"If we can stand on our own two feet, it is because others have raised us up. If, as adults, we can lay claim to competence and compassion, it only means that other human beings have been willing and enabled to commit their competence and compassion to us—through infancy, childhood, and adolescence, right up to this very moment."

Urie Bronfenbrenner (1917 – 2005)

University of Alberta

Psychosocial Competencies During the Transition to Adulthood: Trajectories and Covariates

by

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ABSTRACT

This study modeled trajectories of four psychosocial competencies (autonomy, industry, identity, and intimacy) across four years of university and year-to-year covariation of these competencies with typical student experiences (living away from parents, academic performance, dating, and alcohol use) in 195 Canadian students. Analyses revealed that, on average, autonomy and identity did not change over time. Accounting for gender differences, however, revealed some linear changes across time for these competencies. Industry and intimacy showed curvilinear trajectories of change. Year-to-year, students reported higher autonomy and identity when living away from their parents and when getting higher grades. They also reported higher industry when getting higher grades. When students dated they reported higher identity and intimacy; dating women also reported higher autonomy than dating men. When dating students reported higher intimacy they reported higher perceived affection within their romantic relationships. Possible mechanisms for the observed patterns and their implications are discussed.

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CHAPTER I

Introduction and Literature Review

Historically, adolescence has been identified as a period of key changes in physical, psychosocial, and cognitive characteristics that bring the individual to adulthood (e.g., Erikson, 1968; Inhelder & Piaget, 1958; Loevinger, 1976). In recent decades, however, there has been a shift toward a longer "road to adulthood", with many young people deferring adult responsibilities (e.g., marriage, parenthood, and completion of formal education) well into the third decade of life (Arnett, 2000, 2004). This lengthening of the transition to adulthood has led some scholars to ask whether and when young people will attain the psychosocial competencies (e.g., autonomous functioning, attainment of a coherent identity, the capacity for intimacy; Bomar & Sabatelli, 1996; Galambos, Turner, & Tilton-Weaver, 2005) they need to become fully fledged adults (Booth, Crouter, & Shanahan, 1999; Côté, 2005; Côté & Allahar, 1995). As the postponement of adult roles (i.e., worker, spouse, parent) is most acute within university students, and a majority of Canadian youths enter post-secondary education (Knighton, Hujaleh, Iacampo, & Werkneh, 2009), questions arise about possible delays in their attainment of psychosocial competencies and the outcomes of such delays. This is of interest not only at the individual level, but also for the communities that share a stake in youths' successful transition to adulthood.

Despite the widely recognized demographic shift toward a longer transition to adulthood, and focused concern on its longer term implications for successful adult functioning, very little research has examined psychosocial competencies and their development in young people in their 20s, in or out of university. In the present

investigation, the evolution of several psychosocial competencies that are theoretically and empirically identified as developmentally salient during the transition to adulthood are observed. University students were tracked from their first through their fourth years of post-secondary education to identify whether there is growth in these psychosocial competencies. In addition, I explore individual, social, and academic characteristics and experiences as predictors of inter-individual differences in intra-individual changes in selected psychosocial competencies.

Erikson's Theory of Psychosocial Competencies

According to Erik Erikson (1950), psychosocial competencies or skills develop throughout the lifespan in eight successive phases, each of which has a focal task or challenge. Age-graded changes in social roles and interactions (e.g., the increase in the size of the child's social environment when entering school) bring about psychosocial challenges that, if properly resolved, aid in the development of new psychosocial competencies. As individuals acquire more of these competencies they possess larger arrays of adaptive tools (Peterson & Seligman, 2004). As their array of tools increases, they can more successfully manage the more complex social and psychological tasks of subsequent stages of development.

In Erikson's view, the social environments experienced during infancy and childhood present four sequential challenges that promote four psychosocial competencies (or not) depending on the level of challenge resolution. These challenges are cast as continua, with one end of the continuum representing the highest level of acquisition of the competence. The four continua are: (1) trust to mistrust, (2) autonomy to shame and doubt, (3) initiative to guilt, and (4) industry to inferiority (Erikson, 1950).

In the best of worlds, childhood will bring about competencies in the form of trust, autonomy, initiative, and industry. Adolescence brings about the next challenge and competency: (5) identity to identity confusion, with the acquisition of a coherent identity a major goal. Adulthood contains the challenges to bring about the final three competencies: (6) intimacy to isolation, (7) generativity to absorption, and (8) integrity to despair (Erikson, 1950). The body of research based on Eriksonian theory has found that, in most cases, more favorable resolutions of psychosocial challenges are associated with more positive outcomes. For example, higher levels of identity integration have been related to higher self-esteem and better relationships with parents and friends (Berzonsky & Adams, 1999; Reis & Youniss, 2004), higher intimacy has been related to less social anxiety and higher self-worth (Bouchey, 2007; LaGreca & Lopez, 1998), and higher generativity has been related to higher well being (Rothrauff & Cooney, 2008).

In terms of the transition to adulthood, Erikson (1968) theorized that the level of functioning during adulthood is based on the psychosocial competencies accumulated throughout previous developmental stages, as well as the key integration process during late adolescence that re-visits the so-far acquired psychosocial competencies and evaluates their fit to the challenges introduced by new social environments. This integration process occurs as adolescents experiment with different social roles, examining past and present experiences and evaluating their plans for the future. The outcomes of the challenges and integration process at this stage set the grounds from which the developmental tasks of adulthood are to be faced.

The Eriksonian perspective has stimulated widespread research in the area of psychosocial and personality development (Bertrand & Lachman, 2003), with numerous

psychosocial competencies identified as necessary for adequate adult functioning. Greenberger and Sørensen (1974), for example, highlighted the importance of three general competencies: functioning adequately on one's own, interacting effectively with others, and contributing to social cohesion, which must be acquired for individuals to reach psychosocial maturity. Steinberg and Cauffman (1996; Steinberg et al., 2009) identified temperance (the ability to limit impulsivity and to suppress aggressive behaviour), perspective (the ability to frame decisions within a larger context and to consider future consequences of actions), and responsibility (having healthy autonomy, self-reliance, and clarity of identity) as the competencies that must be attained for adequate handling of the challenges and choices faced during adulthood. Although extensive research has emerged on this topic, it has focused almost exclusively on the development of psychosocial competencies during adolescence (i.e., the teen years), ignoring the recent lengthening of the transition to adulthood well into the twenties.

