Development of Emotion Regulation across the First Two Years of College

Crystal L. Park, **Michelle K. Williams**
University of Connecticut

Paul R. Hernandez
Texas Tech University

V. Bede Agocha, **Sharon Y. Lee**, **Lauren M. Carney**
University of Connecticut

David Loomis
West Virginia University

Abstract

Introduction: Emotion regulation is thought to develop substantially from late adolescence into early adulthood; further, the rate of development purportedly varies based on personal and contextual characteristics. However, little research has explicitly documented this maturation in young adulthood or identified its determinants. We aimed to (1) characterize how adaptive (positive reappraisal, emotional social support-seeking) and maladaptive (suppression, substance use coping) emotion regulation strategies changed over time and (2) predict change in each strategy based on baseline personal, social, and motivational characteristics.

Methods: We followed a sample of 1,578 students entering university in the northeastern United States across their first two years, assessing them four times.

Results: As expected, social support-seeking increased and suppression decreased. However, contrary to expectations, cognitive reappraisal declined over time while substance use coping increased. Women generally used more adaptive emotion regulation strategies than did men; social engagement and connection and eudaimonic well-being were generally predictive of using more adaptive coping over time.

Conclusions: Overall, students did not consistently demonstrate maturation to more adaptive emotion regulation and in fact exhibited decrements over the first two years of college. Students' baseline characteristics accounted for substantial degrees of change in emotion regulation. These findings suggest potentially fruitful directions for interventions to assist college students in developing more adaptive emotion regulation skills.

The college transition can be especially challenging for young adults, who must navigate stressful academic, interpersonal, and social demands with less reliance on family support and expectations for increasingly self-directed and independent behaviors (Arnett, 2016; Lee & Jang, 2015; Zahniser & Conley, 2018). The experiences in the first semester or year of college can strongly influence later academic and achievement outcomes. As a result, colleges and universities provide significant support and resources for first year students; however, those institutional supports decrease significantly by the second year despite growing evidence that the transition to second year is associated with increased academic and interpersonal stressors and adjustment difficulties (Conley et al., 2020; Ishitani, 2016; Tobolowsky & Cox, 2007). The second year also entails managing important developmental and academic milestones, such as resolving identity issues, developing a sense of purpose, gaining functional independence, solidifying major area of study, and navigating more intense interpersonal relationships (Black, 2014; Sterling, 2018).

These first two years of college may be a critical period for developing effective emotion regulation skills. Emotion regulation refers to the processes of modifying emotions, including which, how, and when they are experienced and expressed (Gross, 2008; Nolen-Hoeksema, 2012). Emotion regulation is essential for success in life from early childhood onward, particularly in the context of dealing with stress (Compas et al., 2017; Zahniser & Conley, 2018). Individuals differ in their use of various emotion regulation strategies, and these differences have implications for their well-being and social relationships (Gross, 2008; Gross & John, 2003) especially during key developmental periods (John & Gross, 2004; Zahniser & Conley, 2018).

A large share of emotion regulation research focuses on two strategies, cognitive reappraisal and expressive (emotional) suppression (Ellis et al., 2018; Kelley et al., 2019; Lopez et al., 2020). Cognitive reappraisal involves thinking about a situation differently and thereby altering its emotional meaning and impact (Gross, 2008). Suppression is a form of emotion response modulation involving inhibition of ongoing emotion-expressive behavior (Gross, 2008). Many studies have demonstrated that reappraisal is often positively associated with well-being and inversely with symptoms of maladjustment (Aldao et al., 2010), whereas suppression is often associated with poorer mental health (Gross & Levenson, 1993; Srivastava et al., 2009). Moreover, in both self-report and experimental studies, people who use reappraisal experience more positive and fewer negative emotions, while people who use mainly suppression experience fewer positive and more negative emotions (Dan-Glauser & Gross, 2011; Szasz et al., 2010).

Although the majority of available studies on emotion regulation has focused on cognitive reappraisal and expressive suppression, recent reviews recommend examining additional strategies to more fully capture emotion regulation (Aldao, 2013; Bonanno & Burton, 2013; Rottenberg, 2017), particularly as it overlaps with coping strategies (Compas, 2014). Thus, in the present study, along with reappraisal and suppression, we included two strategies long recognized as relevant to young adult development: seeking emotional support from others and using alcohol or other drugs to avoid dealing with one's emotions (Aspinwall & Taylor, 1992; Katz & Somers, 2017). Seeking emotional support from family and friends is common among students and typically associated with better adjustment (Jenzen et al., 2018; Sladek

et al., 2017) and greater functional independence (Szwedo et al., 2017). In contrast, using alcohol or other drugs to deal with emotional distress is also fairly common among college students (Cooper et al., 2000; Turner et al., 2018; Stapinski et al., 2016) but is generally associated with poorer adjustment and mental health and increased risk of substance dependence (Blevins, Abrantes, & Stephens, 2016; Wicki et al., 2017). Notably the four emotion regulation strategies chosen for the present study satisfy the selection criteria suggested in previous research and reviews (see Gross, 2008; John & Gross, 2004). John and Gross (2004) argue that emotion regulation strategies chosen for study (from among the many possible) should (a) be used commonly in everyday life, (b) lend themselves to both experimental manipulation and individual difference analyses, and (c) be distinguishable in a timeline as antecedent-focused or response-focused regulation. Cognitive reappraisal and expressive suppression readily meet these criteria, as do seeking emotional support and using alcohol or other drugs.

Emotion regulation is presumed to develop over time and to particularly mature in late adolescence (Gross, 2015; McRae et al., 2012; Riediger & Klipker, 2014). Developmental changes in adolescents' competencies are thought to influence their choice and use of various strategies when dealing with everyday stressors and challenges. Changes in cognitive processing, metacognitive skills, and capacities for planning may influence maturation of emotion regulation skills (Caballero et al., 2016; Compas et al., 2017; Riediger & Klipker, 2014).

From mid-adolescence onward, individuals' use of coping strategies becomes more diverse and differentiated, particularly in approach-oriented coping (Kavsek & Seiffge-Krenke, 1996). Between the ages of 12 and 18, adolescents appear to become more effective in determining the best source of support for dealing with a particular problem (Skinner & Zimmer-Gembeck, 2007), although one study of students across six years of high school found little evidence of increased general affect-regulation ability (Griffin et al., 2015).

