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We examined the critical task of emerging adulthood—identity development—via analyses of trajectories of identity exploration and commitment over the college years, as well as whether narrative processing of important events during this period served as a mechanism of identity exploration and commitment. We took advantage of a unique and comprehensive longitudinal design, which included 12 waves of data, both quantitative and qualitative assessments, collected over 4 years, on two distinct college campuses in the Northwestern and Northeastern regions of the United States (Wave 1, $n = 639$; growth models using all waves, $n = 251$). Analyses for this study were preregistered after data collection was complete. We first examined trajectories of exploration and commitment via the dual-cycle identity model. Second, we examined whether exploratory processing in the narration of future self-defining memories at specific waves predicted changes in exploration and commitment in subsequent waves. Findings indicated that exploration and commitment showed trajectories typically viewed as normative (e.g., increasing adaptive forms of exploration and commitment), although trajectories for those at higher socioeconomic statuses differed by showing more exploration and less commitment. We failed to find evidence that exploratory processing predicted changes in exploration and commitment. Implications include distinctions in measurement and theoretical approaches to the study of identity development, the need for greater understanding of what is developing before theorizing how it develops, and the limitations of what is considered normative without attention to structural constraints, such as social class.

Public Significance Statement
Healthy forms of identity development in college play a critical role in academic success and psychological adjustment. The forms of this development, as well as potential explanations for changes in how one understands the self through college, have been lacking. Findings from our 4-year study show that college students generally explore their options more intensely across this time period and move toward committing to particular identities. However, these trends differed for those who come from higher social class backgrounds, suggesting that the opportunities for self-exploration may be limited by financial resources. Finally, the way college students narrated important events during this time did not predict how much they explored and committed to their identities, leaving open questions about why students move through processes of exploration and commitment during college.

Keywords: identity development, emerging adulthood, narrative identity, dual-cycle model, exploratory processing

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Erikson (1963) proposed that the formation of a clear and coherent identity is an essential developmental task during adolescence and into adulthood. This timeframe includes what has since been articulated as emerging adulthood, ages 18–29, which is a developmental period defined by feelings of being "in-between"—that is, no longer an adolescent, but not fully an adult (Arnett, 2000, 2014). During this developmental period, new experiences and cultural demands push individuals to begin to explore their identities—to consider who they are, who they want to be, and how and where they fit into society. Notably, attending college often provides a developmental context in which the pursuit of answers to these cultural demands is especially prevalent and scaffolded through the process of higher education (e.g., selecting majors/careers). However, extant research has focused largely on defining processes of development with little attention to what mechanisms are driving those processes (e.g., McLean & Pasupathi, 2012). Using 12 waves of data from emerging adults throughout their college careers, we sought to examine the relationship between two complementary approaches to identity development, dual-cycle and narrative approaches, by evaluating whether the narration of exploratory processing at one time point would predict changes in identity formation processes (i.e., exploration and commitment) in subsequent time points.

Identity Development

According to Erikson's (1963) theory, identity development occurs throughout the lifespan, driven largely by the pursuit of an answer to the question, "Who am I?" But there are certain developmental periods where this question is more pressing. The cognitive, socioemotional, and physical changes that occur during adolescence and into emerging adulthood, alongside an increasing prevalence of cultural and societal expectations to define the self, make personal identity formation particularly relevant (Erikson, 1968), perhaps especially in industrialized western contexts where development as an individual is more emphasized. Most scholars of identity development argue that the way in which people answer this "Who Am I?" question is through processes of exploration, which can subsequently lead to a greater understanding of the self, sometimes referred to as commitments (e.g., Luyckx et al., 2006; Marcia, 1966; McLean et al., 2007). However, as discussed by McLean and Pasupathi (2012), research on identity development often focuses heavily on what the identity development processes are without understanding how those processes occur. Here, we outline two models of identity development used for the present study, and discuss how they might be used together in order to capture both the processes of identity development and a potential mechanism for those processes.

The Dual-Cycle Model of Identity Development

An early interpretation of Erikson's theory of identity development operationalized exploration and commitment, with the presence or absence of one or both leading to one of four possible identity statuses (also known as the identity status approach to identity; Marcia, 1966). This original conceptualization of identity status most closely aligns with identity formation processes that have since been called exploration in breadth and commitment-making, which indicate how much someone has considered a variety of possibilities for their future and subsequently committed to pursuing them

(Waterman, 2015). However, some scholars later found this early model to be limited in its ability to adequately capture the varied dynamics of identity formation, particularly when it came to reevaluating and identifying with existing commitments, as well as recognizing when getting stuck in these evaluative processes becomes maladaptive (Luyckx, Schwartz, Berzonsky, et al., 2008).

Thus, Luyckx et al. (2006), Luyckx, Schwartz, Berzonsky, et al. (2008) elaborated this initial model by defining a dual-cycle model of identity development, including a cycle of commitment formation and a cycle of commitment evaluation. The commitment formation cycle is essentially the same as what was defined by Marcia's (1966) theory, and includes the original dimensions of exploration in breadth and commitment-making. However, the commitment evaluation cycle involves reflection and continued exploration about existing commitments and making decisions about whether to retain those commitments or search for alternatives. Therefore, in this model, processes of exploration and commitment include exploration in depth and identification with commitments, processes that reflect a more dynamic and cyclical process of continued evaluation and maintenance of existing commitments (Luyckx et al., 2006). Distinct from exploring possibilities for commitment (e.g., various majors), as defined by exploration in breadth, exploration in depth concerns the reflection on commitments that have already been made (e.g., how one sees oneself as a psychology major once declared). Identification with commitments refers to how secure one is with one's commitments and how well they fit with one's values and hopes for the future. Finally, a fifth dimension called ruminative exploration was added (Luyckx, Schwartz, Berzonsky, et al., 2008). This dimension reflects the degree to which an individual may become distressed or overwhelmed during the exploration process and subsequently find themselves stuck in a cycle of passive rumination, which may occur at any point of the identity formation process (Luyckx, Schwartz, Berzonsky, et al., 2008). In short, these dimensions are designed to reflect the varying processes that individuals go through as they come to understand who they are and where they are going, and they reflect the idea that identity development is a lengthy and cyclical process.

Despite the improved definition of exploration and commitment as processes of identity development, dual-cycle approaches (often operationalized as the Dimensions of Identity Development Scale [DIDS]; Luyckx, Schwartz, Berzonsky, et al., 2008), including the one used in the present study, tend to be quite broad and general snapshots of processes in a particular moment in time (see also Crocetti et al., 2008). Thus, there is little explanation for what individuals might be doing, or the activity of exploring and committing, or the potential mechanisms of these developments over time. This may be, in part, because even many of the existing longitudinal studies are not well equipped to identify mechanisms of change due to limited time spans of study (e.g., three waves over 1 year, Negru-Subtirica et al., 2016), few time points of assessment (e.g., three waves over 3 years, van Doeselaar et al., 2020), and/or inappropriate measurements and operationalizations of identity processes based on the frequency of those measurements (e.g., attempting to measure microlevel changes of identity using macrolevel measurements on a day-to-day basis, Klimstra, Luyckx, et al., 2010; see also Klimstra & Schwab, 2021). In short, such designs are ill-equipped to understand mechanisms that explain the unfolding of exploration and commitment over the lengthier time frame in which identity is actually developing.

Additionally, while many longitudinal studies of mean-level change in identity development processes have found evidence for general, systemic patterns of identity maturation (i.e., increases in both commitment and exploration), as well as some stability through adolescence and young adulthood (e.g., Klimstra, Hale, et al., 2010; Luyckx, Schwartz, Goossens, et al., 2008; for reviews, see Branje et al., 2021; Kroger et al., 2010; Meeus, 2016), few studies have used the DIDS to explicitly define developmental trends of identity development dimensions rather than assessing associations with particular outcome variables (e.g., Becht et al., 2019). For those that do, they often report trends that are constrained by additional grouping variables, such as identity status category, personality traits, or work status (e.g., Luyckx et al., 2013, 2014; Seiffge-Krenke et al., 2013). Thus, there is a need for robust assessments of mean-level, unconstrained longitudinal change in identity development processes, with multiple assessments over a long period of time during which identity processes are likely to be highly active. The present study is able to address this gap, with 11 waves of data assessing identity development processes with the DIDS, over 4 years, with a large sample of college-going emerging adults in the United States, at two quite distinct campuses. We were also able to assess a theoretically predictable mechanism of this development over time.