Development of Psychosocial Competencies in the Transition to Adulthood and Beyond

The diversity and instability in life situations that are now characteristic of the transition to adulthood have extended the period of identity exploration and integration identified by Erikson (1968), leading Arnett (2000, 2004) to label ages 18 to 25 as emerging adulthood. Emerging adults may experience multiple changes in their life situations – from moving residence, to coming in and out of romantic relationships, to switching academic tracks, exposing them to a variety of different social roles that test the adaptive value of the psychosocial competencies they have attained. Arnett (2004) believes that, for many, the instability of emerging adulthood does not impede eventual

relationship, educational, and career success in adulthood. Others argue, however, that the lack of structure and adult responsibilities characteristic of this period lead young people to flounder, and in fact, hinder the attainment and integration of psychosocial competencies necessary for adult functioning (Côté, 2005; Côté & Allahar, 1995). Understanding how well young people manage identity integration and other developmental tasks during the transition to adulthood is a basic developmental question that may tell us much about the underpinnings of success in adulthood (Arnett, 2000; Montgomery & Côté, 2003).

Masten, Obradović, and Burt (2006) argue in favor of the importance of the transition to adulthood for competency development. According to their developmental perspective, the transition to adulthood, which encompasses adolescence and emerging adulthood, is a period of concentrated change in individuals, their social contexts, and the interaction between the two. These changes bring to the forefront and can transform previously attained competencies (Roisman, Masten, Coatsworth, & Tellegen, 2004) and at the same time provide the environment for new competencies to emerge (Masten et al., 2006). If the necessary competencies are attained, then effective adaptation to the environment and success in subsequent developmental tasks is possible (Masten & Coatsworth, 1998). Following the Eriksonian perspective then, the competencies of trust, autonomy, initiative, and industry are revisited and transformed and identity integration starts to emerge during the transition to adulthood.

Furthermore, as the boundaries between the transition to adulthood and adulthood are much less concrete than those between other developmental periods (e.g. between childhood and adolescence), the Eriksonian competency of intimacy, which becomes

salient during young adulthood, may also start to emerge during the transition to adulthood (Arnett, 2000; Masten el at., 2004). The possibility of change in any or all of these adaptive capacities during the transition to adulthood marks the experiences of this period (e.g., post-secondary education, military service) as potential "turning points", providing individuals with opportunities to change their life course (Masten & Powell, 2003; Rutter, 2000; Sampson & Laub, 1993). Indeed, longitudinal research spanning childhood to middle age shows that the effects of childhood variables and experiences such as parenting quality and socioeconomic status on adult domain specific functioning (e.g., social competence) are highly mediated by the experiences and adaptive resources gained during the transition to adulthood (e.g., coping and adult support), a pattern that benefits individuals who faced chronic adversity during childhood (Masten et al., 2004). At the same time, continuity in development is also apparent in Masten and her colleagues' research. The level of success in competency attainment in domains salient during previous developmental periods (e.g. adolescence) is a strong predictor of level of adaptation during later developmental periods (e.g. adulthood; Roisman et al., 2004).

While Masten and other scholars' empirical work pays much attention to the importance of competency attainment on later adaptation, little empirical effort has centered on understanding the developmental course of competencies during the transition to adulthood (Roisman et al., 2004). Longitudinal studies following young people through this transition are necessary in order to learn whether, to what extent, and how they attain psychosocial competencies. Surprisingly few if any studies have done so, and none have examined developmental trajectories of key psychosocial competencies (e.g., autonomy, identity) in a sample of university students moving through their first

four years of post-secondary education – young people, who, by many definitions, have not yet reached adulthood.

A longitudinal study by Whitbourne, Sneed, and Sayer (2009), however, informs our understanding of important changes in psychosocial competencies that might occur across the transition to adulthood. These researchers examined psychosocial development once in the college years and several times through middle age (to age 43 for one cohort and age 54 in the second). Measures for Erikson's eight psychosocial development competencies were collected on multiple occasions. Three competencies (trust, autonomy, and initiative) changed slowly but significantly from college age to middle age, increasing in a linear fashion. Industry increased significantly in a steeper linear trajectory, a finding echoing research showing that industry continues to be a challenge in early adulthood (Robitschek & Woodson, 2006). Identity and intimacy, challenges classically identified with the chronological periods of adolescence and emerging adulthood, respectively, showed larger increases in early than later adulthood. Generativity increased significantly and steadily throughout midlife. Finally, ego integrity increased in a significant curvilinear U-shaped pattern, indicating more change during later years.

The results from this long-term study of psychosocial competencies indicate that psychosocial development follows, in general, the age-related pattern theorized by Erikson (1950). Furthermore, the general pattern of increases in resolution for all psychosocial challenges and competency attainment shows that psychosocial competencies continue to develop across the lifespan. While this study provides important evidence of age-related change in psychosocial competencies in multiple

domains, participants were assessed only once during emerging adulthood. How key psychosocial competencies develop across the transition to adulthood remains largely unexplored. The major purpose of the current study was to address this question.

Key Psychosocial Competencies for University Students in the Transition to Adulthood

Based on previous research and Erikson's (1950) psychosocial development theory, changes along four psychosocial challenges were investigated in university students in the present study: autonomy, industry, identity, and intimacy. Autonomy was selected because it has been identified by personality scholars as a key competency that must be developed to reach adult status (Arnett, 2003; Facio & Micocci, 2003; Nelson, 2003). The instability inherent in the transition to adulthood presents changing conditions that can re-ignite the challenge of autonomy (e.g., changes in family relations and environment; Bomar & Sabatelli, 1996; Reis & Youniss, 2004; Scabini, Marta, & Lanz, 2006). It is possible then that as adolescents enter emerging adulthood and encounter novel conditions that test their ability to act independently (e.g., the first year of university life, moving away from home), their autonomy competency is low. As they move through emerging adulthood and become used to the changing context and learn to adapt to it, their autonomy should start to increase.

Research focusing on industry has found that important changes continue to occur through the period of young adulthood (Robitschek & Woodson, 2006). Indeed, Whitbourne et al. (2009) show that changes in industry from college to midlife were steeper than changes in any of the other psychosocial competencies theorized to be salient during infancy and childhood (trust, autonomy, and initiative). Because emerging

adults attending post-secondary educational institutions face novel academic contexts, their level of competence in the domain of industry is likely to decline as previously successful behaviors prove inadequate in the new context. Similar to autonomy, however, as they move through emerging adulthood and become used to the new academic and work contexts, their industry levels should increase. Therefore, a curvilinear pattern for the developmental trajectory of industry seems possible.

In terms of identity, Arnett (2003) identifies the transition to adulthood specifically as an extended period of identity development. In support, Adams, Ryan, and Keating (2000) found that identity achievement increased and identity diffusion decreased throughout the first and second years of university. Based on these and Whitbourne and colleagues' (2009) findings, identity integration should steadily increase throughout the transition to adulthood. However, as role exploration during this period presents emerging adults with ever-changing social contexts, it may be that identity experiences constantly change as emerging adults strive to adapt to the changing context. This, some scholars fear, may lead to instability and confusion instead of growth (Côté & Levine, 2002; Schwartz, Côté, & Arnett, 2005). As a consequence, it may be that the level of identity integration will not increase across the university years, but will fluctuate back and forth or even decrease.