However, research on the development of emotion regulation has predominantly focused on the very early developmental periods of infancy and early childhood (Gullone, Hughes, King, & Tonge, 2010; see John & Gross, 2004). Relatively little research has focused on the development of emotion self-regulatory abilities across the college years (or more generally, late adolescence into early adulthood); thus, whether and how emotion regulation abilities improve across the college transition remains unclear. For example, one study found that half of first year college students increased their emotion regulation capacity across the first semester while the other half declined, producing an overall group finding of no change (Park et al., 2011).

Cross-sectional studies have demonstrated some differences by age in emotion regulation. For example, a study using fMRI scans that instructed older children, adolescents and young adults to use cognitive reappraisal found evidence of higher ability to reappraise with age (McRae et al., 2012). One cross-sectional study compared individuals ages 11 to 50 on seven different emotion regulation strategies and revealed complex patterns, including lower levels of support-seeking and avoidance and higher levels of emotion suppression but also greater "adaptive" emotion regulation (active coping) with age (Zimmermann & Iwanski, 2014). A

study of individuals ages 12 to 97 found that early adolescents reported less use of most adaptive cognitive-emotion regulation strategies (e.g., positive reappraisal) than did late adolescents, who in turn reported using less than did adults (Garnefski & Kraaij, 2006). In contrast, a study of adolescents ages 11 to 17 in rural northeastern U.S. found no age differences in use of emotion regulation strategies to manage economic stress (Wadsworth & Compas, 2000). Several other studies suggested higher use of suppression with increased age. A study of Canadian adolescents ages 12 to 17 found few differences by age across emotion regulation profiles, but older adolescents were more likely to be in the concealing/suppression group (Lougheed & Hollenstein, 2012) and a study of students in a first year psychology class (ages 16 to 33) found older age was associated with higher use of suppression (De France & Hollenstein, 2017). However, these studies were not longitudinal, did not employ well-matched groups, and did not focus specifically on the adolescence to young adult developmental period.

Just a few studies of emerging adults have measured emotion regulation longitudinally, mostly of college students during the first semester or first year of college. One study of first year college students from two months prior to coming on campus to shortly after arriving found increased use of suppression (Srivastava et al., 2009) whereas another found decreased use of suppression and increased use of reappraisal by the end of the first semester (Kneeland & Dovidio, 2020). Still another study following students from ages 11 to 22 found slight increases in a general measure of emotion regulation (Hardy et al., 2020).

A handful of developmental studies of coping, while not concerned with emotion regulation per se (Compas, 2014; Compas et al., 2017), shed light on emotion regulation development in young adults. That is, coping studies often assess emotion regulation strategies along with other methods of dealing with stressors, such as active problem-solving (e.g., Compas et al., 2017; Connor-Smith et al., 2000). Whereas one study found no consistent changes in coping over the first semester of college (Pritchard & Wilson, 2006), another found students' use of avoidant coping decreased slightly across four years while use of approach coping strategies (including social support seeking and active problem-solving) remained stable (Jenzer et al., 2019). Another study of college students across four years found that adaptive active emotional coping declined over the first two years and then rebounded over the following two years to baseline levels while maladaptive avoidant emotional coping increased over the first two years and recovered over the following two but did not even return to baseline levels (Conley et al., 2019). A study following individuals from age 17 to 33 found emotion-oriented coping to decline over time (Wingo et al., 2015), whereas another found that, across adolescence to early adulthood, females were relatively stable in their support seeking, while males initially declined but then gradually increased (Flannery et al., 2018).

Thus, although researchers increasingly recognize the need for more sophisticated longitudinal research documenting changes in emotion regulation strategies across the developmental transition from adolescence through early adulthood, a relatively small amount of research has specifically examined this critical topic. The coping research is useful but limited in this regard in that it rarely includes an array of emotion regulation strategies (e.g., Wingo et al., 2015) and much of it combines multiple strategies into a single score (e.g., combining emotion regulation strategies with problem-focused coping; Jenzer et

al., 2019). Moreover, the longitudinal timeframes used are typically either relatively short (e.g., a few months or one semester) or cross multiple years without examining potentially important transition periods (e.g., freshman to sophomore transition). Finally, coping research often focuses on mean change over time rather than examining *rates of change* (i.e., trajectories) across three or more time points.

Further, we know very little about the factors that determine changes across this critical developmental period. Identifying these determinants is essential for understanding and promoting healthier emotion regulation in emerging adulthood. To characterize potential predictors of different trajectories, we examined a set of student characteristics that may predict rates of maturation in abilities to apply specific emotion regulation strategies; we considered both baseline levels and changes in these characteristics as predictors of emotion regulation change. We based our set of predictors on a small amount of theorizing and research as well as their demonstrated salutary effects on more general development in emerging adulthood (e.g., Katz & Somers, 2017; O'Connor et al., 2011; Sumner et al., 2015).

Some theorists have suggested that aspects of personality underlie emotion regulation development. For example, John and Gross (2004) highlighted the roles of conscientiousness and extraversion in shaping the development of emotion regulation while Jenzer and colleagues (2019) posited that temperament-based motivational tendencies to approach versus inhibit might influence the development of emotion regulation. Thus, individuals more inclined to be socially outgoing are more likely to develop supportive relationships and rely on adaptive social support coping, while those who are introverted would be less likely to do so (John & Gross, 2004). Those more motivated by goal achievement (relative to inhibited by fear) and who tend to plan and approach their goals may develop more effective emotion regulation strategies, while those more motivated by fear may develop avoidance strategies that lead them to a cycle of bypassing opportunities to learn more adaptive skills and, instead, reinforce avoidance (Jenzer et al., 2019). Scholars have also suggested that pursuing a meaningful life may lead individuals to use adaptive strategies for emotion regulation that enhance their eudaimonic well-being (Tamir & Gross, 2011). Gender has also been shown to predict development of emotion regulation strategies (e.g., Flannery et al., 2018).

Thus, we hypothesized that students more focused on self-direction and self-actualization, more motivated toward achieving their goals, and more oriented toward their social life would demonstrate greater increases in their use of adaptive emotion regulation strategies (cognitive reappraisal and seeking social support) and greater decreases in their use of generally maladaptive strategies (emotional suppression and alcohol/drug use as coping) (Tamir & Gross, 2011; Jenzer et al., 2019; Oliver & Gross, 2004). In particular, we assessed students' orientation to fulfill their best potential in terms of personally expressive, self-concordant goals (*eudaimonic well-being*), their tendency to follow through on their responsibilities and commitments (*general determination*), and their motivation to accomplish their goals (*goal striving*) along with three aspects of their social life: the extent to which they felt comfortable with and sought out social interactions (*social activity*), the extent to which they tended to affiliate with and prioritize their group membership over their

individual concerns (*communalism*), and the extent to which they felt connected to and supported by others (*social connectedness*).