Narrative Identity as a Mechanism of Change in Exploration and Commitment

Researchers who employ a narrative identity model conceptualize identity development as a process of constructing narratives about one's important life experiences as they relate to developing self-conceptions (e.g., McAdams & McLean, 2013; McLean et al., 2007). More specifically, individuals are considered to use processes of autobiographical reasoning to gain insight into themselves through reflection on the past. Autobiographical reasoning centers on the degree to which a person makes meaning of past events by reflecting on them and creating causal links between their personal past, their current self, and their imagined future (Habermas & Bluck, 2000).

One form of autobiographical reasoning used in the present study is "exploratory processing," or the degree to which individuals engage in narrative reflection about the meaning of past events to the current understanding of who they are, with an openness to being transformed in some way by these events (e.g., Pals, 2006). Exploratory processing was developed to index the narrative activity of identity work, or how an understanding of self through time develops. In short, a narrative approach to identity development works from the assumption that meaning-making processes about past events, including exploratory processing, are an engine of developing self-understanding—they provide a way for people to explore their identities and then commit to their emergent goals, values, and belief systems.

In a conceptual model proposed for integrating status and narrative approaches to identity, McLean and Pasupathi (2012) suggested that the identity status-based approaches, such as the dual-cycle model, and the narrative approach could be complementary to one another, such that each approach has strengths and weaknesses that the other might address in order to capture a fuller understanding of identity development. They posited that processes like exploration in-breadth and in-depth are processes that could be conducted via narration of the past. More specifically, narrative processes could be one mechanism by which changes in identity exploration and commitment occur. For example, as one examines the meaning of an academic failure or success, such examination might prompt exploration of one's developing academic or career identity, and potential commitment to a particular academic or career path.

Furthermore, autobiographical reasoning not only facilitates the development of self-understanding but also maintaining stability in self-understanding (McLean et al., 2007; Pasupathi et al., 2007). For example, reflection on an academic success might solidify or strengthen the commitment one has made to a particular pathway. Thus, narrative indicators of identity development could be related to dual-cycle dimensions that emphasize processes of creating and committing to parts of an identity (i.e., exploration in breadth and commitment-making) as well as maintenance of existing identity-relevant commitments (i.e., exploration in depth and identification with commitments). Conceptually, individuals who have become distressed and withdraw from engagement in identity commitments or exploration (i.e., ruminative exploration) could also be seen as possibly lacking in autobiographical reasoning (i.e., not seeing connections between past events and the current or future self). In line with the general concept of narrative processing driving stability and change within identity status, a recent study found participant narratives within each identity status did have some common themes that could illuminate the thought processes and life events that may contribute to identity formation (e.g., participants' familial, educational, and romantic experiences all seemed to influence their identity formation processes and subsequent identity status; Skhirtladze et al., 2022). Thus, we test whether the process of narration is a possible mechanism for changes in dual-cycle identity dimensions over time.

Present Study

The present study involves a longitudinal examination of identity development in college-going emerging adults, with preregistered analyses using 12 waves of data across 4 years, at two distinct college campuses. Our primary question concerned the role of exploratory narrative processing as a mechanism of change in identity exploration and commitment. Our design provides a significant contribution to existing literature in several ways. First, many studies utilizing both narrative and status approaches have operationalized narrative indicators of autobiographical reasoning that are less focused on the activity of exploration, such as self-event connections and meaning-making (McLean et al., 2014; Pasupathi et al., 2007). Both of these narrative indicators may be theoretically assumed to involve some degree of exploration, but do not necessarily assess identity exploration explicitly. In the present study, our narrative indicator was exploratory processing, which is a direct measure of exploration.

Second, the dual-cycle model and other identity status approaches are typically focused on the present (i.e., a snapshot of a current moment in time) or future (i.e., knowing where you're going; McLean & Pasupathi, 2012). Survey questions typically ask about what one is currently exploring or committed to in relation to the future (e.g., "I have decided on the direction I want to follow in life"). Narrative approaches to identity are typically focused on the past and how interpretations of that past connect to the present self, at least in the way that they are employed empirically (Syed & McLean, 2016). Narrative prompts are typically focused on past events and participants are encouraged to narrate such events in terms of their meaning to one's current self-understanding. However, in the current study, exploratory processing was coded

from participants who provided future self-defining memory narratives. Instead of the typical approach of asking for a self-defining memory that is important to the current self (e.g., Singer & Salovey, 1996), in a novel assessment, we asked participants for a self-defining memory that was "most significant in defining your view of your ideal future self, the adult you ideally hope to become." In this way, we are able to examine the extent to which recent past events occurring during the college years stimulated exploratory processing about the development of the future self, an approach that we hoped would maximize the potential for overlap with the more present and future-focused dual-cycle approach.

The second major contribution of our design is that it also allowed us to test the unconditional change in processes of identity development across a lengthy period of time (4 years), when identity development is a pressing task (for emerging adults in the college context), and with multiple assessments (11 waves). This is a significant advance over prior longitudinal designs. Additionally, as mentioned above, the DIDS typically assesses five dimensions of commitment and exploration (Luyckx, Schwartz, Berzonsky, et al., 2008), but recent research has suggested that the original five-dimension structure may not be adequate, and that there may be a sixth dimension or factor, reconsideration of commitments. This new dimension reflects the process of worrying about present commitments and looking for new ones, and is associated with negative psychological outcomes, similar to excessive ruminative exploration (Beyers & Luyckx, 2016). Thus, the present study can contribute to the existing literature by providing both a robust evaluation of unconditional change in DIDS across time for a relatively large sample across many time points (i.e., 11 waves across 4 years), as well examining the factor structure of this measure using longitudinal data.

As articulated in our two-step preregistration, we examined exploratory processing as a mechanism of change in dimensions of exploration and commitment. We first tested the factor structure of the DIDS to determine how many factors there were. We next examined the unconditional models of the dimensions of the DIDS to observe change over time. We did not have hypotheses about what the unconditional growth trends would be. We then proceeded to examine whether exploratory processing predicted changes in the dimensions of the DIDS. Given the modesty and inconsistency of past research on relations between narrative and identity status models (e.g., McLean & Pratt, 2006; van Doeselaar et al., 2020), we had no specific hypotheses for how the two would be related. We also included measures of socioeconomic status (SES), gender, and conscientiousness because we know from prior analyses with this data set that they are associated with missingness (Lilgendahl & McLean, 2020).

Method

The present study made use of a longitudinal data set with which we have a good deal of familiarity. Data were collected under the approval of the Institutional Review Boards for Western Washington University and Haverford College. Data collection was completed as part of a larger study prior to the beginning of this project (Wave 1 data were collected in a staggered fashion between 2013 and 2015). Portions of the data set had already been analyzed for other studies and participant narratives had been coded prior to our preregistration of the specific analyses for the present article. However, the narrative codes and survey measures employed in the present study have not been used for any other analyses from this project. We note that the data file itself cannot be shared publicly due to restrictions from the Institutional Review Board.

Participants and Procedure

Participants were drawn from the Identity Pathways Project (IPP), an ongoing longitudinal study of college student development involving students from two institutions, a small, private, highly selective liberal arts college in the Northeastern United States (Campus 1) and a medium-sized, public, moderately selective state university in the Northwestern region of the United States (Campus 2). IPP is a multi-wave study in which participants completed a written online survey in the summer before college began (Wave 1), winter and spring of freshman year (Waves 2 and 3), and fall, winter, and spring for the following 3 years (Waves 4–12), and a 1-year postgraduation follow-up (Wave 13). The current analyses used data from Waves 1–12, using baseline demographic variables collected in Wave 1 (i.e., gender, conscientiousness, and SES), the DIDS collected in Waves 2–12, and exploratory processing coded from narratives collected in Waves 4, 7, and 10. Due to the complexity of the larger longitudinal project, with many assessments at each wave of data collection, not all narrative assessments could be offered at every time point. Thus, future self-defining memory narratives were collected once per year, starting in Year 2, at waves that were evenly spaced apart.

The samples at each institution were recruited during the summer to complete Wave 1 prior to starting college (recruited between 2013 and 2015), with an aim of recruiting approximately 300 participants per campus. For Campus 1, all members of the entering classes of 2013 and 2015 were invited to participate. In the Summer of 2013, 48% ($N = 159$) of the entering class participated, and 45% ($N = 157$) of the entering class in 2015 participated.