As the transition to adulthood involves a slow progression to the attainment of full adult status (Arnett, 2003), the first psychosocial challenge of adulthood, intimacy, can move to the forefront during this period. Indeed, research has shown age changes in intimacy during the college years (Van Manen & Whitbourne, 1997). Research on resilience indicates that supportive relationships, which can only occur when adequate

intimacy is reached within the relationships, could have positive influences on resilience during the transition to adulthood and even serve as turning points (Quinton, Pickles, Maughan, & Rutter, 1993; Rutter, 1996; Rutter & Quinton, 1984). Although the competency of intimacy starts to develop much earlier than in emerging adulthood as supportive relationships are of key importance since infancy, the formation of romantic relationships is a developmental task of the transition to adulthood. This change in the type of relationships that are formed requires a revision of the intimacy competency during this period. As emerging adults move through university, their intimacy competency is expected to increase as a result of more and longer term romantic relationships that are normative during this period.

The Current Study

The current study focused on autonomy, industry, identity, and intimacy as key psychosocial competencies that may change and develop further in university students. Although Erikson's (1950) and Masten's (2004) perspectives on competency also theorize changes in trust and initiative, empirical investigation has shown little to no change in these competencies during late adolescence and young adulthood (e.g., Whitbourne et al., 2009; Whitbourne, Zuschlag, Elliot, & Waterman, 1992). For this reason, trust and initiative were not included in the present study.

Individual differences in developmental trajectories of psychosocial competencies.

Within a developmental systems framework, developmental research must recognize the complexity of human development and, accordingly, take into consideration the multiple levels of organization in which individuals and their

experiences are embedded, such as biology and culture (Galambos, 2004). Following this perspective, the current study also addressed a second question: are there moderation effects of gender and race on the trajectories of competency development? As individuals' characteristics at the different levels of organization influence person-environment interactions, developmental trajectories may differ between individuals with different characteristics. In terms of the possible influence of gender in person-environment interactions, research has found that men and women experience the transition to adulthood differently, assuming and experimenting with social roles on dissimilar timetables (Cohen, Kasen, Chen, Hartmark, & Gordon, 2003). These experiential differences might translate into differences in the development of psychosocial competencies. Whitbourne et al. (2009), for example, identified gender differences in trajectories of intimacy in adults. Women showed higher initial levels of intimacy and a pattern of decelerating development over time while men showed lower initial levels but a pattern of consistent and steady rise. It may be that women are on an accelerated timetable with respect to some psychosocial competencies during the transition to adulthood.

Similarly, in terms of the possible influence of race on development, research on the experiences of youths from different racial groups indicates that there may be racial differences in how the transition to adulthood is experienced (Arnett & Eisenberg, 2007). As an example, Cohen et al. (2003) showed that Black youths acquired more adult roles (e.g., full residential independence, financial responsibilities to the family home) yet developed independence and responsibility to a lesser extent than White youths. As there is no research that has focused on competency development during the transition to

adulthood, however, specific hypotheses about racial differences are unwarranted. I examine race as an individual difference variable in an exploratory manner.

Time-varying covariates of within-person change in psychosocial competencies.

The current study also addressed a third question: what are the possible within-person predictors of changes in university students' psychosocial competencies during the transition to adulthood? Specifically, the present study investigates how level of autonomy, industry, identity, and intimacy from year-to-year covary with living situation, academic performance, romantic situations, and alcohol consumption. Diversity in living arrangements during the transition to adulthood is a prime example of the instability inherent in this period. Indeed, people in their 20s experience the highest rate of residential change of all age groups (U.S. Census Bureau, 2004). Different living arrangements can bring with them demands (e.g., coexisting with roommates, taking full responsibility for household chores) and opportunities for exploration, which might play into the development of autonomy, industry, and identity. Research has found an association between living arrangements and identity status. Individuals with moratorium identity status who were living on their own reported facing more developmental problems and using fewer coping strategies than individuals with achieved identity status in the same living situation and individuals with moratorium identity status living with parents (Jordyn & Byrd, 2003). The researchers called attention to the lack of longitudinal research necessary for identifying the nature of the link between independent living and levels of psychosocial competency.

For youths attending post-secondary education during their transition to adulthood, new academic contexts are part of the challenges and social changes they experience. Arnett (2004) affirms that this new academic context holds much more significance for emerging adults than the academic context of their high school years. Emerging adults view post-secondary education as an exploration of their interests and abilities that will inform their choices for career paths as well as their identity consolidation. According to Erikson (1968), how well individuals perform on this ability exploration is important for gaining a sense that one is "able to make things and make them well" (p. 123), which is the competency of industry. Furthermore, this type of exploration also influences identity development as they discover areas in which they can function with unique excellence. Thus, according to these perspectives, an association between academic performance during post-secondary education and psychosocial competency development exists. Yet few studies have examined this association in post-secondary students. One study (Good & Adams, 2008) of academic success in first-year college students found a relationship between grades and the two psychosocial competencies of identity and autonomy such that students with higher levels of identity and with lower levels of autonomy showed higher grades than students with lower levels of identity and higher levels of autonomy. Furthermore, in another study (Boyd, Hunt, Kandell, & Lucas, 2003), young people demonstrating higher levels of identity exploration were more likely to be in good academic standing in their educational institutions. As research on the relationship between psychosocial competencies and academic performance is scarce, further longitudinal analysis of this association is needed.

Exploring interpersonal relationships during the transition to adulthood should bring about increases in the levels of psychosocial competencies (Erikson, 1968). Yet few studies have examined romantic relationship factors in university students as covariates of psychosocial competencies across time. Cohen et al. (2003) showed that there is great variation in emerging adults' patterns of romantic experiences. The question, however, is whether romantic relationship factors are associated with psychosocial competencies. Individuals with higher psychosocial development have reported higher quality and more satisfying friendships (Moore & Boldero, 1991). In another study, intimacy development was associated with lower psychological distress among first year college students in romantic relationships than among those not in romantic relationships (Paul, Poole, & Jakubowyc, 1998). Whitbourne et al. (2009) found that being involved in a romantic relationship during college was associated with higher levels of intimacy during this period and greater increase in intimacy through adulthood. This may be evidence for the long-term importance of the association between romantic experiences and psychosocial development.

The university period is a time of high risk for alcohol related problems both for the drinkers as well as for those around them (Wechsler et al., 1994; Wechsler, Kuo, Lee, & Dowdall, 2000). While this has led to extensive research on alcohol use, its covariation with psychosocial competencies over time has received little attention. In adolescence, more psychosocially mature adolescents (those showing higher levels of psychosocial competency attainment) report less frequent heavy drinking (Adalbjarnardottir, 2002). A similar study with college students, however, supported this pattern for women and not for men (Fischer, Forthun, Pidcock, & Dowd, 2007). Longitudinal research by Chassin et

al. (2010) found that constantly elevated alcohol and marijuana use during adolescence were associated with shallower increases in psychosocial competence during the transition to adulthood. Conversely, research has also shown that the level of psychosocial development during adolescence is related to the likelihood of experiencing alcohol abuse and dependence at age 21 (Oesterle, Hill, Hawkins, & Abbott, 2008). Longitudinal analysis of the association between psychosocial competencies and heavy alcohol use (i.e., getting drunk) during the transition to adulthood is the necessary next step.