In sum, we aimed to advance our understanding of how college students' emotion regulation styles develop across a critical transition period (i.e., from high school student to established college student). The prevailing assumption is that college students mature and develop more effective regulatory capabilities, but this development has not been well-documented, especially beyond the first year of college. Accordingly, in this study, we address two specific questions:

1. Do students, as a whole, change in their use of adaptive and maladaptive emotion regulation strategies across the first two years of college?

2. Can individual differences in growth trajectories over time be predicted from baseline personal, social, and motivational characteristics, or time-varying changes in these characteristics?

Method

Participants

We invited all students accepted to a large research-intensive university located in the northeast U.S. to participate in the study in the spring/summer of 2015. The analytic sample ($N = 1,578$) consisted of all participants who completed at least one survey over a two-year period (i.e., participants who consented but completed no survey measures [$n = 138$] were not included in analyses). The analytic sample comprised mostly college Freshmen (94%), but 6% were non-Freshmen (e.g., transfer students). Because we expected these students to be experiencing a similar transition to a new college environment, we retained them for analysis. Concerning participants' demographic characteristics, 57.8% identified as female, 60.9% identified as White, 16.9% as Asian, 9.2% as Latinx, 6.2% as African American, 3% as multi-racial or other, 3.7% chose not to respond, and less than 1% as Native Hawaiian, Pacific Islander, or Native American.

Procedure

The study protocol consisted of online surveys administered to students at four time points: in the summer of 2015 (i.e., prior to starting their first year at the university; Time 1), the following spring (i.e., end of the first year at the university; Time 2), the fall of the second year (Time 3), and the spring of the second year (Time 4). All study procedures were approved by the university Institutional Review Board and participants received a $20 incentive following each wave of data collection. All participants provided documented informed consent.

Measures

Measures included both predictors and emotion regulation. Not all measures were administered at all time points due to time constraints, proprietary scale access, and participant burden. See Table 1 for psychometric information on reliability and Supplemental Table 1 for psychometric information on measurement invariance.

Predictor variables

Demographics.—Participants self-reported their demographic characteristics on the first survey. Gender was coded (0 = male, 1 = female).

Eudaimonic well-being.—Eudaimonic well-being was measured using eight items from the 21-item Questionnaire for Eudaimonic Well-Being (QEWB; Waterman, et al., 2010). The reduction in items was necessary to reduce participant burden and was based on an iterative process in prior pilot testing. Across multiple factor analyses, we retained high loading items with an eye toward maintaining the distinction of eudaimonic well-being as happiness specifically derived from purposeful and meaningful pursuits (Waterman et al., 2010). Participants rated their agreement with statements describing their attitudes and affect toward self-discovery, intense involvement in activities, and purpose and fulfillment in life. Response options ranged from 1 (Strongly Disagree) to 5 (Strongly Agree). Items included "I believe I have discovered who I really am," and "If I did not find what I was doing rewarding for me, I do not think I could continue doing it." Items were summed. Eudaimonic well-being was administered at Times 1, 2, and 4, and the reliabilities were good (Cronbach's α ranging from .84 to .88).

Communalism.—Communalism was measured using 8 items from the 31-item Communalism Scale (Boykin et al., 1997). Item reduction was again based on a similar iterative process in pilot testing and high loading items retained. The modified communalism scale asked participants to rate their agreement or disagreement with statements about their extent of emphasizing social relationships, shared experiences, affiliation, and group achievement over individual needs and accomplishments. Response options ranged from 1 (Completely False) to 6 (Completely True). Items included "I enjoy being part of a group effort" and "There are very few things I would not share with family members." Items were combined to create a single communalism variable. Communalism was administered at Time 1, 2, and 4, and the reliabilities were good (with Cronbach's α ranging from .78 to .80).

General determination, goal motivation, and social connection and social activity.—The proprietary ACT Engage survey was used to collect information on four constructs: *general determination*, *goal striving*, *social connection*, and *social activity* primarily within an academic and college context. The Engage survey is a college readiness assessment typically administered just prior to or within the first year of college. It was offered to all newly enrolling students at the university as part of their orientation. Recruitment for the current study occurred following the administration of the Engage survey at Time 1. Scales contain 10–12 items and are scored on a 6-point Likert scale ranging from strongly disagree to strongly agree. All data were provided to the researchers as scale means; previously reported reliabilities include alphas ranging from .81 to .87 (Petersen, Casillas, & Robbins, 2006). General Determination is defined as the extent to which one strives to follow through on commitments and obligations (e.g., "It is important for me to finish what I start'). Goal striving is defined as the strength of one's efforts to achieve objectives and end goals (e.g., "I bounce back after facing disappointment and failure"). Social connection is defined as feelings of connection and involvement in the

college community (e.g., "I feel part of this college") and social activity as one's comfort meeting and interacting with other people (e.g., "I avoid activities that require meeting new people" (reverse scored)). Previous research shows that these constructs predict academic performance and persistence (see Robbins et al., 2004 for review), and that the survey demonstrates construct validity in assessing such factors (e.g., Kuo et al., 2020). The ACT Engage scale scores were re-scaled to range from 0–10 (original range 0–100) to prevent model convergence problems due to having variables with drastically different variances, and were administered at Times 1, 2, and 3.

Emotion Regulation Measures

Cognitive reappraisal and expressive suppression.—Cognitive reappraisal and expressive suppression were measured using the 10-item Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). The ERQ captures cognitive reappraisal using 6 items, and expressive suppression using 4 items. Items measuring cognitive reappraisal included "When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm," and "I control my emotions by changing the way I think about the situation I'm in." Items measuring expressive suppression included "I keep my emotions to myself," and "When I am feeling positive emotions, I am careful not to express them." Items for each emotion regulation strategy were combined to create a scale score for that strategy. The ERQ was administered at all 4 time points and corresponding reliabilities were good (with Cronbach's α ranging from .84 to .87 for cognitive reappraisal and .74 to .80 for expressive suppression).

