significant, albeit in the low to moderate range, and consistent with theoretical expectations. In the current study, the Cronbach’s alpha was .689.

**CDS.** The CDS (Osipow, 1987; Osipow, Carney, Winer, et al., 1976; White & Tracey, 2011) consists of 18 items (2 comprising the certainty and the remaining 16 the indecision scales respectively). Respondents completed Likert-type
ratings ranging from 1 (low similarity with item) to 4 (high similarity with item). Reliability estimates obtained from university students found test–retest correlations ranging from .82 to .90 (Osipow, Carney, & Barak, 1976). Among participants in the current sample, measures of internal consistency produced Cronbach’s alpha of .818 for the CDS.

The CDS Manual (Osipow, 1987) reports several studies demonstrating the validity of the CDS as a measure of career decision-making. In terms of concurrent validity, the CDS scales significantly correlate in the expected direction with the Assessment of Career Decision Making (ACDM; Buck & Daniels, 1985; as cited in Osipow, 1987) and with the Attitude Scale of the Career Maturity Inventory (CMI; Crites, 1973; as cited in Osipow, 1987). In addition, the discriminative validity of the measure is demonstrated by several studies in which the CDS significantly distinguished between college students self-reporting a commitment to a future career vs. those self-reporting a lack of occupational commitment (Osipow, 1987).

Behavior Rating Inventory of Executive Function. The Behavior Rating Inventory of Executive Function (BRIEF; Guy, Isquith, & Gioia, 2004) consists of 80 questions rated by the individual on a scale of never, sometimes, and often (high scores = deficits). This measure includes the Metacognitive Index (MCI; working memory, planning/organization, organization of materials, and task completion subscores) and Behavioral Regulation Index (BRI; inhibition, shifting, emotional control, and monitor subscores). The overall internal consistency reliability in the current study was .919 for the BRIEF. Moreover, reliabilities for the BRIEF range from .93 for the BRI to .95 for the MCI with an overall reliability of .96 for the instrument (BRIEF; Guy et al., 2004). Convergent and divergent validity for the BRIEF is evidenced by the high correlations between the BRIEF and other self-report measures of “behavioral, emotional, academic, and attentional functioning and were not correlated with measures of somatization on the CBCL/YSR and BASC-SR” (BRIEF; Guy et al., 2004, pp. 77-78). Furthermore, the two factors, the MCI and BRI, were supported by factor analysis, accounting for 70% in the variance among a nonclinical sample (N = 1,000).

Wechsler Adult Intelligence Scale–Fourth Edition (WAIS-IV). The Vocabulary subtest of the WAIS-IV (Wechsler, 2008) is a commonly used test of crystallized verbal intelligence. The Vocabulary subtest has a test-retest stability of .89, and a split-half reliability of .94. In addition, this subtest correlates with the vocabulary subtest of the WAIS-III at .87 and it is the single best indicator, among the other subtests, of the Full-Scale IQ (FSIQ) score, correlating with FSIQ at .72 (Groth-Marnat, 2009). The complete test consists of 33 words (increasing in difficulty as the test progresses) used to measure participants level of verbal knowledge. The test was individually administered utilizing procedures outlined in Wechsler (2008) but was shortened from 33 to 26 for time purposes. In scoring the test, each word was scored on a scale of 0 to 2 points by a member of the research team. An independent scorer then verified the scores and inter-rater reliability was 90%. The researcher addressed and rescored all discrepancies and final scores were calculated.

Procedure

The study involved two sessions, each lasting approximately 1 hr. Each participant had to complete the first phase of the study before completing the second. On arrival at the first session, all participants signed in and they were given an identification card to be used for admittance into the second session of the study (a procedure used to ensure participant confidentiality). During the first session, participants were tested in groups of 10 to 20 and completed the BRIEF, the CDS, and the EOM-EIS-R. The second session consisted of the individual administration of the WAIS-IV, in addition to other tasks as part of a larger study.

Analysis

Correlation coefficients were used to look at the relationship between executive function, as measured by the BRIEF, and identity, as measured by the EOM-EIS-R. Backward elimination regression analysis was utilized to explore the relationship between executive function, identity, and career decision-making after controlling for intelligence. The analysis included entering all of the variables into the model then progressively deleting predictors until only significant predictors remained in the final model. These regression analyses were tested for the following assumptions: linearity, independence, normality, and equal variances (Montgomery, Peck, & Vining, 2001).