A fourth and final question of this study is whether there are gender differences in how changes in psychosocial competencies covary with student experiences across time. As previously mentioned, men and women can experience the transition to adulthood differently. In a similar manner, research has found some differences in the student experiences of men and women. For example, research suggests that emerging adult women are likely to leave the parental home at an earlier age and in higher proportions than emerging adult men (e.g., Beaupré, Turcotte, & Milan, 2006; Cohen et al., 2003). In terms of other student experiences, college women have been found to earn higher grades, have fewer sexual partners, and consume alcohol less frequently than college men (e.g., Centers for Disease Control, 1997; Conger & Long, 2010; Wilsnack, Vogeltanz, Wilsnack, & Harris, 2000). It is therefore important to explore potential gender differences in the covariation of psychosocial competencies with these student experiences.

Research questions.

In summary, this longitudinal study following a sample of university students through a 4 year span during their transition to adulthood asked the following research questions:

1. What are the trajectories of change in four developmentally salient psychosocial competencies during the transition to adulthood (autonomy, industry, identity, and intimacy)?
2. Do these trajectories differ by gender and race?
3. What are the possible within-person predictors of changes in university students' psychosocial competencies during the transition to adulthood?
4. Do these covariations of psychosocial competencies with student experiences differ by gender?

CHAPTER II

Method

Participants

Participants were 195 students (60% women) at the University of Alberta who were tracked for up to four years. The mean age at study onset was 18.35 years (*SD* = .47). Race breakdown was 73% White, 13% Asian, 6% mixed, 3% Indo-Canadian, and 5% other visible minorities (e.g., Black, Arabic). During their first year, half (52%) lived with their parents, 28% in campus residence, 14% in an apartment either alone or with roommates, and 5% with relatives other than parents. Most participants (84%) grew up in two-parent homes, and the majority of their mothers and fathers (75%) completed two-year college or four-year university degrees.

Available data suggest that characteristics of the current sample at first year are reasonably representative of undergraduate students at the University of Alberta around the time that the sample was recruited. Sixty percent of the sample was female compared to 57% of full-time undergraduates (University of Alberta, 2006). Twenty-seven percent of the sample self-identified as non-White. This compares to 19% in a sample of 473 University of Alberta undergraduates surveyed in June 2005. Fifty-two percent of the sample lived with parents, similar to the 51% figure for University of Alberta undergraduates (Canadian Undergraduate Survey Consortium, 2005). The distribution of participants in faculties was similar to the actual distribution of first-year students at the University of Alberta (e.g., 41% of the sample was enrolled in Science compared to 34% of all first-year students; 32% of the sample was enrolled in Arts compared to 32% of all first-year students; Dalton, 2007).

Procedures

Participants engaged in full-time studies in fall 2005 were recruited from compulsory first-year English and Engineering classes. Interested students (N = 198) meeting the criteria (full-time, first year in any college or university, under age 20) attended an initial group session, in either September or October, where they completed consent forms as well as pen-and-paper baseline questionnaires. These 198 students were invited to complete monthly, web-based questionnaires during their first year and an annual questionnaire near the end of their second (a paper and pencil questionnaire in March), third (a web-based questionnaire in February), and fourth (a web-based questionnaire in March) years.

Of the 198 students completing the baseline questionnaire, retention was 164 students at the end of first year (83% of original sample), 93 at second year (47% of original sample), 108 at third year (55% of original sample), and 92 at fourth year (46% of original sample). Of the original 198 participants, 65 (33%) responded to all 5 waves of data collection (i.e., beginning and end of first year, and end of second through fourth years), 31 (16%) to 4 waves, 28 (14%) to 3 waves, 57 (29%) to 2 waves, and 16 (8%) participated only in the first wave of data collection. It should be noted that in any given wave, some of the missing students were not registered at the university during that wave. For example, 35 of the original 198 participants were no longer registered at the university during the 5^{th} wave, or end of fourth year.

Academic records were collected for all four years of university for all students in the original sample, regardless of whether they completed the questionnaires in a given wave, as long as they were registered at the university and had not revoked consent.

Thus, at the end of their fourth year, grades were available for 132 of the 198 students constituting the original sample. Three of the 198 students from the original sample were excluded from the current study due to excessive missing data (e.g., gender and race), resulting in a core sample of 195. For all analyses examining growth trajectories, missing data were treated as unbalanced data, allowing the inclusion of all cases in which there was at least partial data for the psychosocial competencies or time-varying covariates. A more complete explanation of how missing data were handled is included in the results section.

Attrition analysis.

I assessed differences between students present versus missing at each year of data collection on their first semester reports of variables examined in the present study (i.e., gender, race, autonomy, industry, identity, intimacy, living arrangements, grade-point average (GPA), dating status, dating affection, and alcohol use). Only two comparisons were significant for students present versus missing at the end of first year. First, missingness was higher among men than among women: more men (n = 14) than women (n = 7) were absent at the end of first year (χ^2 (1) = 6.97, $p \leq .05$). Second, absent students were drunk less frequently (M = .17 days, SD = .41) in a 14-day period during their first semester compared to participating students (M = 1.09 days, SD = 1.66, t (20.34) = 3.83, $p \leq .05$).

Students present versus missing from the study at the end of second year did not differ in gender and race or in their first semester reports of autonomy, industry, identity, intimacy, dating status, and dating affection. Students missing at the end of second year were more likely to have lived away from parents during their first year (55%) compared

to participating students (37%; χ^2 (1) = 5.19, $p \leq .05$). Missing students were drunk more frequently (*M* = 1.38 days, *SD* = 1.95) in a 14-day period during their first semester and had lower first-semester GPAs (*M* = 2.61, *SD* = .84) compared to participating students (drunk prevalence: *M* = .70 days, *SD* = 1.17, *t* (96) = -2.09, $p \leq .05$; GPA: *M* = 3.04, *SD* = .65, *t* (188) = 3.92, $p \leq .01$).

Students present versus missing from the study at the end of third year did not differ on any variable except for autonomy and GPA. Students missing from the study at the end of third year on average scored higher on autonomy at baseline (*M* = 3.91, *SD* = .54) compared to participating students (*M* = 3.75, *SD* = .55, *t* (193) = -2.09, $p \leq .05$). Missing students also had lower first-semester GPAs (*M* = 2.61, *SD* = .84) compared to participating students (*M* = 3.04, *SD* = .65, *t* (188) = 3.92, $p \leq .05$).