Emotional support seeking and substance use coping.—Two scales from the Brief COPE (Carver, 1997) assessed emotional support seeking (2 items) and substance use coping (2 items) in response to a problem, stressor, or difficult event. Response options ranged from 1 (I haven't been doing this at all) to 4 (I've been doing this a lot). Sample item was "I've been getting comfort and understanding from someone" and "I've been using alcohol or other drugs to make myself feel better," respectively. Emotional support seeking was measured at Times 1, 2, and 4, and substance use coping was measured at Times 1, 2, and 3.

Descriptive statistics and estimates of internal consistency reliability for all measures are found in Table 1. Level-1 (within-person correlations) among variables across time points are found in Table 2 and level-2 (between-person correlations) among variables are found in Table 3.

Statistical assumptions, preliminary analyses, and analysis details

Prior to conducting substantive analyses, we examined the data for outliers and inspected the tenability of statistical assumptions (i.e., distributional characteristics and inter-item correlations) in SPSS software version 25 (Table 1). We found no evidence of extreme outliers (i.e., leverage, Studentized deleted residuals, and Cook's D values were all acceptably small; Judd, McClelland, & Ryan, 2009). Further, we determined that the statistical assumptions were met (i.e., Q-Q plots showed only minor deviations from normality for most variables). The only exception concerned the positive skew and peaked

distribution (kurtosis) of Substance Use scale scores. Finally, we examined the patterns of missing data in our longitudinal data set. Response rates to the survey and to the specific questions within the survey varied across occasions (Table 1). The overall response rates at each wave were as follows: 100% at T1, 72.9% at T2, 70.1% at T3, and 75.0% at T4. In addition, our analysis indicated that 56.1% of students completed all four surveys, 17.1% responded to three out of four surveys, 15.7% responded to two out of four surveys, and 11.1% responded to only one out of four surveys. We used Little's MCAR test (Little, 1988) to determine the tenability of the strict missing completely at random assumption and the analysis revealed that the pattern of missing data was not consistent with the MCAR assumption $\chi^2(2098) = 2,259.63$, $p = 007$. Therefore consistent with best practices in longitudinal developmental studies (Jelii et al., 2009), full information maximum likelihood (FIML) estimation methods were used, as FIML estimation has been shown to ensure unbiased estimates under the more reasonable missing-at-random (MAR) assumption, even when the percent of missing data is large (Enders, 2010). That is, MAR allows missing data when they are conditioned on observed data used in the analysis (Enders, 2010). Recent research has argued that longitudinal studies, such as this one, are highly unlikely to violate the MAR assumption because missing data on each variable can be conditioned on the data from the same variable collected on prior waves (Marsh et al., 2019). This approach has been shown to adequately address missing data in large longitudinal studies, such as the current investigation (Jelii et al., 2009).

Our second set of preliminary analyses focused on the tenability of the assumption of longitudinal measurement invariance for our emotion regulation variables (Vandenburg & Lance, 2000). Consistent with best practices, we conducted Structural Equation Model (SEM)-based multivariate longitudinal confirmatory factor analysis (CFA), followed by individual tests of longitudinal measurement invariance for each of the emotion regulation variables (Little, 2013). We assessed global model fit using a variety of indices according to recommended cutoff criteria (Hu & Bentler, 1999), including the chi-square goodness-of-fit test (χ^2), Root Mean Square Error of Approximation (RMSEA; values < .05, or non-significant PCLOSE test), the Comparative Fit Index (CFI values .95), and the Standardized Root Mean Square Residual (SRMR values .08). When nested longitudinal measurement invariance models were compared, the cutoff value of CFI values > .01 indicated worse model fit (Cheung & Rensvold, 2002) and when nested growth curve models were compared, χ tests were used to guide decisions for improved model fit (Little, 2013). Finally, consistent with recommendations for controlling Type-I error rate in complex SEMs, we adopted a Bonferroni-adjusted alpha level of .0125 (i.e., alpha level = .05/#DVs = .05/4 = .0125) when evaluating parameter estimates (Green & Babyak, 1997).

Since the indicators of the Brief COPE subscales had only four response options, we treated all indicators as categorical in the multivariate and individual CFA models, using the Weighted Least Squares (WLSMV) estimator in M*plus* version 8.01 (Muthén & Muthén, 2017). The results indicated that the multivariate longitudinal CFA exhibited good fit; additionally, the individual longitudinal CFAs provided support for strong measurement invariance over time; See Supplemental Table 1.

Results

Research Question 1: Maturation over time

Students changed their use of both adaptive (cognitive reappraisal and emotional support seeking) and maladaptive (substance use coping and suppression) emotion regulation strategies over the first two years of college (see Figure 1 and Table 1). Change in use of more adaptive strategies was not straightforward. For example, on average, students used less cognitive reappraisal from the spring prior to college ($M = 5.03$) to spring of the second year of college ($M = 4.85$); however, students increased their use of emotional support seeking over the same period ($M = 2.62$ and $M = 2.75$, spring prior to college to second year of college, respectively). By contrast, students used more maladaptive emotion regulation strategies over the first two years of college. On average, students increased use of substances to cope with emotions from the spring prior to college ($M = 1.12$) to spring of the second year of college ($M = 1.40$). Students' use of suppression exhibited a curvilinear pattern – a modest increase from the spring prior to college to the spring of the first year of college ($M = 3.66$, $M = 3.95$, respectively) followed by a slight decline by spring of the second year of college ($M = 3.72$), see Tables 1–3 for complete descriptive statistics and correlation information.

A series of SEM-based unconditional latent growth curve analyses were conducted where time was coded so that the intercept could be interpreted as the sample average at the first time-point (i.e., summer prior to attending the university) and changes over time in college are represented by the linear or curvilinear growth trends. The SEM growth models confirmed the patterns described above. Specifically, the models confirmed: (a) a small linear decline for cognitive reappraisal ($\gamma_{10} = -0.05$, S.E. = .009, standardized $\gamma_{10} = -.06$; waves T1-T4); (b) a small linear increase for emotional support seeking ($\gamma_{10} = 0.03$, S.E. = .008, standardized $\gamma_{10} = .05$; T1, T2, & T4); (c) a moderate linear increase in substance use ($\gamma_{10} = 0.10$, S.E. = .007, standardized $\gamma_{10} = .33$; T1-T3); and (d) a quadratic pattern of a moderate increase ($\gamma_{10} = .26$, S.E. = .03, standardized $\gamma_{10} = .28$; T1-T2) followed by small decline ($\gamma_{20} = -.06$, S.E. = .007, standardized $\gamma_{20} = -.07$; T2-T4) for suppression (model fit shown in Table 4, Models 5.1, 7.1, 8.1, & 6.2, respectively).