Results

Descriptive Statistics

Means and standard deviations for each of the tasks are presented in Table 1. Independent t-tests found no significant sex differences among the major dependent variables; therefore, all analyses were conducted collapsing over gender.

Relationships Between Identity Statuses and Executive Functions

Correlational analyses were conducted between the main summary scores of each of our experimental measures of identity and executive function, and represent partial correlations controlling for verbal intelligence (i.e., vocabulary score). To facilitate interpretation of these correlations, it is important to note here that high index scores on the BRIEF (MCI/metacognitive control and BRI/behavior regulation)
Table 1. Means and Standard Deviations for Scores on Vocabulary, Executive Function, Identity, and Career Decision-Making Measures.

| Score              | M    | SD   |
|--------------------|------|------|
| Vocabulary         | 26.16| 8.86 |
| BRIEF MCI          | 1.66 | 0.29 |
| BRIEF BRI          | 1.60 | 0.24 |
| Identity achievement| 46.65| 9.56 |
| Moratorium         | 41.30| 12.08|
| Diffusion          | 50.03| 8.93 |
| Foreclosure        | 65.97| 8.42 |
| Career certainty   | 6.05 | 1.77 |
| Career uncertainty | 30.08| 9.32 |

Note. BRIEF = Behavior Rating Inventory of Executive Function; BRIEF MCI = Metacognitive Index; BRIEF BRI = Behavior Regulation Index. Possible score ranges on the measures (a) from 0 to 52 for Vocabulary with higher scores reflecting greater vocabulary knowledge; (b) 1-3 for the BRIEF MCI, and 1-3 for the BRIEF BRI with higher scores indicating greater problems with daily executive functions; (c) 16-96 for Identity Achievement, Moratorium, Diffusion, and Foreclosure with higher scores indicating endorsement of the identity status; and (d) 2-8 for Career Certainty and 16-64 for Career Uncertainty with higher scores reflecting greater certainty and uncertainty, respectively.

Table 2. Correlations Between Measures of Identity and Executive Function.

| MCI              | BRI |
|------------------|-----|
| Identity diffusion| .235| .03 |
| Identity foreclosure| .057| .315*|
| Identity moratorium| .362*| .397**|
| Identity achievement| -.408***| -.218|

Note. MCI = Metacognitive Index; BRI = Behavior Regulation Index. Data displayed represent correlations after controlling for verbal intelligence. *p < .05. **p < .001.

indicate executive function difficulties. There were statistically significant positive correlations between the BRIEF MCI index and identity diffusion, \( r(68) = .235, p < .050 \), as well as the BRIEF BRI index and identity foreclosure \( r(68) = .315, p < .008 \). Identity moratorium was positively correlated with the MCI, \( r(68) = .362, p < .002 \), and the BRI, \( r(68) = .397, p < .001 \). There was a negative correlation between the identity achievement and the MCI, \( r(68) = -.408, p < .001 \), while the correlation between identity achievement and the BRI, \( r(68) = -.218, p < .070 \), represented a statistical trend (Table 2).

Regression Analyses of Executive Function, Identity, and Career Decision-Making

Separate regression analyses were conducted to examine the best predictors of career decision-making certainty and career decision-making uncertainty. For each analysis, the vocabulary score was entered into the first step. The purpose of using the vocabulary score as a covariate in these analyses was to account for the possibility that a portion of the shared variance between the executive function and identity measures, and that of career decision-making was due to verbal ability. Given that all three constructs were measured by means of self-report, each survey is likely to tap verbal skills to some extent. In the second step of the analysis, the two executive function variables (MCI and BRI) and four identity variables (Identity Achievement, Moratorium, Diffusion, and Foreclosure) were entered into the model. Next, a process of backward elimination was conducted, such that only significant predictors of career certainty and uncertainty were included in the final model.

In the prediction of Career Certainty, the regression analysis including vocabulary as a covariate, identity achievement, and executive function, specifically the metacognitive index of the BRIEF, explained 28% of the variance, \( F(3, 70) = 8.870, p = .000, R^2 = .275 \). In this model, standardized beta weights indicate that identity achievement, \( \beta = .324, p = .004 \), and MCI, \( \beta = -.287, p = .011 \), were significant predictors of Career Certainty, whereas vocabulary was not (Table 3). Alternatively, for the prediction of Career Uncertainty, the regression analysis suggested a model consisting of vocabulary, identity achievement, identity diffusion, and the behavior regulation index that predicted almost 48% of the variance in this construct. The full regression model was significant, \( F(4, 67) = 15.475, p = .000, R^2 = .480 \), and standardized regression coefficients suggested that vocabulary, \( \beta = -.214, p = .021 \); identity achievement, \( \beta = -.292, p = .003 \); identity diffusion \( \beta = .409, p = .000 \); and the BRI index, \( \beta = .270, p = .004 \), were all significant predictors of Career Uncertainty (Table 4).