Finally, students missing from the study at the end of fourth year differed from participating students on gender, living arrangements, and drunk prevalence during their first semester. Participation was higher among women than men: over twice as many women (*n* = 62) participated at the end of fourth year than men (*n* = 28; χ^2 (1) = 5.50, $p \leq .05$). More students absent during fourth year lived away from their parents (57%) at baseline compared to participating students (37%, χ^2 (1) = 8.15, $p \leq .05$). Absent students were drunk more frequently (*M* = 1.46 days, *SD* = 1.97) in a 14-day period during their first semester at university compared to participating students (*M* = .58 days, *SD* = 1.01, *t* (96) = -2.76, $p \leq .05$). In conclusion, participation dropout by the end of fourth year was higher among men, students who lived away from home, and students who indicated heavier episodic drinking early in their first semester.

Measures

Data from five waves of measurement were used in this study: two from the first year of university (baseline in September or October and once during second semester) and one in each of the subsequent three years. Time was coded as: 0 (baseline or September/October), .58 (from baseline to March of first year), 1.58 (from baseline to March of second year), 2.50 (from baseline to February of third year), and 3.58 (from baseline to March of fourth year). In terms of between-persons predictors, Gender was coded as 0 (women) or 1 (men), and Race was coded as 0 (Minority) or 1 (White).

Within-person predictors, or time-varying covariates, include four psychosocial competencies, living situation (living away from parents, living in campus residence), academic performance, romantic relationships (dating status and perceived affection in dating relationship), and alcohol use (drunk prevalence). Table 1 presents descriptive statistics for each within-person variable at each of the data waves for the entire sample.

Psychosocial competencies were assessed at baseline, in March of the first and second years, in February of the third year, and in March of the fourth year. Four 12-item subscales from the Erikson Psychosocial Inventory Scale (Rosenthal, Gurney, & Moore, 1981) were used to measure autonomy (e.g., “I like to make my own choices”, “I can stand on my own two feet”), industry (e.g., “I stick with things until they’re finished”, “I’m good at my work”), identity (e.g., “I like myself and am proud of what I stand for”, “I know what kind of person I am”), and intimacy (e.g., “I’m ready to get involved with a special person”, “It’s important to me to be completely open with my friends”). Students rated each item on a scale ranging from 1 (*hardly ever true*) to 5 (*almost always true*) and the mean response across all items was calculated for each subscale. Higher mean scores

Table 1

Descriptive Statistics for Psychosocial Competencies, Living Situation, Academic Performance, Romantic Relationships, and Alcohol Use across Time

Variables		Year in University				
		Start 1st	End 1st	End 2nd	End 3rd	End 4th
Psychosocial Competencies						
Autonomy[a]	*M*	3.82	3.77	3.80	3.80	3.78
	SD	.55	.65	.64	.62	.65
	n	197	148	92	101	91
Industry[a]	*M*	3.95	3.81	3.86	3.88	3.90
	SD	.54	.63	.58	.56	.58
	n	197	149	92	101	90
Identity[a]	*M*	3.70	3.66	3.68	3.73	3.73
	SD	.67	.73	.75	.74	.68
	n	197	149	92	103	92
Intimacy[a]	*M*	3.62	3.65	3.74	3.68	3.73
	SD	.62	.67	.63	.67	.67
	n	197	149	92	102	91
Living Situation						
With parents	*%*	53	55	60	52	56
	n	196	167	92	106	93
On campus	*%*	28	29	20	11	9
	N	196	167	92	106	93
Academic Performance						
GPA[c]	*M*	2.81	2.82	3.04	3.20	3.25
	SD	.79	.86	.70	.64	.63
	N	190	188	165	147	132
Romantic Relationships						
Dating status[b]	*%*	34	43	54	49	63
	N	101	164	91	103	90
Perceived Affection[a]	*M*	4.16	4.06	4.19	4.01	4.04
	SD	.81	1.21	.78	1.20	1.01
	N	34	72	49	47	55
Alcohol Use						
14-day drunk (number of days)	*M*	1.02	.95	.58	1.00	1.09
	SD	1.62	1.69	.89	1.25	1.54
	N	99	149	89	68	55

Note: *M* = mean, *SD* = standard deviation, *n* = number of participants with scores on variable. [a] possible range = 1.00 to 5.00. [b] percentage of participants dating during given wave. [c] possible range = 1.00 to 4.00.

on each subscale indicate higher levels of attainment of the psychosocial competency. Each of the four subscales showed excellent internal consistency, with alpha coefficients ranging across the fives waves of data from .80 to .87 for the autonomy subscale, .82 to .87 for industry, .85 to .90 for identity, and .81 to .85 for intimacy.

Measurement validity was also tested for the core sample at baseline through confirmatory factor analysis (CFA). To do so, a model loading all 48 items onto their related latent factors (i.e., autonomy, industry, identity, and intimacy) was examined using LISREL (Jöreskog, Sörbom, du Toit, & du Toit, 2000). Although this measurement model showed a significant χ^2 ($\chi^2(1074) = 2516.17$, $p < .01$), the goodness of fit indices showed an adequate fit to the data (*RMSEA* = .08, *CFI* = .89). In terms of factor loadings, all but three scale items had statistically significant loadings on their specific latent factors and 43 out of the 48 items showed at least fair loading values (above .45; Tabachnick & Fidell, 2007). Therefore, the four psychosocial competency scales showed measurement validity in the core sample.

Students' *living situation* was recorded at baseline, in February of their first year, and at the end of their second, third and fourth years. For analysis purposes, living situation was coded with two orthogonal contrast variables, one contrasting *students living with parents* (2) versus *students living away from parents either in campus residence or other arrangements* (-1), and one contrasting *living alone, with roommates, or with other relatives* (1) with *living in campus residence* (-1). Across all years, the most common living arrangement for students was with parents (52-60%). There was a decrease in the proportion of students who lived in campus residences across waves (from 28% in first year to 8%), and an increase in the proportion of students who lived

alone, with roommates, or with other relatives (from 19% in first year to 38% in third year and 35% in fourth year).

Academic performance was measured using students' GPAs, which were supplied by the university Registrar for the fall and winter semesters of the first year and winter semesters of the subsequent three years. All GPAs were calculated as weighted averages over all courses taken and converted to a scale ranging from 0 (letter grade of F) to 4 (letter grade of A or A+). Average semester GPAs increased across years, ranging from 2.81 (*SD* = .79; letter grade of B-) to 3.25 (*SD* = .63; letter grade of B+).