Research Question 2: Predictors of maturation over time

After describing the general patterns of maturation over time, we aimed to predict growth trends using time-varying changes in personal, social and motivational characteristics; gender; and time-invariant average levels of personal, social and motivational characteristics (i.e., averaged over all time-points). In this context, the time-varying predictors represent the semester-by-semester fluctuations in personal, social and motivational characteristics, while the time-invariant counterparts represent more general dispositions. We implemented a model-building approach to assess the unique impacts of the predictors on growth in each type of emotion regulation. First, we regressed each type of emotion regulation on the time-varying predictors. Then, we regressed the intercept of the growth model on gender. Finally, we regressed the linear growth slope on the gender and average levels of predictors.

Predicting change in adaptive emotion-regulation strategies.—As noted above, the unconditional growth model of cognitive reappraisal indicated a slight decline over time. Our sequential prediction models (i.e., time-varying covariates, predictors of the intercept, and predictors of the linear slope) indicated that each step in the process improved model fit (Table 1, Models 5.2, 5.3, and 5.4). The final model revealed that women (γ_{01}) initially reported using cognitive reappraisal more than their male peers (Table 5, Model 5.4; variance components shown in supplemental Table 2). However, female students' use of cognitive reappraisal declined significantly faster than their male counterparts (γ_{11}). In addition, higher levels of time-varying communalism (γ_{30}), eudaimonic well-being (γ_{40}), goal striving (γ_{60}), and social connections (γ_{80}) were associated with higher levels of cognitive reappraisal over time.

The unconditional growth model of emotional support seeking indicated a slight increase over time. Our sequential prediction models indicated that only the time-varying predictors and prediction of the intercept improved model fit (Table 4, Models 7.2 and 7.3, respectively). Similar to cognitive reappraisal, the final model revealed that women (γ_{01}) initially reported using emotional support seeking more than their male counterparts and the gap between the groups did not change over time. Further, the model revealed that higher levels of time-varying eudaimonic well-being (γ_{40}) and social connections (γ_{80}) were associated with higher levels of emotional support seeking over time (Table 5, Model 7.3; variance components shown in Supplemental Table 2).

Predicting maladaptive self-regulation strategies.—The unconditional growth model of emotional suppression indicated a quadratic pattern of an initial increase followed by a slight decline over time. Our sequential prediction models indicated that each step in the process improved model fit (Table 4, Models 6.3, 6.4, and 6.5). The final model revealed that women (γ_{01}) initially reported using emotional suppression less than their male peers and this gap between groups did not change over time (Table 5, Model 6.5; variance components shown in supplemental Table 2). In addition, higher levels of the time-varying predictors of social activities (γ_{70}) and social connections (γ_{80}), as well as higher levels of the time-invariant predictors of average communalism (γ_{12}) and average social activities (γ_{16}) predicted less growth in emotional suppression over time.

Finally, the unconditional growth model of using substances to cope with negative emotions indicated a slight increase over time. Our sequential prediction models indicated that each step in the process improved model fit (Table 4, Models 8.2, 8.3, and 8.4; variance components shown in supplemental Table 2). The final model revealed no gender differences in substance use coping at baseline, but female students' substance use coping increased more slowly than their male counterparts over time (γ_{11}). In addition, higher levels of both time-varying changes in social connection (γ_{80}) and time-invariant average social connection (γ_{17}) predicted faster growth in substance use. However, higher levels of time-varying changes in social activities (γ_{70}) predicted lower levels of substance use coping over time.

Discussion

Development of adaptive emotion regulation strategies involves a complex interplay among individuals' abilities to manage, modulate, and express emotional experiences and effectively respond to internal and external demands. While we know much about the development of emotion regulation in early childhood and adolescence, we know much less about other critical developmental periods such as emerging adulthood. Findings from the current study indicate that emotion regulation strategies do, indeed, change over the course of the first two years of college, but these changes were not fully consistent with maturation towards use of more adaptive and less maladaptive emotion regulation strategies. Further, the predictors of change in emotion regulation strategies across time comprise a complex constellation of factors including fairly consistent effects of female gender as promotive of more adaptive emotion regulation.

Our findings highlight the different trajectories of each of the four types of emotion regulation we considered. Although we expected to see greater use of adaptive (and lesser use of maladaptive) emotion regulation over time, we found such effects only for seeking emotional support, which increased across time, and suppression, which decreased over time. Increases in seeking emotional support over time may be due to enhanced motivation to draw on one's external resources to facilitate emotion regulation (Riediger & Klipker, 2014) as well as expansions in one's social support network (Szwedo et al., 2017). In fact, increases in social networks over time, along with increases in eudaimonic well-being, were the only predictors of changes in seeking social support. The early college years may foster seeking social support as a form of emotion regulation through both the many planned and organic opportunities campus life provides for emotional sharing and connection (Guthrie & Fruiht, 2020). Also, young people may recruit social support to supplement any perceived shortcomings of internal regulatory resources (Opitz, Gross, & Urry, 2012) or as a consequence of greater maturation in their ability to tailor self-regulation to the specific demands of emotion-eliciting situations (Riediger & Klipker, 2014). It is important to determine whether seeking emotional social support continues to increase throughout the undergraduate years and as students leave the college environment and develop social lives in the community.

Previous longitudinal studies examining changes in emotional suppression in college students have reported both increases (Srivastava et al., 2009) and decreases (Kneeland & Dovidio, 2020) over the first semester. Our study of change in suppression over the course of the first two years found increases during the first year followed by a decline during the second year, the only curvilinear pattern found among the four emotion regulation strategies examined. As students encounter challenging contexts during the first year, they may be uncertain about how to express their emotions or may experience negative consequences for doing so, resulting in greater use of suppression strategies. Yet as they move into the second year, they may need to rely less on suppression, perhaps by engaging in other, more adaptive emotion regulation strategies. Consistent with several prior studies, we found that women generally engaged in less suppression than did men (see Nolan-Hoeksema, 2012), as did participants with higher levels of communalism and social support. Increases in social activities and social connections over time also predicted less use of emotion suppression.

These results, suggesting lessening of emotional suppression with widening social horizons, await future verification and elaboration.

Contrary to our expectations, use of cognitive reappraisal declined consistently over the first two years of college, with a more rapid decline for women, who started off using more reappraisal than men. To some degree the decline in reappraisal may be a consequence of an initial ceiling effect—that is, students starting college reporting greater use of reappraisal showed slightly faster decline in the use of cognitive reappraisal (see Table 5). Increases in communalism, eudaimonic well-being, goal striving, and social connection (but not average levels of any of these factors) all promoted increases in cognitive reappraisal, suggesting some potential targets for future development of interventions to improve emotion regulation.