For Campus 2, there were approximately 3,000 students in the two entering classes from which we recruited for this study (2014 and 2015). Students who attended summer orientation (90% attendance rate) received a flyer about IPP. In the Summer of 2014, a randomly selected sample of 400 students (gender balanced) were sent an invitation to participate. Once 150 people completed the survey, recruitment was halted. A similar procedure was used in the Summer of 2015, except that we oversampled underrepresented students interested in science, technology, engineering, and math fields for project goals not pertaining to this article (McLean, Koepf, & Lilgendahl, 2022). An email invitation was sent to 500 students, which resulted in 173 participants from this class. Across the two campuses, 638 participants completed the Wave 1 survey ($n = 315$ for Campus 1 and $n = 323$ for Campus 2).

For the full Wave 1 sample, 35% ($n = 221$) identified as male, and 63% ($n = 405$) identified as female (eight provided alternative responses and five were missing). For race/ethnicity, participants selected all applicable response options or wrote their own; 75% selected white, 18% selected Asian, 10% selected Latino/a, 6% selected Black/African American, 2% selected Native American, and 1% selected "other." Additionally, 13% selected more than one racial category. Although this overall pattern was quite similar across campuses, there were significant differences in the proportions selecting white (Campus 1 = 69%, Campus 2 = 80%) and Black/African American (Campus 1 = 9%, Campus 2 = 3%). This pattern is generally consistent with both institutional and regional demographic differences between the two campuses.

SES was assessed with household income and maternal and paternal educational level. Consistent with institutional differences, the campuses differed on all three indicators. Household income was assessed with nine categories, with 1 = less than $10,000 a year to 9 = over $200,000 a year. The mode for both campuses was $90,000–$120,000 and the range for both campuses was 1–9; however, for Campus 1, 43% fell below $90,000 and 36% fell above $120,000, whereas for Campus 2, 60% fell below $90,000 and 21% fell above $120,000. The most extreme disparity was in the highest category of over $200,000, with 20% for Campus 1 and 5% for Campus 2. For Campus 1, 45% of mothers had a master's degree or higher, 33% had a 4-year college degree, and 21% had some college or less. Similarly, 52% of fathers had a master's degree or higher, 23% had a 4-year college degree, and 22% had some college or less. In contrast, for Campus 2, 22% of mothers had a master's degree or higher, 26% had a 4-year college degree, and 53% had some college or less. Similarly, 22% of fathers had a master's degree or higher, 28% had a 4-year college degree, and 50% had some college or less.

Missingness

Previous attrition analyses using this data set (e.g., Lilgendahl & McLean, 2020) showed that gender (coded as men vs. women, since only eight participants identified outside of the gender binary), trait conscientiousness, and SES were associated with missingness in the data. Specifically, participants who dropped out after Wave 1 versus those who completed at least one other wave were more likely to be men, $\chi^2(1) = 6.96$, $p = .01$ (adjusted standardized residual = 2.6), and lower on conscientiousness, $t(636) = 2.41$, $p = .01$, $d = 0.19$. There was no difference in drop out after Wave 1 for SES, $t(635) = -0.01$, $p = .99$, $d < 0.001$. Associations between these variables and the number of waves completed showed that, on average, participants identifying as women completed more waves than those identifying as men, $t(623) = -2.68$, $p = .01$, $d = 0.21$, those with higher family SES completed more waves than those with lower SES, $r(637) = .09$, $p = .03$, and those higher on conscientiousness completed more waves than those lower on conscientiousness, $r(638) = .12$, $p = .01$. Finally, examining participants who completed at least one wave in the final year (Waves 10–12) versus those who completed one wave prior (Waves 2–9) showed that those with higher SES were marginally more likely to have completed at least one wave in the final year compared to those with lower SES, $t(543) = -1.97$, $p = .05$, $d = 0.17$, but there were no differences for gender, $\chi^2(1) = 0.36$, $p = .55$ or conscientiousness, $t(543) = -1.56$, $p = .12$, $d = 0.13$. Knowing that these variables were associated with various types of attrition, we employed them as covariates in our final models (described below).

Measures

All measures and prompts can be found on our Open Science Framework (OSF) site for the larger project.

Dimensions of Identity Development

The DIDS (Luyckx, Schwartz, Berzonsky, et al., 2008) was administered to participants at Waves 2–12. The DIDS is a 25-item self-report questionnaire designed to assess identity status based on five dimensions of identity development on a 5-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) (see sample

items in reported factor analyses below). However, some research since its original conception has suggested that a factor structure using six dimensions is more fitting (e.g., Beyers & Luyckx, 2016; Skhirtladze et al., 2016). This is discussed in further detail below. Reliability for this scale is also included below, after examination of the factor structure, to allow for accurate reporting for each dimension.

Conscientiousness

Conscientiousness was measured at Wave 1 with the Big Five Inventory (BFI; John & Srivastava, 1999). The BFI is a commonly used self-report measure of the big five traits in which participants rate, on a 5-point scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*), the extent to which 44 statements reflect their traits. The conscientiousness subscale of the BFI contains nine items (e.g., "Is a reliable worker" and "Perseveres until the task is finished"). The alpha reliability for this subscale at Wave 1 ranged from .79 to .81 (across cohorts and campuses). After reverse-scoring necessary items, all items were averaged together to create a single conscientiousness score for each participant.

Narrative Prompts and Coding

At Waves 4, 7, and 10, participants were provided with the same narrative prompt for a future self-defining memory, which is a novel prompt developed specifically for IPP (adapted from Singer & Moffitt, 1991–1992):

> Looking back over the past year (last school year and this past summer), what event or experience was the most significant in defining your view of your ideal **future self**, the adult you ideally hope to become? Tell us about this event in as much detail as possible–what happened, where, with whom, what you were thinking and feeling at the time. Also, explain in detail how this event shaped your vision of your ideal future self.

These narratives were subsequently coded for the presence of exploratory narrative processing (adapted from Pals, 2006). Exploratory processing is defined as, "the extent to which a person openly analyzes and explores the meaning of past events in order to understand their internal impact and potential to change the self or one's broader understanding of life, the world, people, etc." It is coded on a 1–4 scale, with 1 being *not at all* or *minimally* exploratory, and 4 being *highly exploratory in both style and content*.

Reliability was established using the typical guidelines and processes for the field (Syed & Nelson, 2015). Prior to the development of this project (Summer 2019), a team of two student coders (not authors of this article) were trained in how to code for exploratory narrative processing by the person who developed the concept and coding procedure for exploratory narrative processing (Pals, 2006) and is a coprincipal investigator on IPP. After training, student coders coded all of the sets of future self-defining memories in IPP and used in this project—all four campus/cohort subgroups at Waves 4, 7, and 10. They used Campus 1, Cohort 1, Wave 4 as one set of training purposes and engaged in an iterative process of coding subsets of narratives and discussion that resulted in an ICC of .77. After that training process, the two coders worked independently to code the remaining sets of future self-defining memory narratives across the waves. ICCs were coded for each of the four subgroups (campus/cohort) at each wave and results in ICCs ranging from .74 to .88 (with all but one of the 11 formal ICCs calculated being greater than .80). Because exploratory processing was scored on a

continuum, final scores for each participant at each wave were created by averaging the two coders' ratings together.

Analysis Plan and Two-Step Preregistration

Because there were known to be at least two possible factor structures for the DIDS, we preregistered our first set of analyses to assess the appropriate factor structure of the DIDS using confirmatory factor analysis (CFA) using a variety of model fit indices (chi-square, comparative fit index [CFI], root-mean-square error of approximation [RMSEA], and standardized root-mean-square residual [SRMR]), which was subsequently assessed for measurement invariance. Following the identification of the best factor structure (described below) and adequate invariance, we updated our preregistration to continue with the primary analyses. We conducted piecewise growth curve models using a model-building approach and traditional model fit criteria (i.e., chi-square and Bayesian information criterion [BIC]). First, we estimated developmental trends in the DIDS over time using freely estimated models, testing for linear, cubic, and quadratic patterns of growth. Upon identifying the best-fitting model, we tested covariate versions of those models using the variables known to be associated with missingness in the data (i.e., gender, conscientiousness, and SES). In order to keep the models as parsimonious as possible, we retained only statistically significant covariates for further analysis. We then conducted the full piecewise growth models. In such a model, the predictor is added as a "knot" at particular time points to assess change in the outcome variable at subsequent time points. We assessed exploratory narrative processing (Waves, 4, 7, 10) as a predictor of change in the intercepts (Waves 4, 7, 10) and slopes of each DIDS factor (Waves 5–7, 7–10, 11–12), predicting a total of three intercepts and three slopes with exploratory processing considered statistically significantly predictive at $p < .05$.