Romantic relationships were assessed in October and March of the first year and at the end of the second, third, and fourth years. *Dating status* was assessed by asking participants whether they were currently "seeing someone or going out with someone who is more than just a friend" (*no* = 0, *yes* = 1). When participants stated that they were dating someone, the *perceived affection* they experienced in the romantic relationship was measured with the affection scale from the Network of Relationships Inventory (e.g., "How much does this person like or love you?"; Furman & Buhrmester, 1985). Responses to this 3-item scale ranged from 1 (*Little or none*) to 5 (*The most*). A higher mean score indicates more perceived affection in the relationship. This scale showed excellent internal consistency, with alpha coefficients ranging from 0.91 to 0.98 across the five waves of data. Measurement validity at baseline was tested through CFA using LISREL (Jöreskog, Sörbom, du Toit, & du Toit, 2000). The measurement model did not significantly differ from the observed data ($\chi^2(1) = .02$, $p > .05$), evidencing measurement validity in the present sample. The proportion of students who reported being involved in a romantic relationship ranged from 34% to 63% across all years. The

average level of *perceived affection* reported by dating students ranged from 4.04 (*SD* = 1.01) to 4.19 (*SD* = .78) across all years.

One item from the Monitoring the Future survey (e.g., Johnston, O'Malley, Bachman, & Schulenberg, 2009) assessed level of *alcohol use* (or *drunk prevalence*) in October and March of the first year and at the end of each of the second through fourth years. Participants indicated on how many days in the last 2 weeks they had "been drunk or very high from drinking alcoholic beverages". Responses ranged from 0 to 14 days. Higher scores indicate greater drunkenness prevalence and greater potential for alcohol abuse. Average days drunk ranged from .58 (*SD* = .89) to 1.09 (*SD* = 1.54) across years.

CHAPTER III

Results

Analysis Plan

The data analysis proceeded in three steps. First, measurement invariance for the four psychosocial competencies (autonomy, industry, identity, and intimacy) was examined in a series of confirmatory factor analyses. Second, preliminary analyses examined (1) autocorrelations of the four competencies across time, (2) correlations between the time-varying covariates and each psychosocial competency within time, and (3) intercorrelations among the time-varying covariates within time. Third, a series of multilevel models of change were constructed to examine trajectories of the four competencies across time and the between-persons and within-person predictors of these competencies.

Measurement Invariance

One basic assumption in longitudinal research is that measures used to gather information about underlying constructs assess the same constructs across time, that is, there is measurement invariance (Schaie, Maitland, Willis, & Intrieri, 1998). Lack of measurement invariance renders the results of over-time comparisons meaningless. Thus, prior to addressing the main research questions, measurement invariance across data collection waves was examined.

Confirmatory factor analysis (CFA) is an accepted and increasingly popular approach to examine measurement invariance (Crockett, Randall, Shen, Russell, & Driscoll, 2005; Meredith, 1993; Schaie et al., 1998; Schmitt, Pulakos, & Lieblein, 1984). In this approach, nested models of the relationship between scale items and the latent

constructs they are intended to measure are created and tested. Four models with sequentially higher levels of constraint are tested simultaneously across waves (Schmitt et al., 1984; Vandenberg, 2002; Vandenberg & Lance, 2000).

The configural invariance model (Model 1) constrains groups of scale items or indicators to regress onto the latent construct they are supposed to represent (Meredith, 1993; Vandenberg & Lance, 2000). This model implies that the same items-construct relations hold across waves and therefore, at least similar latent variables are present across the waves (Schaie et al., 1998; Widaman & Reise, 1997). The weak factorial or metric invariance model (Model 2) constrains the factor loadings from Model 1 to be equal across all waves, testing the hypothesis that the metric relation between the observed and true scores for each item is the same across waves (Schmitt et al., 1984). This implies that the same latent variances are being measured across waves (Vandenberg & Lance, 2000). The strong factorial or scalar invariance model (Model 3) adds the constraint of equal intercepts (i.e., means) across waves to the constraint introduced in Model 2. Strong factorial invariance implies that both the expected responses and the metric relation between observed and true scores are the same across waves for each item (Vandenberg & Lance, 2000; Widaman & Reise, 1997). Finally, the strict factorial model (Model 4) adds the constraint of equal error variances across waves to the constraints in Model 3. This level of invariance implies that observed differences in variance across waves are due only to differences in variance of the true scores across groups.

Model fit and the differences in goodness of fit across models are used to evaluate the different levels of measurement invariance. Poor model fit and significant differences

among nested models may indicate differences across waves in the relations between items and latent constructs (Tabachnick & Fidell, 2007).

The present study examined measurement invariance at these four levels using LISREL 8 to assess goodness of model fit and differences in model fit across models (Jöreskog, Sörbom, du Toit, & du Toit, 2000) for the four subscales of the Erikson Psychosocial Inventory Scale (EPI; Rosenthal et al., 1981) and the relationship affection subscale of the Network of Relationships Inventory (NRI; Furman & Buhrmester, 1985). While measurement invariance analysis for the first four scales was based on the core sample (N = 195), measurement invariance for the perceived affection subscale was analyzed using only participants who ever reported dating (*n* = 119). Goodness of fit for each model was examined using the χ^2 statistic, the comparative fix index (*CFI*), and the root-mean-square error of approximation (*RMSEA*). Non-significant χ^2 values, *CFI* values of .95 or greater, and *RMSEA* values of .05 or less indicate good model fit (Rigdon, 1996; Tabachnick & Fidell, 2007). *RMSEA* values between .05 and .08, and *CFI* values between .90 and .95 indicate fair model fit (Browne & Cudeck, 1993; Hu & Bentler, 1998; Tabachnick & Fidell, 2007). *RMSEA* values between .08 and .10, and *CFI* values between .80 and .89 indicate marginal but adequate fit (Hu & Bentler, 1998; Knight, Virdin, Ocampo, & Roosa, 1994; Rigdon, 1996).

As shown in Table 2, Model 1 for the autonomy, industry, identity, and intimacy scales showed significant χ^2 values, which may indicate poor model fit. The *CFI* goodness of fit indices, however, indicate adequate to fair model fit and the *RMSEA* values indicate near adequate model fit for these scales. As significant χ^2 values can

Table 2

Measurement Invariance Results across Five Waves for Autonomy, Industry, Identity, Intimacy, and Relationship Affection Scales