The consistent increases in using substances to cope with negative affect was also contrary to our expectations for maturation. Research on college students shows that use of alcohol and other drugs generally declines across the college years (Lindgren et al., 2016). Yet it appears that those individuals who drink alcohol or use other drugs to regulate their emotions increasingly rely on these strategies over time, which may set them apart from their peers and lead to long-term health problems and substance dependence (Cooper et al., 2008). It may also be that with increasing cognitive self-reflective abilities, individuals have gained more insight into their motives and are more likely to attribute their substance use to efforts at reducing stress. Once again, women used this strategy less and exhibited a less rapid increase than did men. Students with higher average levels of social connections used substances to regulate emotions *more* over time but increases in social activity engagement predicted less use of this strategy over time. These opposite findings regarding social predictors are intriguing, perhaps reflecting both the role of peers in promoting a culture of normative substance use (LaBrie et al., 2010; Lewis et al., 2015) and the role of social activities in promoting healthier engagement in campus life (Shinde, 2010; Theall et al., 2009). These findings highlight the need for interventions focused on the emotion-regulating functions of students' substance use (e.g., Park et al., 2018) as well as the need to consider social involvement with greater granularity.

Overall, our findings are provocative in challenging the common notion of uniformly increasing maturation in emotion regulation strategies (e.g., McRae et al., 2012), particularly in the context of college student development. Yet these finding are tempered by the study's limitations, including a focus on just the first two years and a single university community, along with the inclusion of just four (albeit central) emotion regulation strategies drawn from a large universe of strategies; further, some measures were just two items or factor analytic reductions of longer scales, which may result in lower content validity and lower internal consistency. All measures were self-reports, which have well-known biases (e.g., Furnham & Henderson, 1982, 1983) and common-rater, common-method variance (Podsakoff et al., 2003). We did not assess the role of SES or other demographic variables that might covary with and account for observed relationships or moderate them (e.g., Troy et al., 2017). We also did not assess specific stressors encountered or overall levels of stress that may have influenced individuals' use of emotion regulation, nor did we measure quantity of substance

use, quality of social support, or social desirability, all of which might have influenced our results.

Counterbalancing these weaknesses, our study design has important strengths, including a fairly large and diverse sample of undergraduates and a longitudinal approach that allowed us to track students across two full years, capturing not only the transition to college but also development across the first two years of college, which has been shown to be a highly challenging developmental period (Black, 2014; Conley et al., 2020; Tobolowsky & Cox, 2007).

Future research is needed to replicate and extend these findings. We examined the students' personal, social and motivational characteristics as predictors of change; future work might also examine more complex models of reciprocal influence. Longitudinal research that extends beyond the first two years will illuminate the trajectories of emotion regulation development. Our results suggest that interventions that promote more adaptive emotion regulation, already common in elementary and high school settings (e.g., Felver, Celis-de Hoyos, Tezanos, & Singh, 2016) may also be usefully delivered in university setting, perhaps as part of student wellness or integrated into coursework. Explicit focus on emotion regulation skills may be a key element of such interventions (e.g., Robbins, Oh, Le, & Button, 2009). In addition, our results suggest that more malleable qualities rather than traits predict development of emotion regulation trajectories (e.g., general determination was not a predictor of any trajectory, and aside from gender, time-varying predictors were largely more predictive of trajectories than were average levels of those factors). Thus, focusing on improving specific qualities such as eudaimonic well-being (helping students to identify and orient towards their purpose in life) as well as engagement in campus social activities and building a healthy social network, may be important targets of such interventions. The broader literature demonstrating that healthy emotion regulation is strongly implicated not only in career success but also in personal health and well-being suggests that interventions to promote more adaptive emotion regulation may have large long-term benefits, well-worth our investment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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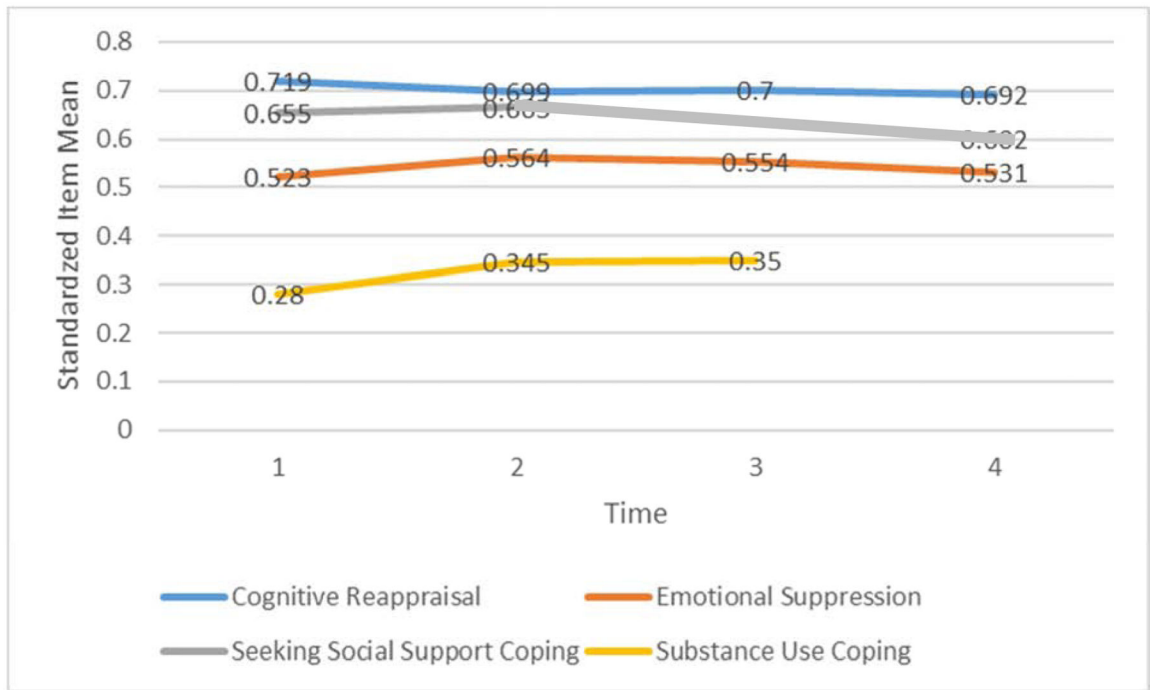
Figure 1.
Mean Changes in Emotion Regulation Strategies across the First Two Years of College

Table 1.