Results

All reported analyses and decisions throughout the Results section were preregistered unless indicated otherwise. Script for analyses conducted via R software (RStudio Team, 2020) can be found on OSF.

CFA

Participants completed the 25 items of the DIDS at 11 different time points (Waves 2–12). Data from respondents were used for two CFA, which were subsequently compared to one another using a model fit approach. Appropriate model fit indices are debated, so a variety of methods were used: chi-square, CFI, RMSEA, and SRMR. As stated above, the DIDS was designed with a five-factor structure (Luyckx, Schwartz, Berzonsky, et al., 2008), yet subsequent studies have found a six-factor structure to be a better fit (e.g., Mastrotheodoros & Motti-Stefanidi, 2017). Because of the two possible factor structures presented in previous literature, we sought to first identify which structure would be the best fit for our data. Additionally, our focus was the relative fit between different possible models, so model fit criteria were slightly lower than traditional criteria (e.g., Hu & Bentler, 1999). Acceptable criteria for model fit for chi-square was less than three times the degrees of freedom. Criteria for CFI were values of at least .85 showing acceptable fit. Criteria for both RMSEA and SRMR were values of less than .10 indicating acceptable fit.

Two CFAs were conducted at each of 11 waves of data (Waves 2–12) for the 25 items with the program JASP (Version 0.16.3; JASP Team, 2022) using maximum likelihood factoring. For each wave of data, the first CFA separated the 25 items into five latent factors, in accordance with the intended factor structure of the DIDS from its original conceptualization (Luyckx, Schwartz, Berzonsky, et al., 2008). The second CFA separated the DIDS items into six factors, per the recent research suggesting that may be a better structure (Beyers & Luyckx, 2016; Mastrotheodoros & Motti-Stefanidi, 2017; Skhirtladze et al., 2016). All latent variables were allowed to correlate, and item scaling was used to make the model solvable. No error terms were specified to correlate. The five- and six-factor CFAs were then compared with model fit criteria, and also by using a chi-square difference test. As shown in Table 1, the results of both the model fit comparison and the chi-square difference tests indicated that the six-factor model was a better fit for the present data across all waves and all fit indices. This six-factor model met all predetermined criteria for acceptable model fit, with the exception of the chi-square criteria in all but one of the waves, which was not consistent with acceptable fit. However, given the agreement across other fit indices and the fact that chi-square can be an overly sensitive statistical test, this model was still deemed acceptable and thus retained for subsequent analyses. These analyses provide evidence for configural invariance of the six-factor model across the 11 waves.

Because the items that were grouped together in the six-factor model mapped precisely onto results from prior research (Mastrotheodoros & Motti-Stefanidi, 2017), we retained the names of each factor used in past work. The first factor was commitment-making ($\alpha = .87$), indicated by five items (e.g., "I have decided on the direction I am going to follow in my life"). The second factor was exploration in breadth ($\alpha = .73$), indicated by five items (e.g., "I think actively about different directions I might take in my life"). The third factor was ruminative exploration ($\alpha = .81$), indicated by five items (e.g., "I am doubtful about what I really want to achieve in life"). The fourth factor was identification with commitments ($\alpha = .75$), indicated by five items (e.g., "My plans for the future match with my true interests and values"). The fifth factor was exploration in depth ($\alpha = .65$), indicated by three items (e.g., "I think about the future plans I already made"). The sixth factor was reconsideration of commitments ($\alpha = .62$), indicated by two items (e.g., "I try to find out what other people think about the specific direction I decided to take in my life").

The six-factor model was then tested for configural, metric, and scalar measurement invariance using multigroup CFA in JASP (Version 0.16.3; JASP Team, 2022). Although configural invariance was already established in the previous analyses that indicated consistent support for the six-factor solution, the JASP procedure provides additional evidence by testing whether the model adequately fits the data across waves, rather than additionally comparing to an alternative. The metric invariance test then compares a model with factor loadings constrained to be equal across waves to the previous configural invariance model in which the loadings were unconstrained. Finally, the scalar invariance test compares a model with the item intercepts constrained to be equal across waves to the previous metric invariance model in which the intercepts were unconstrained. There are no clear rules for acceptable levels of fit for measurement invariance, but there are some commonly used

Table 1

Model Fit Indices for CFA Comparing Five- and Six-Factor Structures for the DIDS Across 11 Waves of Data

Wave	Model	χ^2	df	CFI	RMSEA	RMSEA 95% CI	SRMR
2	Five-factor	1,296.301	265	.875	.090	[.085–.095]	.123
	Six-factor	962.758	260	.915	.075	[.070–.080]	.070
	Difference	333.543	5				
3	Five-factor	1,229.247	265	.850	.094	[.089–.099]	.102
	Six-factor	1,116.850	260	.867	.089	[.084–.095]	.081
	Difference	112.397	5				
4	Five-factor	1,150.749	265	.860	.093	[.087–.098]	.109
	Six-factor	996.328	260	.884	.086	[.080–.091]	.071
	Difference	154.421	5				
5	Five-factor	1,399.499	265	.831	.105	[.100–.110]	.145
	Six-factor	1,101.335	260	.875	.091	[.086–.097]	.082
	Difference	298.164	5				
6	Five-factor	922.733	265	.891	.080	[.074–.085]	.091
	Six-factor	839.768	260	.904	.076	[.070–.081]	.076
	Difference	82.976	5				
7	Five-factor	966.071	265	.881	.087	[.081–.093]	.112
	Six-factor	777.674	260	.912	.076	[.070–.082]	.070
	Difference	188.397	5				
8	Five-factor	1,086.495	265	.870	.094	[.088–.100]	.137
	Six-factor	826.080	260	.911	.079	[.073–.085]	.067
	Difference	260.415	5				
9	Five-factor	1,028.964	265	.862	.092	[.086–.098]	.128
	Six-factor	828.560	260	.897	.080	[.074–.086]	.075
	Difference	200.404	5				
10	Five-factor	1,305.557	265	.809	.112	[.106–.118]	.141
	Six-factor	918.244	260	.879	.090	[.084–.096]	.069
	Difference	387.313	5				
11	Five-factor	1,027.975	265	.865	.095	[.089–.101]	.120
	Six-factor	850.353	260	.895	.085	[.078–.091]	.065
	Difference	177.622	5				
12	Five-factor	1,059.724	265	.859	.098	[.092–.104]	.135
	Six-factor	821.674	260	.900	.083	[.077–.090]	.071
	Difference	238.050	5				

Note. CFA = confirmatory factor analysis; DIDS = Dimensions of Identity Development Scale; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; CI = confidence interval; SRMR = standardized root-mean-square residual.

suggested cutoffs (e.g., Putnick & Bornstein, 2016). Our criteria for invariance were ΔCFI of .01, ΔRMSEA of .015, and ΔSRMR of .030. If fit measures disagreed, we defaulted our conclusion to align with agreement between two-thirds criteria. We first tested invariance across waves using proximal time points (e.g., Waves 2 and 3, Waves 3 and 4). Results from this testing did not seem to indicate notable issues of variance in the data across time (see Table 2). We then attempted to test each factor individually for invariance across all waves. For the factors of commitment-making, exploration in breadth, ruminative exploration, and identification with commitments, invariance was mostly supported by at least two-thirds fit measures, with the exception of commitment-making which did not meet the criteria for metric invariance. However, invariance tests could not be modeled for exploration in depth or reconsideration of commitments, either separately or when combined. Finally, we attempted to test the full six-factor model across all waves. Results of the full model provided evidence for invariance, although scalar invariance could only be complete by removing Wave 10 from the analysis. The results from completed invariance tests across all waves can be found in the online supplemental materials, but taken together, the analyses do not suggest any major departures from invariance across waves for the six dimensions.

Data Modeling

To assess change in the DIDS across time, piecewise growth curve models were conducted using the *lavaan* package (Rosseel, 2012) in R (RStudio Team, 2020), using a model-building approach. In all models, we used the observed scale scores as indicators of the latent intercept and slopes. We did not use the latent dimension scores as indicators of the latent intercepts and slopes because such second-order latent models are computationally intensive, and we ran into some estimation problems when attempting to fit the much simpler multigroup CFA models across all 11 waves. The supportive evidence for invariance across waves suggests that this approach would not lead to substantially different estimates.