Discussion

The goals of the current study were to fill the gaps in our knowledge regarding the associations among three constructs putatively related to a major milestone in emerging adulthood, the exploration of and commitment to a vocational
identity. Whereas previous research has established the link between identity development and career decision-making, the associations between a relevant domain of cognition, executive function, and identity and career decision-making have been unexamined to date. In general, there is little attention to the cognitive underpinnings of these constructs in the recent literature on vocational development.

The findings of this study support a relationship between identity and career decision-making that has been reported in the literature (e.g., Blustein et al., 1989; Vondracek et al., 1995), with career certainty predicted by higher scores on identity achievement. In contrast, career uncertainty was negatively related to identity achievement, but positively related to moratorium and diffusion, consistent with the characterization of these two identity statuses with regard to a lack of commitment. These results are consistent with the conclusions of Blustein et al. (1989) who found that occupational commitment was positively related to identity achievement, and such associations are not surprising given that a subset of the questions on the EOM-EIS-R are related to the occupational decision-making aspects of identity development.

In addition, this study expanded on previous research suggesting a link between executive function and identity by explicitly testing this relationship with specific measures of each construct. Our results provide empirical support for the theoretical speculation of Norvilitis and Reid (2002) and Shanahan and Pychyl (2007) that there is a relationship between executive function and identity status. Consistent with our predictions, the metacognition component of executive function (working memory, planning/organization, organization of materials, and task completion) was related to the successful attainment of identity achievement, necessitating commitment and exploration. Furthermore, increased levels of metacognition were negatively correlated with identity Diffusion, characterized by a lack of commitment and exploration. These results suggest a possible role for working memory, planning/organization, organization of materials, and task completion in the process of exploring and committing to a chosen identity in emerging adults.

Moratorium, characterized by a lack of commitment, was associated with reports of greater difficulties with the metacognitive index and the behavioral regulation index. This demonstrates that individuals who are actively exploring, but have not yet committed to a direction or plan, are also self-reporting problems with aspects of executive function such as planning, working memory, and organized behavior, as well as the executive function components of emotion regulation, inhibition, and flexibility. One interpretation is that those students who are aware of their active exploration, but also their lack of commitment, may view their own executive functions as inadequate not only in their daily behaviors but also in the process of developing a strong sense of identity. In addition, we found that the difficulties with the behavioral regulation component of executive function were related to the identity status characterized by a lack of exploration, that is, foreclosure. One interpretation is that individuals with lower levels of inhibition, shifting, emotional control, and monitor are more likely to commit to an identity before exploring all possible options, perhaps because they see themselves as not having the types of skills required to support such exploration. Interestingly, behavioral regulation was only moderately related to identity achievement, and was not significantly related to identity diffusion.

The major thrust of our study, however, was to examine the joint contributions of identity and executive function to career decision-making, especially levels of certainty and uncertainty. Whereas, the literature clearly establishes a role for identity (e.g., Blustein et al., 1989; Vondracek et al., 1995) there is a need to explore the contribution of cognitive skills to this decision-making process. The hierarchical multiple regression analyses demonstrated that identity achievement and executive function, specifically the metacognitive index, were significant predictors of career certainty. The results suggest that individuals with greater levels of working memory, planning/organization, organization of materials, and task completion along with higher levels of identity achievement are more likely to report greater certainty about their plans for their future career. These findings are consistent with the “planning style” of exploration (Lumberg, 1987) and “job search intensity” (Werbel, 2000) that are both related to vocational growth. In addition, the results dovetail nicely with the literature on the importance of career decision-making self-efficacy to the process of career development. As reported in several studies (e.g., Bullock-Yowell et al., 2011, 2012; Tang et al., 2008), this manifestation of self-efficacy involves confidence in one’s ability to plan, set goals, and engage in organized, strategic behavior, and this degree of confidence is positively related to career decision-making. It makes sense that one’s confidence in such abilities would be related to one’s self-perception of strengths in the underlying skills—planning, goal setting, organized behavior—that is, executive functions. Our findings demonstrate that self-reported executive function skills are, indeed, positively related levels of career decision-making certainty.