Scale	Invariance Models			
	Model 1 Configural	Model 2 Weak Factorial	Model 3 Strong Factorial	Model 4 Strict Factorial
Autonomy				
$\chi^2(df)$	670.89 (270)*	714.10 (314)*	798.13 (358)*	879.63 (406)*
RMSEA (90% Conf. Int.)	.11 (.10; .12)	0.10 (.09, .11)	.10 (.09; .11)	.10 (.09; .11)
CFI	.92	.92	.92	.91
Comparison Model	N/A	Model 1	Model 2	Model 3
$\chi^2_{diff}(df_{diff})$	N/A	43.21 (44)	84.03 (44)*	81.50 (48)*
Industry				
$\chi^2(df)$	957.26 (270)*	1005.69 (314)*	1092.97 (358)*	1181.13 (406)*
RMSEA (90% Conf. Int.)	.15 (.14; .16)	.14 (.13; .15)	.13 (.12; .14)	.13 (.12; .14)
CFI	.86	.86	.85	.85
Comparison Model	N/A	Model 1	Model 2	Model 3
$\chi^2_{diff}(df_{diff})$	N/A	48.43 (44)	87.28 (44)*	88.16 (48)*
Identity				
$\chi^2(df)$	746.11 (270)*	791.98 (314)*	838.40 (358)*	908.57 (406)
RMSEA (90% Conf. Int.)	.12 (.11; .13)	.11 (.10; .12)	.10 (.09; .11)	.10 (.09; .11)
CFI	.93	.93	.93	.93
Comparison Model	N/A	Model 1	Model 2	Model 3
$\chi^2_{diff}(df_{diff})$	N/A	45.87 (44)	46.42 (44)	70.17 (48)*
Intimacy				
$\chi^2(df)$	747.98 (270)*	808.43 (314)*	885.16 (358)*	931.87 (406)*
RMSEA (90% Conf. Int.)	.12 (.11; .13)	.11 (.10; .12)	.11 (.10; .12)	.10 (.09; .11)
CFI	.88	.88	.87	.87

Comparison Model	N/A	Model 1	Model 2	Model 3
$\chi^2_{diff}(df_{diff})$	N/A	60.45 (44)	76.73 (44)*	46.71 (48)
Perceived Relationship Affection				
$\chi^2(df)$	10.77 (5)	28.42 (9)*		
RMSEA (90% Conf. Int.)	.09 (.00; .17)	.12 (.07; .18)		
CFI	1.0	.99		
Comparison Model	N/A	Model 1		
$\chi^2_{diff}(df_{diff})$	N/A	17.65 (4)*		

NOTE. * $p \leq .05$.

occur in well fitting models due to high data complexity, more weight should be given in this case to the goodness of fit indices. Based on these indices, Model 1 for the four scales shows marginal but adequate fit and thus configural invariance can be assumed, albeit cautiously. Model 1 for the perceived affection scale showed a non-significant χ^2 value and goodness of fit indices indicating good model fit. Based on the indices and χ^2 value Model 1 for this scale shows good model fit and thus configural invariance can be assumed.

Model 2, which tested for weak factorial invariance, did not have a significantly different fit than Model 1 for the autonomy, industry, identity, and intimacy scales as evidenced by the non-significant change in χ^2 value. Therefore, weak factorial invariance can be assumed for these scales. Model 2 for the relationship affection scale had a significantly different model fit than Model 1 for this scale. This may be indicative of a lack of weak factorial invariance. Bentler (1990), however, advices that changes in *CFI* of .01 or less when testing models for measurement equivalence may indicate that the null hypothesis should not be rejected, even in the presence of significant chi-square differences. The small change in *CFI* between Models 1 and 2 could, therefore, be interpreted as supporting the conclusion that weak invariance is present in this scale. The change in *RMSEA* value between Models 1 and 2 for this scale was greater. *RMSEA*, however, has been found to over-reject true models in small samples (Tabachnick & Fidell, 2007). As the subsample of students involved in a romantic relationship in the present study is of a smaller nature, the high *CFI* value in Model 2 and the small change in *CFI* between Models 1 and 2 should be weighed more heavily than the *RMSEA* values involved. Taken together, these results indicate potential problems in the perceived

affection scale, which shows partial weak factorial invariance at best. For this reason no tests for stronger types of invariance were conducted for this scale.

Model 3, which tested for strong factorial invariance, had a significantly lower model fit than Model 2 for all but the identity scale. The difference in χ^2 between Models 2 and 3 for this scale was non-significant. Furthermore, Model 3's *RMSEA* index value showed better model fit than that of Model 2. These results evidence the presence of strong factorial invariance in the identity scale. Strong factorial invariance, however, cannot be assumed for the autonomy, industry, intimacy, and perceived affection scales. Finally, Model 4, which tested strict factorial invariance, had a significantly lower model fit than Model 3 for all the scales. Therefore, strict factorial invariance cannot be assumed for any of the scales.

Overall, the present CFA analysis provides support for configural and complete or partial weak factorial invariance in the five multi-item scales used in the present study. Schmitt and Kuljanin (2008) argue that, while all four levels of invariance should be examined, in practice, analysis of most measures produces positive results only for the first two levels. Horn and McArdle (1992) argue that when the grouping variable is time and measures are within-person, these first two levels of invariance are sufficient, provided positive evidence. Schaie et al. (1998) further argue that some changes in model fit across development are to be expected without changes in the construct that a particular scale measures. Yet these developmental changes would potentially change the variances and intercepts across time. For this reason, testing models with more stringent constraints than those used for weak factorial invariance tests may not be appropriate in developmental research. Based on these recommendations and the present analyses, all

five multi-item scales used in this study showed sufficient measurement invariance. With the assumption of measurement invariance verified, the next level of analysis was undertaken.

Preliminary Correlational Analysis

Autocorrelations for the four outcome variables across time for the core sample were all significant ($p \leq .001$) and ranged from .56 to .74 for autonomy (median $r = .67$), .56 to .76 for industry (median $r = .69$), .56 to .78 for identity (median $r = .70$), and .68 to .85 for intimacy (median $r = .77$). In general, there were higher autocorrelations across shorter intervals (e.g., between waves 1 and 2) and lower autocorrelations across longer intervals (e.g., between waves 1 and 5).

Correlations among the four outcomes within time for the core sample were also all significant ($p \leq .01$). Higher autonomy was associated with higher industry (range across waves is $r = .48$ to .71), higher identity (range across waves is $r = .74$ to .83), and higher intimacy (range across waves is $r = .30$ to .50). Higher industry was associated with higher identity (range across waves is $r = .60$ to .75) and higher intimacy (range across waves is $r = .37$ to .55). Finally, higher identity was associated with higher intimacy (range across waves is $r = .37$ to .66).

Correlations between each psychosocial competency and the time-varying covariates within time are presented in Tables 3 to 6. Higher autonomy was associated with living away from parents at the end of third year, with higher perceived relationship affection at the end of first year, and with higher frequencies of getting drunk at the end of third year (see Table 3). Table 4 shows that higher industry was associated with higher academic performance at every time point. Higher industry was also associated with

Table 3

Within-Time Correlations between Autonomy and the Time-Varying Covariates

	Autonomy				
Covariates	Start 1st	End 1st	End 2nd	End 3rd	End 4th
Living Situation					
With parents[a]	-.10	-.08	-.10	-.23*	-.20
Campus residence[b]	.11	.10	.10	.16	.05
Academic Performance	-.02	.08	.18	.20	.22
Romantic Relationships					
Dating status	.16	.16	.03	.11	.16
Perceived Affection	.10	.27*	-.13	-.03	.17
Drunk Prevalence	.05	-.07	.05	.27*	.12

NOTE. Range of n = 34 to 195. [a] With parents = 2, Away from parents = - 1. [b] On campus = -1, Off campus = 1. * $p \leq .05$.