First, we tested for linear, quadratic, and cubic growth using freely estimated growth curve models with no covariates until there was a single, established preferred model for each of the six subscales. Model fit criteria for all model comparisons were a statistically significant chi-square difference test and ΔBIC greater than 2. If the two indices ever disagreed, we defaulted to BIC results. We then examined covariate models for each of the six subscales, using covariates that were known to be associated with missingness in the data (i.e.,

Table 2
Fit Indices of Measurement Invariance Results for Six-Factor Model of the DIDS Across 11 Waves of Data

| | | Type of measurement invariance | | |
| | | Configural ($\Delta df = 260$) | Metric ($\Delta df = 19$) | Scalar ($\Delta df = 19$) |
Wave	Fit index			
2/3	$\Delta\chi^2$	−412*	−112*	−233*
	ΔCFI	.006	.007	.014
	ΔRMSEA	−.004	−.001	−.004
	ΔSRMR	−.006	−.008	.001
3/4	$\Delta\chi^2$	−442*	−104*	−229*
	ΔCFI	.010	.006	.017
	ΔRMSEA	−.006	.000	−.004
	ΔSRMR	−.012	−.007	.000
4/5	$\Delta\chi^2$	−497*	−32*	−109*
	ΔCFI	.015	.001	.007
	ΔRMSEA	−.006	.001	−.001
	ΔSRMR	−.009	−.003	.002
5/6	$\Delta\chi^2$	−469*	−101*	−217*
	ΔCFI	.012	.006	.016
	ΔRMSEA	−.007	−.001	−.003
	ΔSRMR	−.008	−.006	.001
6/7	$\Delta\chi^2$	−312*	−132*	−243*
	ΔCFI	.002	.010	.018
	ΔRMSEA	−.002	−.002	−.005
	ΔSRMR	−.009	−.010	.000
7/8	$\Delta\chi^2$	−313*	−17	−24
	ΔCFI	.004	−.001	.001
	ΔRMSEA	−.002	.001	.001
	ΔSRMR	−.003	−.002	.002
8/9	$\Delta\chi^2$	−240	−30	−20
	ΔCFI	−.002	.001	.017
	ΔRMSEA	.000	.001	.002
	ΔSRMR	−.002	−.002	.002
9/10	$\Delta\chi^2$	−243	−27	−23
	ΔCFI	−.001	.000	.001
	ΔRMSEA	.001	.001	.002
	ΔSRMR	−.003	−.002	.002
10/11	$\Delta\chi^2$	−337*	−38*	−18
	ΔCFI	.006	.002	−.001
	ΔRMSEA	−.003	.001	.001
	ΔSRMR	−.005	−.005	.002
11/12	$\Delta\chi^2$	−291	−46*	−40*
	ΔCFI	.002	.003	.002
	ΔRMSEA	−.001	.001	.000
	ΔSRMR	−.004	−.004	.002

Note. DIDS = Dimensions of Identity Development Scale; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual.
* $p < .05$.

gender, conscientiousness, and SES; see Lilgendahl & McLean, 2020) to predict all the intercept and slope of each model.[1] We subsequently retained only statistically significant covariates of each subscale for further analysis in order to keep each model as parsimonious as possible.

After establishing the type of growth present across time and the statistically significant covariates of the intercepts and/or slopes for each subscale, we conducted piecewise growth models using exploratory narrative processing of future self-defining memories as a predictor of change in identity status, as measured by the DIDS. In piecewise growth modeling, researchers identify potential time points of significance, turning points or "knots," in a growth trajectory and use those knots as points to assess for

change in the general growth trend. Here, exploratory processing was not assessed at every time point, so we placed knots in each model at every wave that was measured. This left us with three knots, at Waves 4, 7, and 10 (see Figure 1). Exploratory processing was entered into the model as a predictor of slopes and intercepts at each respective knot, and was considered predictive of DIDS status at $p < .05$. Due to limited data, only linear change was examined between knots. Table 3 shows the results of the final

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[1] Per our pre-registration, we did not include word count as a covariate, as there is substantial literature available showing that narrative processing occurs independent of word count.

Figure 1

Timeline for Measurement of Study Variables Across 12 Waves of Data Collection
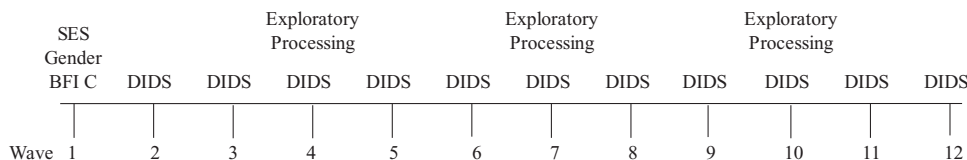
Note. SES = socioeconomic status; BFI C = Big Five Inventory, Conscientiousness; DIDS = Dimensions of Identity Development Scale.

piecewise growth models for all DIDS subscales. Tables for results from the freely estimated and covariates models with no predictors, as well as fit index comparisons between all models for individual subscales, can be found in the online supplemental materials.

Commitment-Making

The preferred freely estimated growth model for commitment-making was cubic, where there were increases in commitment-making during early waves, followed by a period of relative stability in commitment-making, and then another increase in the last few waves (Figure 2[2]). There was an overall net increase of 0.32 scale points from the start to the end of data collection, or an increase of approximately 0.32 *SD*s. The statistically significant covariates were conscientiousness ($b = 0.20, p < .001; \beta = .22$) and SES ($b = -0.18, p < .001; \beta = -.20$) predicting the intercept, such that more conscientiousness was associated with higher levels of commitment-making and higher SES was associated with less commitment-making. The full four-piece piecewise growth model for commitment-making had issues of convergence within R. After closer examination, it was determined that the third knot of the model at Wave 10 was causing the convergence problem, so the fourth piece of the commitment-making model was dropped. This left the final model as only a three-piece model, with knots at Waves 4 and 7. Final results indicated that exploratory processing did not predict commitment-making at any time point.

Exploration in Breadth

The preferred freely estimated growth model for exploration in breath was linear, where there was a general slow increase of exploration in breadth across all waves (Figure 3). There was an overall net increase of 0.08 scale points from the start to the end of data collection, or an increase of approximately 0.10 *SD*s. The only statistically significant covariate was SES predicting the linear slope ($b = 0.04, p = .003; \beta = .21$), such that higher SES was associated with more exploration in breadth. The piecewise growth model for exploration in breadth was a four-piece model, with knots at Waves 4, 7, and 10. Final results indicated that exploratory processing did not predict exploration in breadth at any time point.

Ruminative Exploration

The preferred freely estimated growth model for ruminative exploration was quadratic, where there was a slight decrease in ruminative exploration in early waves, followed by a sharper decrease in later

waves (Figure 4). There was an overall net decrease of 0.02 scale points from the start to the end of data collection or an increase of approximately 0.02 *SD*s. The only statistically significant covariate was conscientiousness predicting the intercept ($b = -0.176, p < .001; \beta = -.23$), such that higher conscientiousness was associated with less ruminative exploration. The piecewise growth model for ruminative exploration was a four-piece model, with knots at Waves 4, 7, and 10. Final results indicated that exploratory processing did not predict ruminative exploration at any time point.

Identification With Commitments

The preferred freely estimated growth model for identification with commitments was quadratic, such that there was a slight increase in identification with commitments in early waves, and followed by a sharper increase in later waves (Figure 5). There was an overall net increase of 0.08 scale points from the start to the end of data collection or an increase of approximately 0.09 *SD*s. The statistically significant covariates were SES ($b = -0.13, p = .001; \beta = -.19$) and conscientiousness ($b = 0.20, p < .001; \beta = .29$) predicting the intercept, such that higher SES was associated with less identification with commitments and higher levels of conscientiousness was associated with more identification with commitments. The piecewise growth model for identification with commitments was a four-piece model, with knots at Waves 4, 7, and 10. Final results indicated that exploratory processing did not predict identification with commitments at any time point.