Summary of descriptive statistics for all variables at each time point

Variables	Time	N	Mean	SD	Kurtosis	Skewness	α
Female (0 = male, 1 = female)	T1	1578	0.58	0.49	−1.90	−0.32	-
Cognitive Reappraisal	T1	1211	5.03	1.02	0.63	−0.39	.84
Cognitive Reappraisal	T2	1056	4.89	1.10	0.43	−0.45	.86
Cognitive Reappraisal	T3	1092	4.89	1.02	0.71	−0.25	.85
Cognitive Reappraisal	T4	1184	4.85	1.05	0.26	−0.16	.87
Emotional Suppression	T1	1211	3.66	1.22	−0.42	0.10	.74
Emotional Suppression	T2	1056	3.95	1.29	−0.30	−0.10	.76
Emotional Suppression	T3	1092	3.88	1.27	−0.27	−0.05	.76
Emotional Suppression	T4	1184	3.72	1.27	−0.39	0.05	.80
Emotional Support Seeking	T1	1219	2.63	0.90	−0.90	−0.12	.81
Emotional Support Seeking	T2	1055	2.65	0.94	−0.92	−0.18	.87
Emotional Support Seeking	T4	1171	2.74	0.90	−0.84	−0.23	.85
Substance Use	T1	1222	1.12	0.41	17.86	3.99	.91
Substance Use	T2	972	1.39	0.69	3.30	1.96	.88
Substance Use	T3	1094	1.41	0.70	2.67	1.84	.90
Communalism	T1	1189	4.63	0.73	−0.20	−0.29	.80
Communalism	T2	1045	4.45	0.79	−0.65	−0.10	.80
Communalism	T4	1168	4.50	0.76	−0.31	−0.24	.78
Eudaimonic Well-being	T1	1192	3.63	0.64	−0.09	−0.02	.84
Eudaimonic Well-being	T2	1048	3.56	0.74	0.03	−0.15	.88
Eudaimonic Well-being	T4	1168	3.56	0.72	0.42	−0.21	.87
General Determination	T1	1570	59.39	5.92	4.33	−1.46	-
General Determination	T2	998	56.59	7.42	1.02	−0.95	-
General Determination	T3	1106	57.12	6.91	1.47	−0.97	-
Goal Striving	T1	1570	51.96	6.13	3.08	−1.20	-
Goal Striving	T2	998	48.75	7.04	0.22	−0.59	-
Goal Striving	T3	1106	49.01	7.11	0.26	−0.62	-
Social Activities	T1	1570	42.11	9.46	−0.42	−0.34	-
Social Activities	T2	998	38.59	9.77	−0.44	−0.14	-
Social Activities	T3	1106	38.99	9.61	−0.45	−0.15	-
Social Connections	T1	1570	53.17	7.51	1.85	−1.08	-
Social Connections	T2	998	50.64	9.09	0.43	−0.69	-
Social Connections	T3	1106	51.19	8.92	0.42	−0.70	-

Table 2.

Summary of level-1 (i.e., within-person) correlations among the time-varying predictors and outcomes

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Cognitive Reappraisal	--								
2. Emotional Suppression	0.01	--							
3. Emotional Support Seeking	.20**	−.34**	--						
4. Substance Use	−.09**	.13**	0.01	--					
5. Communalism	.27**	−.19**	.22**	−.16**	--				
6. Eudaimonic Well-being	.31**	−.13**	.21**	−.10**	.25**	--			
7. General Determination	.32**	−.17**	.21**	−.24**	.43**	.46**	--		
8. Goal Striving	.40**	−.22**	.19**	−.22**	.37**	.54**	.81**	--	
9. Social Activities	.24**	−.39**	.19**	−.08**	.25**	.32**	.34**	.48**	--
10. Social Connections	.30**	−.41**	.31**	−.07**	.29**	.38**	.51**	.59**	.64**

Note.

**
p < 0.01.

Table 3.

Summary of level-2 (i.e., between-person) correlations among the time-invariant predictors and outcomes

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Gender	--									
2. Cognitive Reappraisal	.10**	--								
3. Emotional Suppression	-.21**	-.02	--							
4. Emotional Support Seeking	.28**	.23**	-.41**	--						
5.Substance Use	-.10**	-.12**	.11**	.01	--					
6. Communalism	.19**	.29**	-.22**	.25**	-.16**	--				
7. Eudaimonic Well-being	-.01	.33**	-.18**	.26**	-.12**	.27**	--			
8. General Determination	.14**	.34**	-.17**	.22**	-.24**	.44**	.45**	--		
9. Goal Striving	.02	.41**	-.23**	.20**	-.21**	.37**	.54**	.82**	--	
10. Social Activities	-.01	.24**	-.41**	.20**	-.04	.26**	.33**	.34**	.50**	--
11. Social Connections	.09**	.29**	-.43**	.33**	-.05*	.31**	.35**	.50**	.58**	.67**

Note.

*
p < 0.05,

**
p < 0.01.

Table 4.

Global fit of unconditional and conditional growth curve models for self-regulation processes (N=1,578).