In contrast, an individual’s scores on verbal intelligence, identity diffusion, identity achievement, and the behavior

| Step 2 Vocabulary | 0.214 | −2.358 | 0.021 |
|-------------------|-------|--------|-------|
| Step 1 Vocabulary | 0.234 | −2.017 | 0.048 |
| EOM-EIS diffusion | 0.409 | 4.416  | 0.000 |
| EOM-EIS identity achievement | −0.292 | −3.072 | 0.003 |
| BRIEF BRI | 0.27  | 2.988  | 0.004 |

Note. EOM-EIS = Extended Objective Measure of Ego Identity Status; BRIEF BRI = Behavior Rating Inventory of Executive Function Behavioral Regulation Index.

Table 4. Backward Elimination Regression Model Predicting Career Decision-Making Uncertainty.
The finding that the behavior regulation aspect of executive functions more reliably predicted career uncertainty supports other authors’ speculations that “affectively charged” cognitions (Cassidy, 1990; cited in Germeijjs, & Verschueren, 2009) are evident during career indecision phases. The components of the behavior regulation index of the BRIEF may be considered to be “hot” executive functions (e.g., Egeland & Fallmyr, 2010) or those executive functions infused with emotional and motivational forces. In addition, Gati and Amir (2010) point out that career decision-making difficulties (i.e., indecision, uncertainty) frequently involve general indecisiveness, problems obtaining information, and challenges distinguishing reliable from unreliable information. Our finding that low vocabulary (perhaps reflective of other intellectual deficits) was related to career uncertainty, but not certainty, might suggest how verbal intelligence, along with executive function impairments, interfere with the exploration and information gathering that can lead to a diffused identity and higher levels of career uncertainty.

**Limitations**

Whereas this study provides a foundation for the further investigation of executive function, identity, and the role of each in the career decision-making process, we must note several limitations. This preliminary study included a relatively small sample of traditional-aged students early in their college career, and further research would benefit from the investigation of the relationship between executive function, identity, and career decision-making among individuals in different age groups, as well as in varying situations (e.g., non-college educated young adults). For example, we were perplexed by the finding that neither the Moratorium nor Foreclosure identity statuses were significant predictors of career certainty or uncertainty in our study. One speculation is that, in a relatively homogeneous typical sample, the “extremes” of the identity variable (i.e., Identity Achievement that involves exploration and commitment, and Diffusion that involves neither exploration nor commitment) emerge as the most sensitive predictions. Similarly, studying a non-college sample of emerging adults might provide more variability in the BRIEF measure of executive functions and allow an examination of how more serious impairments in executive function may affect the career decision-making process.

Further limitations include the fact that correlational findings cannot determine cause and effect, and future studies should use longitudinal designs and path analysis to determine whether causal and meditational relationships among these constructs can be determined. Moreover, it is important to note that, given that the measures used in this study were self-report, there is the possibility of shared measurement variance and a halo effect artificially increasing the correlations observed.

**Research Directions and Practical Implications**

This study builds on previous research and explores the role of executive function, a mechanism not previously investigated as factor instrumental in the career development process. Importantly, exploration of the connections between executive functions and career decision-making self-efficacy will be a potentially fruitful area of future inquiry. It may be the case that career decision-making self-efficacy is the mediator between executive function and the career decision-making process. Moreover, the current evidence of the role of executive function abilities in the prediction of career uncertainty is potentially helpful for counselors, parents, and teachers. The logical extension of this finding is that activities that may increase basic levels of executive function and the subsequent likelihood of identity achievement may better prepare adolescents and emerging adults for making decisions about their futures. In addition, career counselors may be able to use the predictors of career uncertainty found in this study—lower vocabulary, executive function deficits, and a particular pattern of identity status—to identity students who might be at risk for delayed or difficult career exploration and commitment.

**Conclusions**

Notwithstanding the limitations stated above, this study represents an important contribution to an emerging literature that has been replete with speculations, but few direct investigations of the contribution of executive function to identity and to career decision-making. According to the current findings, elements of self-reported executive function are related to identity statuses and differentially predict the domains of career decision-making certainty and uncertainty. Continued research utilizing direct measures of executive/prefrontal function will illuminate the manner in which neurological development may influence identity development, vocational development, as well as other important domains of future planning characteristic of emerging adulthood.

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