Exploration in Depth

The preferred freely estimated growth model for exploration in depth was quadratic, where there was a sharp increase in exploration in depth in early waves, but this increase became more gradual in later waves (Figure 6). There was an overall net increase of 0.38 scale points from the start to the end of data collection or an increase of approximately 0.43 *SD*s. The statistically significant covariates were SES ($b = -0.10, p = .006; \beta = -.17$) and conscientiousness ($b = 0.09, p = .010; \beta = .14$) predicting the intercept, such that higher SES was associated with less exploration in depth and more conscientiousness was associated with more exploration in depth. The piecewise growth

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[2] Figures 2–7 show the freely estimated models of each factor of the DIDS. The scale has been adjusted on all figures to a range of 3–4, as the entire trend can be seen within this range. This is not to erroneously inflate the degree of change that occurred, but rather for the purposes of visualizing the appropriate trajectory for each factor (i.e., linear, quadratic, or cubic) as the changes in some factors are difficult to see on the full 1–5 scale.

Table 3

Model Summaries: Parameter Estimates From Piecewise Growth Curve Models Predicting DIDS as a Function of Exploratory Narrative Processing of Future Self-Defining Memories

DIDS factor	Regressions		Covariates		Intercepts (M)		Variances	
	b	SE	b	SE	b	SE	τ	SE
CM								
Intercept					3.22***	0.06	0.63***	006
SES			−0.12**	0.05				
BFI C			0.22***	0.04				
Slope 1					0.29***	0.06	0.08	0.06
Slope 2	−0.06	0.04			0.15	0.11	0.29***	0.04
Slope 3	−0.04	0.04			0.24*	0.11	0.22***	0.03
EB								
Intercept					3.82***	0.05	0.20***	0.03
Slope 1					0.13*	0.06	0.09	0.06
SES			0.07	0.05				
Slope 2	0.02	0.04			−0.15	0.11	0.09*	0.04
Slope 3	0.02	0.04			0.06	0.12	0.12**	0.04
Slope 4	−0.04	0.07			0.04	0.20	0.19	0.17
RE								
Intercept					3.15***	0.06	0.53***	0.06
BFI C			−0.15**	0.05				
Slope 1					0.06	0.07	0.01	0.06
Slope 2	<−0.01	0.05			−0.09	0.13	0.26***	0.05
Slope 3	0.02	0.05			<−0.01	0.13	0.18**	0.05
Slope 4	0.14	0.09			−0.41	0.25	0.62*	0.25
IC								
Intercept					3.42***	0.05	0.42***	0.05
SES			−0.07	0.05				
BFI C			0.19***	0.04				
Slope 1					0.04	0.06	0.13*	0.06
Slope 2	−0.03	0.04			0.16	0.11	0.20***	0.04
Slope 3	−0.03	0.04			0.10	0.12	0.19***	0.05
Slope 4	−0.14	0.08			0.43	0.22	0.57**	0.20
ED								
Intercept					3.60***	0.05	0.31***	0.04
SES			−0.04	0.04				
BFI C			0.12***	0.03				
Slope 1					0.23***	0.06	<0.01	0.04
Slope 2	−0.04	0.03			0.17	0.10	0.20***	0.04
Slope 3	0.01	0.04			0.16	0.11	0.15***	0.04
Slope 4	0.02	0.07			<0.01	0.20	0.42*	0.17
RC								
Intercept					3.51***	0.04	0.15***	0.02
Slope 1					<0.01	0.07	0.20**	0.08
SES			−0.04	0.05				
Slope 2	−0.09*	0.04			0.30*	0.12	0.23***	0.06
Slope 3	0.06	0.05			−0.12	0.13	0.05	0.05
Slope 4	0.19*	0.08			−0.64**	0.23	0.52*	0.26

Note. DIDS = Dimensions of Identity Development Scale; CM = commitment-making; EB = exploration in breadth; RE = ruminative exploration; IC = identification with commitments; ED = exploration in depth; RC = reconsideration of commitments; SES = socioeconomic status; BFI C = Big Five Inventory, Conscientiousness.
* $p < .05$.   ** $p < .01$.   *** $p < .001$.

model for exploration in depth was a four-piece model, with knots at Waves 4, 7, and 10. Final results indicated that exploratory processing did not predict exploration in depth at any time point.

Reconsideration of Commitments

The preferred freely estimated growth model for reconsideration of commitments was linear, where there was a general trend of increased reconsideration of commitments across all waves (Figure 7). There was an overall net increase of 0.08 scale points

from the start to the end of data collection or an increase of approximately 0.10 *SD*s. The only statistically significant covariate was SES predicting the linear slope ($b = 0.04$, $p = .007$; $\beta = .21$), such that higher SES was associated with more reconsideration of commitments. The piecewise growth model for reconsideration of commitments was a four-piece model, with knots at Waves 4, 7, and 10. Final results indicated that exploratory processing was a statistically significant predictor of the slope for reconsideration of commitments at Wave 4 ($b = −0.09$, $p = .027$; $\beta = −.19$) and at Wave 10 ($b = 0.19$, $p = .021$; $\beta = .26$), such that more exploratory processing

Figure 2

Freely Estimated Growth Trends for Commitment-Making

Commitment-Making among College Students across Time
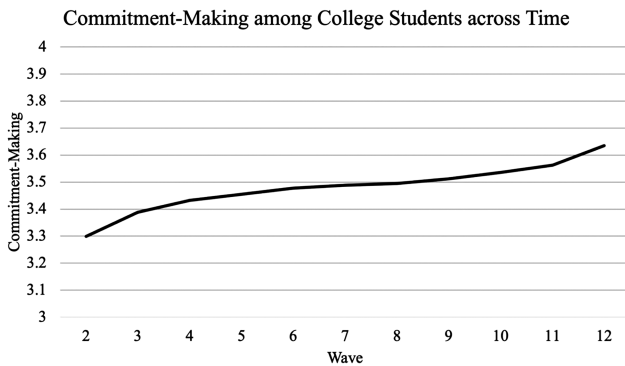
was associated with less reconsideration of commitments at Wave 4, but with more reconsideration of commitments at Wave 10. Exploratory processing did not predict reconsideration of commitments at Wave 7 ($b = 0.06$, $p = .196$; $\beta = .25$).

Discussion

The present study sought to examine how dimensions of exploration and commitment change over time, and to assess whether exploratory processing serves as a mechanism of change in those processes for emerging adult college students. Overall, across 4 years and 12 waves of data, our results indicate patterns of stability and change in identity formation processes over time, such that participants mostly trended toward identity maturation (i.e., increased adaptive exploration and commitment). However, we found little evidence for exploratory processing as a predictor of change in either exploration or commitment over time, which may suggest that narrative identity and identity status methodologies are capturing discrete aspects of identity development. We discuss each of our results in turn, followed by implications for the study of identity development.

Developmental Trends in the DIDS

As stated above, our freely estimated models of growth for the dimensions of identity development, as measured by the DIDS,

Figure 3

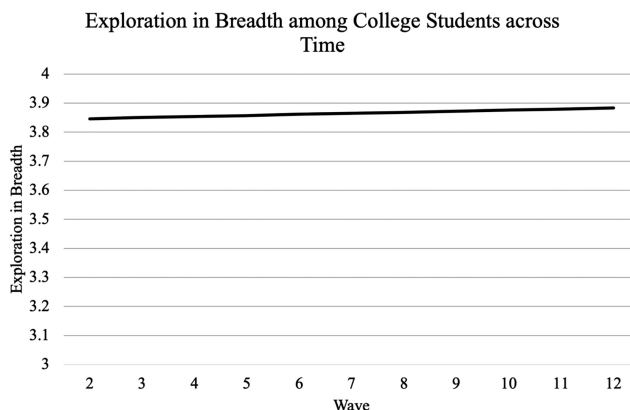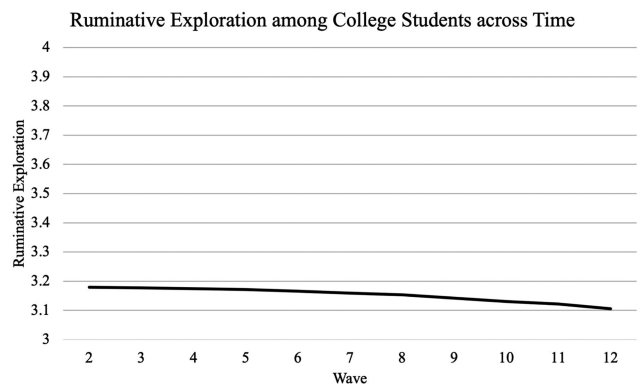*Freely Estimated Growth Trends for Exploration in Breadth*

Exploration in Breadth among College Students across Time

Figure 4

Freely Estimated Growth Trends for Ruminative Exploration

Ruminative Exploration among College Students across Time

were relatively consistent with past literature. Specifically, past research has indicated that, while large portions of young adults have not yet fully reached identity achievement (Kroger et al., 2010), which is defined by high levels of both exploration and commitment and is considered the most advanced status of identity development, most still display more adaptive exploration and commitment over time than maladaptive exploration and reconsideration (Kroger et al., 2010; Meeus, 2016). Our results were mostly in line with these findings, such that commitment-making, identification with commitments, exploration in breadth, and exploration in depth all showed increases over time. Additionally, we saw expected decreases in ruminative exploration.