Model	χ^2(df)	CFI	RMSEA 90% CI	SRMR	Model Comparison	χ^2 (df)	Pass?
Cognitive Reappraisal							
5.0 Unconditional Intercept (no growth)	1044.05 (182) ***	.946	.055 [.052, .058]	.126			
5.1 Unconditional Linear Growth	999.82 (179) ***	.949	.054 [.051, .057]	.126	5.0 vs. 5.1	45.23 (3)	Y
5.2 Time-Varying Predictors	466.68 (173) ***	.982	.033 [.029, .036]	.054	5.1 vs. 5.2	532.14 (6)	Y
5.3 Time-Invariant Predictors / Correlates of the Intercept	388.50 (166) ***	.986	.029 [.025, .033]	.036	5.2 vs. 5.3	78.18 (7)	Y
5.4 Time-Invariant Predictors of Linear Growth	352.15 (159) ***	.988	.028 [.024, .032]	.034	5.3 vs. 5.4	36.35 (7)	Y
Emotional Suppression							
6.0 Unconditional Intercept only (no growth)	946.45 (182) ***	.954	.052 [.048, .055]	.118			
6.1 Unconditional Linear Growth	919.40 (179) ***	.955	.051 [.048, .054]	.118	6.0 vs. 6.1	27.05 (3)	Y
6.2 Unconditional Quadratic Growth	841.65 (178) ***	.960	.049 [.045, .052]	.118	6.1 vs. 6.2	77.75 (1)	Y
6.3 Time-Varying Predictors	531.65 (172) ***	.978	.036 [.033, .040]	.068	6.2 vs. 6.3	310.00 (6)	Y
6.4 Time-Invariant Predictors / Correlates of the Intercept	291.27 (165) ***	.992	.022 [.018, .026]	.025	6.3 vs. 6.4	240.38 (7)	Y
6.5 Time-Invariant Predictors of Linear Growth	256.68 (158) ***	.994	.020 [.015, .024]	.024	6.4 vs. 6.5	34.59 (7)	Y
Emotional Support Seeking							
7.0 Unconditional Intercept only (no growth)	655.81 (158) ***	.967	.045 [.041, .048]	.092			
7.1 Unconditional Linear Growth	640.85 (155) ***	.968	.045 [.041, .048]	.092	7.0 vs. 7.1	14.96 (3)	Y
7.2 Time-Varying Predictors	354.39 (149) ***	.987	.030 [.026, .034]	.038	7.1 vs. 7.2	286.46 (6) ***	Y
7.3 Time-Invariant Predictors / Correlates of the Intercept	197.31 (142) ***	.996	.016 [.010, .021]	.021	7.2 vs. 7.3	157.08 (7) ***	Y
7.4 Time-Invariant Predictors of Linear Growth	195.03 (135) ***	.996	.017 [.011, .022]	.021	7.3 vs. 7.4	2.28 (7)	N
Substance Use							
8.0 Unconditional Intercept only (no growth)	824.71 (157) ***	.955	.052 [.048, .055]	.066			
8.1 Unconditional Linear Growth	423.64 (154) ***	.982	.033 [.030, .037]	.058	8.0 vs. 8.1	401.07 (3) ***	Y
8.2 Time-Varying Predictors / Correlates of the Intercept	315.84 (148) ***	.989	.027 [.023, .031]	.034	8.1 vs. 8.2	107.80 (6) ***	Y
8.3 Time-Invariant Predictors / Correlates of the Intercept	294.41 (141) ***	.990	.026 [.022, .030]	.032	8.2 vs. 8.3	21.53 (7) **	Y
8.4 Time-Invariant Predictors of Linear Growth	245.48 (134) ***	.993	.023 [.018, .027]	.025	8.2 vs. 8.4	48.93 (7) ***	Y

Notes: Unconditional quadratic growth models were tested for cognitive reappraisal, emotional support seeking, and substance use outcomes, but these models resulted in nonconvergence. Therefore, we proceeded with unconditional linear growth models for all outcomes except for emotional suppression.

**
p .01,

***
p .001

Table 5.

Summary of time-varying and time-invariant structural coefficients (level 1 and level 2 fixed effects)

Outcomes

Predictors	Cognitive Reappraisal (Model 5.4) B (SE)	β	Emotional Suppression (Model 6.5) B (SE)	β	Emotional Support Seeking (Model 7.3) B (SE)	β	Substance Use (Model 8.4) B (SE)	β
Intercept (γ_{00})	4.88 (.04)***		3.92 (.05)***		2.37 (.03)***		1.16 (.02)***	
Female (γ_{01})[a]	0.21 (.05)***	.35	−0.43 (.06)***	−.53	0.41 (.04)***	.78	−0.05 (.02)	−.15
Linear Growth Slope (γ_{10})	−0.02 (.01)		0.27 (.03)***		0.03 (.01)***		0.14 (.01)***	
Female(γ_{11})[a]	−0.05 (.02)**	−.50	−0.01 (.02)	−.05			−0.04 (.01)**	−.32
Avg. Communalism(γ_{12})[a]	0.03 (.03)	.14	−0.07 (.03)*	−.26			−0.03 (.02)	−.12
Avg. Eudaimonic Well-being(γ_{13})[a]	0.03 (.04)	.15	−0.004 (.04)	−.02			−0.07 (.03)	−.22
Avg. General Determination(γ_{14})[a]	−0.10 (.06)	−.41	0.04 (.07)	.11			−0.07 (.05)	−.21
Avg. Goal Striving(γ_{15})[a]	0.15 (.07)	.69	0.07 (.07)	.23			0.02 (.05)	.06
Avg. Social Activities(γ_{16})[a]	−0.05 (.02)	−.36	−0.10 (.03)***	−.54			−0.02 (.02)	−.13
Avg. Social Connections(γ_{17})[a]	0.04 (.03)	.32	0.05 (.04)	.20			0.09 (.03)***	.34
Quadratic Growth Slope (γ_{20})			−0.06 (.01)***					
Communalism(γ_{30})[b]	0.14 (.03)***	.10	−0.06 (.03)	−.04	0.08 (.03)	.07	−0.03 (.02)	−.05
Eudaimonic Well-being(γ_{40})[b]	0.24 (.03)***	.16	0.05 (.03)	.03	0.17 (.03)***	.12	−0.008 (.02)	−.01
General Determination(γ_{50})[b]	−0.06 (.05)	−.03	0.04 (.06)	.02	0.04 (.05)	.03	−0.07 (.04)	−.10
Goal Striving(γ_{60})[b]	0.25 (.06)***	.15	0.06 (.06)	.03	−0.07 (.06)	−.05	−0.06 (.04)	−.09
Social Activities(γ_{70})[b]	−0.03 (.03)	−.03	−0.18 (.03)***	−.14	0.04 (.03)	.04	−0.07 (.02)***	−.15
Social Connections(γ_{80})[b]	0.13 (.04)***	.10	−0.13 (.04)***	−.08	0.12 (.04)***	.10	0.07 (.02)**	.13
R^2								
Intercept	.42		.27		.33		.00	
Linear Growth Slope	.54		.21		.60		.16	

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Notes. All continuous predictors were centered for analysis; female status was dummy-coded for the analysis (0=male, 1=female); βs associated with continuous variables standardized on the variances of the predictor (X) and outcome (Y); βs associated with dichotomous variables standardized on Y-only;

R^2 calculated as $\dfrac{Variances\,Highest\,Unconditional\,Model - Variances\,Highest\,Conditional\,Model}{Variances\,Highest\,Unconditional\,Model}$.

[a] Time invariant predictor,

[b] Time-varying predictor

*
p .0125,

**
p < .01,

***
p < .001