Our results concerning reconsideration of commitments were contrary to some extant literature showing decreased reconsideration over time (e.g., Meeus, 2016), although this work focused on adolescents rather than emerging adults. Other work has also seemed to indicate that most emerging adults see decreases of reconsideration over time, but these trajectories were examined via groupings of participants by identity status rather than as an entire sample (e.g., Becht et al., 2021). However, given that our sample was comprised entirely of students, it may be possible that this is a byproduct of the American college environment. Indeed, there may also be cultural distinctions between our study and most others, as many longitudinal studies using the DIDS have been conducted in European

Figure 5

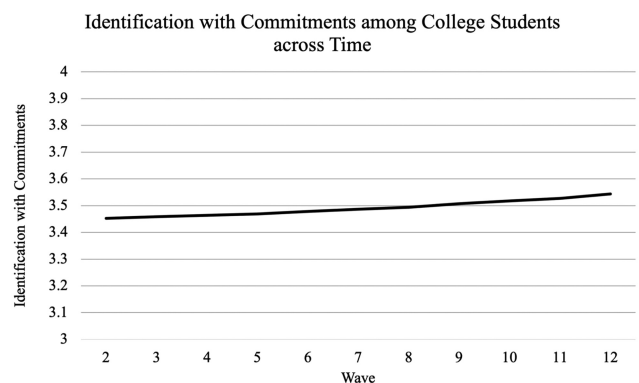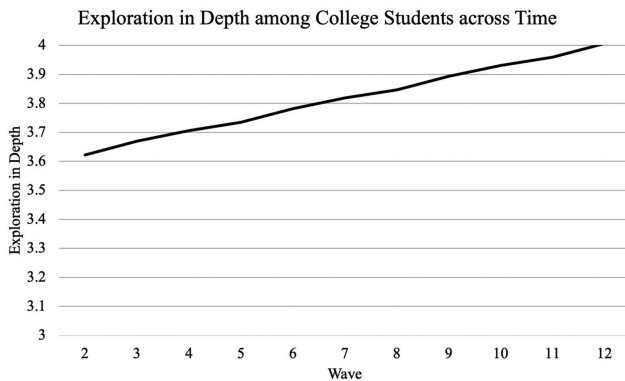*Freely Estimated Growth Trends for Identification With Commitments*

Identification with Commitments among College Students across Time

Figure 6

Freely Estimated Growth Trends for Exploration in Depth

Exploration in Depth among College Students across Time

countries, such as Belgium (e.g., Luyckx et al., 2013), Greece (e.g., Mastrotheodoros & Motti-Stefanidi, 2017), and Germany (e.g., Seiffge-Krenke et al., 2013), where there are quite distinct educational contexts and pathways. In the United States, where this study was conducted, students are encouraged to take many different types of classes in order to expose them to future possibilities and interests, as well as to think critically about the long-term consequences of their decisions. While this process may facilitate exploration and commitment-making, it may also be overwhelming and frightening at times, causing some level of uncertainty about one's decisions to arise. This may be particularly true as the perceived amount of time to change one's mind decreases throughout a college career. Furthermore, this increase may also be due to an increase in the number of commitments that an individual has made over time. In early college contexts, it is possible that there are relatively few commitments to reconsider, and thus reconsideration of commitments may increase toward the end of college as a byproduct of having made more commitments in the first place. Finally, we note that sociohistorical events may shape these processes in ways not yet known. Just as more emerging adults are attending some form of higher education than was the case decades ago, sociohistorical events will continue to shape processes of exploration and commitment, with emerging evidence of the COVID-19 pandemic playing a role in these processes, as an example (Pasupathi et al., 2022).

Figure 7

Freely Estimated Growth Trends for Reconsideration of Commitments

Reconsideration of Commitments among College Students across Time
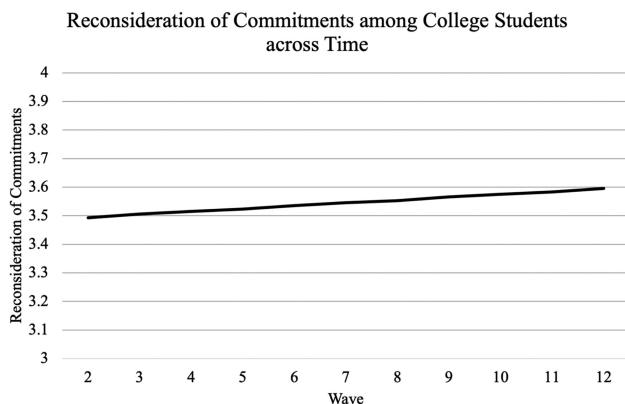
SES and Conscientiousness Matter in Processes of Identity Development

While not central to our primary analyses, the addition of SES and trait conscientiousness as covariates in our models yielded an intriguing and relatively consistent pattern of results. For SES, participants who came from higher SES backgrounds on average showed less commitment-making, identification with commitments, and exploration in depth, and more exploration in breadth and reconsideration of commitments, compared to their lower SES counterparts. Overall, our results suggest that participants from higher SES backgrounds were able to explore more options and commit to less, and to reconsider more of their commitments once they were initially made. These are novel results, and we discuss their implications below.

For trait conscientiousness, those higher on conscientiousness showed more commitment-making, identification with commitments, and exploration in depth, and less ruminative exploration. This is consistent with past literature that has shown higher levels of conscientiousness, which is a personality trait that inherently includes being thoughtful and following through with future plans, to be positively associated with adaptive identity dimensions and negatively associated with rumination (e.g., Crocetti et al., 2008; Klimstra et al., 2012). Additionally, industriousness is an important aspect of conscientiousness, and Erikson's (1963) theory of identity states that industry precedes identity in development. Thus, it makes intuitive sense that conscientiousness relates to identity dimensions in the predictable patterns that we observed in this study.

Narration May Not Be a Mechanism of Change for Exploration and Commitment

Overall, the results of this study showed very little evidence for a predictive relationship between narrative and status measures. Exploratory processing was not associated with commitment-making, exploration in breadth, ruminative exploration, identification with commitments, or exploration in depth at any point.

Exploratory processing was only significantly predictive of reconsideration of commitments, at two of three knots within the models. However, given the number of tests conducted, and the *p* values close to .05, we are hesitant to overinflate the importance of these findings and interpret them with caution. This is further complicated by the inconsistent relationship between the two, such that more exploratory processing at the first knot predicted less subsequent reconsideration of commitments, was not predictive of subsequent commitments at the second knot, and at the final knot, predicted more subsequent reconsideration of commitments. It is possible that this is a reflection of the developmental processes participants were most likely to be experiencing across the college years. Specifically, when considering their future self in the first year of college, those who engaged in more exploratory processing may have been in a period of forming new commitments rather than reconsidering existing ones. However, in the final year of college, it is possible that further engagement in exploration of how past commitments will affect their futures, may have triggered more anxiety about the future, especially as they looked to a new postcollege phase of their lives. We present this interpretation as tentative, and in need of replication, but emphasize the unique

qualities of our data set that make it ideal for identifying such trends.

While there was little support for our hypothesis that exploratory narrative processing would act as a mechanism of change for the dual-cycle dimensions of identity development, our results are actually consistent with some prior literature. Although there is limited research examining the relationships between narrative and identity status-based approaches to identity, what does exist shows a mixture of mostly modest to null findings. For example, one of the first studies to compare the two approaches, McLean and Pratt (2006) found mixed support for their hypotheses that narrative meaning-making scores would predict identity status over time (i.e., diffusion, moratorium, foreclosure, and achievement). Across 6 years, at three different time points, there was one main association between meaning-making and an overall identity maturity index, which was computed from all four identity status category scores. Predicted associations between meaning and individual identity statuses were primarily inconsistent or not present at all, and almost all effect sizes were small. In other work more closely scrutinizing the role of identity content in identity development, one study found no associations between identity status and meaning-making (McLean et al., 2014). Another study found a relationship between narrative meaning-making and identity status for exploration, but not for commitment, and the association between meaning and exploration was small (McLean et al., 2016). In a pair of studies explicitly comparing the narrative approach with dual-cycle model, researchers once again found weak and often inconsistent relationships between the two (van Doeselaar et al., 2020). Cross-sectionally, van Doeselaar and colleagues found that self-event connections in turning point narratives were associated with commitment-making, identification with commitments, exploration in breadth, and exploration in depth, but not with ruminative exploration. However, all effect sizes were small. Furthermore, in a longitudinal follow-up study across 2 years and three waves of data, the results between self-event connections and identity status were not replicated. The authors themselves subsequently concluded that the two approaches to identity development may be capturing discrete, albeit potentially complementary, aspects of identity formation (van Doeselaar et al., 2020). Although we anticipated that in examining exploratory processing in future self-defining memories we would be more likely to see relations between these models of identity development, our results suggest that these models are fairly distinct, contrary to theoretical arguments (e.g., McLean & Pasupathi, 2012).

Theoretical Implications

The first theoretical implication of the present study is that our study did not find evidence for narration as a robust explanation for changes in identity processes, as measured by the DIDS, over time. This could be because narrative construction simply is not a mechanism for such development. However, additional explanations should be ruled out in future research before making a final conclusion. Specifically, many scholars examine identity development within specific domains, and there is evidence that particular domains of identity may develop differentially. For example, Syed and Azmitia (2008) found that participant narrative content about ethnic identity varied by ethnic group and ethnic identity status. Specifically, they found that ethnic minority participants more frequently narrated experiences such as being the victim of racial prejudice, but those participants who reported more

prejudicial experiences (alongside experiences of connecting to culture) were more likely to be identity achieved. While not examined from a dual-cycle perspective, another study by Lilgendahl et al. (2018) examined the domain of bicultural identity, and found that domain-specific exploratory narrative processing was positively related to bicultural identity conflict, suggesting that exploratory processing might be used in particular identity domains as a way to deal with identity conflict. This fits with other research that has recently suggested that identity development processes can differ by domains such as minoritized group status. For example, in the domain of race/ethnicity, Black children may consider race/ethnicity to be more central to their identity and may explore this facet of their identity earlier and more so than white children because they have more identity-relevant experiences (e.g., prejudice; parent socialization) at a younger age in this domain (e.g., Ghavami et al., 2016; Rogers et al., 2021; Williams et al., 2020). Examining other domains, specific classroom experiences, and other life events could provide a more suitable environment for narrative to emerge as a clear predictor of identity dimensions development.

The second implication of this work is that prior research has suggested that "normative" identity development involves increased exploration and commitment, an idea which may have been based on data from particular types of samples. Indeed, Jeffrey Arnett, the leading researcher in the realm of emerging adulthood, has similarly alluded to the fact that contextual factors such as social class may broadly influence the experience of this developmental period (e.g., Arnett, 2016). Arnett's work suggests that there are notable similarities in the features of emerging adulthood across social classes, but there are also differences, such as those from lower social classes experiencing more depression and having less financial support for higher education. Yet, prior research with the dual-cycle model has not often considered the role of structural supports and obstacles, such as SES, to engaging in identity processes. Indeed, our results suggest that identity development may be significantly impacted by sociocultural factors such as SES. While some research provides argument for addressing the development of SES as a particular identity rather than as an influencing factor on identity development (e.g., Destin et al., 2017), there is very little research that explicitly examines the influence of SES in identity development processes broadly. In one exception to this, Aries and Seider (2007) looked at the relationship between identity status and SES and found evidence for a complex relationship between identity exploration and social class, with low-income students within private schools showing more identity exploration than either affluent students or low-income students in public schools. This may be partially because individuals from affluent origins are likely to have more material and social resources, while also experiencing greater educational and occupational expectations from society and their family of origin (Gottfredson, 2002; Griffiths, 2006). Conversely, individuals who come from lower SES backgrounds with fewer resources may have different, and perhaps more restricted, ideas about future options that are considered both appropriate and attainable in their contexts (Griffiths, 2006). These findings fall in line with other research that suggests that family education level and social class influence students' motivations and goals for attending college, such that first-generation and working-class students may view college more as a time for the gain of material wealth and social status rather than a time for independence and self-discovery (Azmitia et al., 2008; Covarrubias et al., 2019; Radmacher &

Azmitia, 2013). Furthermore, other recent work with adolescents has found evidence for identity formation processes being influenced by the amount of external resources and demands. For example, a study with Lithuanian adolescents suggests that familiar economic conditions directly and indirectly affect identity processes (Vosylis et al., 2020). Specifically, economic resources influence levels of familial conflict and stress. This can facilitate parents in better economic positions to provide more interest and support to their child's academic goals, which subsequently influences adolescent identity processing. Thus, we join an increasing number of scholars who see structural and sociocultural factors as critical to developmental literature (Fish & Syed, 2018; McLean & Syed, 2015; Rogers et al., 2021). We consider the pattern of results in this study to highlight a potential consideration for other identity development researchers. Specifically, given that so much of psychology research is conducted on college students, a population of people who already tend to come from more privileged backgrounds, we need to pay attention to what we consider "normative" development, as our results indicate that it may only be "normative" for those with privileged identities.

Limitations and Future Directions

The discussion of the lack of relation between these two models of identity development highlights the fact that the processes of identity development remain poorly defined. That is, it may be that a core problem with this work is that we are attempting to explain something that is thus far poorly defined by the field. For example, from a dual-cycle perspective, what does it look like to explore and commit to an identity? As we discussed above, does this vary by content domain, or other characteristics of the person, such as their social class? Our lack of clear descriptive data about what is actually developing hinders our ability to find mechanisms for change in that development. Indeed, recent calls have been made for a more widely used, comprehensive framework to guide research in the realm of identity, including a more thorough consideration of content in addition to the development process (Galliher et al., 2017; McLean et al., 2014; McLean et al., 2016). Thus, we encourage future research to continue to center content alongside process as being crucial for understanding identity development. This may also be relevant to better understanding why exploratory processing showed a relationship with reconsideration of commitments, but not the other two dual-cycle exploration dimensions (i.e., exploration in breadth and depth). This may be because both exploratory processing and reconsideration are more reflective in nature, while exploration in breadth and depth is comparatively more behavioral. However, future research should examine this possibility more closely.

Importantly, the present study was not without its own limitations. First, we used measures ourselves (i.e., DIDS and exploratory processing) that were broadly defined rather than focused on content domain. Additionally, while our measurement invariance tests seemed to support invariance across waves, there were some analytic difficulties that may limit the reliability of this conclusion. Furthermore, the DIDS (and other identity process measures) has been critiqued as a measure that lacks statistical sensitivity, or the ability to accurately capture information about the intended underlying constructs (Johnson et al., 2022). Given that issues of sensitivity may limit the ability to detect change over time, this is a notable issue, but additional longitudinal research on this issue is needed. Second, because our sample was limited to college-aged students, we cannot generalize these findings to those outside of these educational contexts. Although the present data set attempted to oversample certain underrepresented populations (e.g., students underrepresented in science, technology, engineering, and math, McLean, Koepf, & Lilgendahl, 2022), college students still represent a specific demographic that differs from the general public. Finally, while we made attempts to use robust statistical techniques using a relatively large, longitudinal data set with many points of assessment, we still ran a large number of tests and some results conflicted with previous findings, and so we emphasized the need for more intensive longitudinal research to confirm and expand upon our findings.

Conclusion

The present study examined whether exploratory narrative processing serves as a mechanism of change for identity development, as measured by the DIDS, over 4 years of college. There was little support for this hypothesis, as exploratory processing was not predictive of five out of six identity dimensions at any time point. It was predictive of reconsideration of commitments, but the pattern of results was inconsistent and so we interpret them with caution. We also found unexpected associations between SES and the DIDS, which suggest that identity scholars use care when considering particular developmental trends as "normal." There is a growing body of literature which suggests that some patterns of development may only be normal for people from privileged backgrounds (e.g., Rogers et al., 2021). Finally, we present a need for intensive, longitudinal research that considers both content and process as equal components to identity development in order to continue to grow our understanding of how we come to know who we are.

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