Table 4

Within-Time Correlations between Industry and the Time-Varying Covariates

	Industry				
Covariates	Start 1st	End 1st	End 2nd	End 3rd	End 4th
Living Situation					
With parents[a]	-.08	.06	-.11	-.12	-.20
Campus residence[b]	.11	.15	.07	.05	.04
Academic Performance	.15*	.31*	.33*	.42*	.40*
Romantic Relationships					
Dating status	.06	.13	.15	.25*	.17
Perceived Affection	.25	.21	-.18	.05	.40*
Drunk Prevalence	.08	-.19*	.02	.12	-.19

NOTE. Range of n = 34 to 195. [a] With parents = 2, Away from parents = - 1. [b] On campus = -1, Off campus = 1.* $p \leq .05$.

Table 5

Within-Time Correlations between Identity and the Time-Varying Covariates

	Identity				
Covariates	Start 1st	End 1st	End 2nd	End 3rd	End 4th
Living Situation					
With parents[a]	-.11	-.05	-.12	-.10	-.16
Campus residence[b]	.18*	.16	.16	-.08	-.02
Academic Performance	.02	.10	.21*	.15	.18
Romantic Relationships					
Dating status	.16	.23*	.22*	.21*	.16
Perceived Affection	.27	.24	-.19	-.11	.16
Drunk Prevalence	-.08	-.12	-.01	.14	.01

NOTE. Range of n = 34 to 195. * [a] With parents = 2, Away from parents = - 1. [b] On campus = -1, Off campus = 1. $p \leq .05$.

Table 6

Within-Time Correlations between Intimacy and the Time-Varying Covariates

	Intimacy				
Covariates	Start 1st	End 1st	End 2nd	End 3rd	End 4th
Living Situation					
With parents[a]	-.07	-.02	-.06	-.09	-.20
Campus residence[b]	.10	-.00	.05	.05	.02
Academic Performance	-.05	.08	.13	-.07	.07
Romantic Relationships					
Dating status	.23*	.44*	.42*	.54*	.56*
Perceived Affection	.25	.42*	-.05	-.09	.37*
Drunk Prevalence	-.02	-.02	.09	.02	-.08

NOTE. Range of n = 34 to 195. [a] With parents = 2, Away from parents = - 1. [b] On campus = -1, Off campus = 1.* $p \leq .05$.

dating at the end of third year, with higher perceived relationship affection at the end of fourth year, and with getting drunk less frequently at the end of first year. Table 5 shows that in terms of identity, lower identity was associated with living in campus residence rather than off campus alone or with non-family members at baseline. Higher identity was also associated with higher academic performance at the end of second year, and with dating at the end of first, second and, third year. Turning to Table 6, higher intimacy was associated with dating at all time points, and with higher perceived relationship affection at the end of first and fourth year.

Correlations among time-varying covariates within time were also examined. Living with parents was associated with not dating at the end of second (r = -.28, $p \leq .05$) and third (r = -.23, $p \leq .05$) year. Living with parents was also associated with lower drunk prevalence at baseline (r = -.50, $p \leq .05$), and at the end of first (r = -.25, $p \leq .05$) and second (r = -.29, $p \leq .05$) year. Living in campus residence was associated with higher drunk prevalence (r = -.46, $p \leq .05$) and with lower perceived relationship affection (r = -.41, $p \leq .05$) at baseline. Finally, higher academic performance (i.e., GPA) was associated with higher perceived relationship affection at the end of fourth year (r = .34, $p \leq .05$).

Multilevel Modeling

Multilevel modeling allows the evaluation of individual differences in change over time as well as the use of data organized at more than one level (i.e., nested). This approach is therefore well suited for developmental research, which deals with within-person repeated measures over time (Level 1 data; e.g., living situation in a given year) as well as between-persons factors (Level 2 data; e.g., gender and race) that may help

identify differences in developmental pathways for the outcomes of interest. In the present study, a series of multilevel models of change were constructed using HLM 6.0 (Raudenbush & Bryk, 2002) to examine the trajectories of change for autonomy, industry, identity, and intimacy and their covariation with student experience variables both at the within-person and between-persons levels.

Unconditional means models containing no covariates were constructed for each psychosocial competency to determine the proportions of within-person and between-persons variance (Unconditional Model). The general forms of the equations for this model are as follows:

$$\text{Level 1: } Psychosocial\ competency_{ti} = \pi_{0i} + e_{ti} \quad (1)$$

$$\text{Level 2: } \pi_{0i} = \beta_{00} + r_{0i} \quad (2)$$

Equation 1 expresses, for each participant (person *i*), the mean psychosocial competency score (averaged across time; the intercept), π_{0i}, plus a random error component, e_{ti}. This is sometimes known as the person-specific mean (Singer & Willett, 2003). Equation 2 expresses the intercept in Equation 1 in terms of the grand mean of all participants' scores, β_{00}, plus a random error component, r_{0i}.

Linear and quadratic functions were then tested (Model 1: Growth Model). The linear function of each competency was tested by adding time to their unconditional models as a predictor. The quadratic function was then tested for possible curvilinear growth by adding time squared to the linear function model. Only significant quadratic functions were retained in subsequent models. The general forms of the equations for this model are as follows:

$$\text{Level 1: } Psychosocial\ competency_{ti} = \pi_{0i} + \pi_{1i}(Time) + \pi_{2i}(Time\ squared) + e_{ti} \quad (3)$$

$$\text{Level 2: } \pi_{0i} = \beta_{00} + r_{0i} \quad (4)$$

$$\pi_{1i} = \beta_{10} + r_{1i} \quad (5)$$

$$\pi_{2i} = \beta_{20} + r_{2i} \quad (6)$$

Equation 3 models the psychosocial competency score for each participant as a function of that participant's score at baseline, π_{0i} (i.e., the intercept), the participant's linear rate of change across time, π_{1i} (i.e., the linear slope), the participant's quadratic rate of change across time, π_{2i} (i.e., the quadratic slope), and a random error component, e_{ti}. Equation 4 expresses the intercept for each participant in terms of the grand mean of all participants' scores at baseline, β_{00}, plus a random error component, r_{0i}. Equation 5 expresses the linear slope for each participant in terms of the average rate of linear change across all participants, β_{10}, and error, r_{1i}. Finally, Equation 6 expresses the quadratic slope for each participant in terms of the average rate of quadratic change across all participants, β_{20}, and error, r_{2i}.

Interactions with the between-subjects variables (gender and race) were tested next by adding them to the growth model at Level 2 (Model 2: Gender & Ethnicity Model) as predictors of the intercepts and slopes. The general forms of the level 2 equations are as follows:

$$\text{Level 2: } \pi_{0i} = \beta_{00} + \beta_{01}(Gender) + \beta_{02}(Race) + r_{0i} \quad (7)$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(Gender) + \beta_{12}(Race) + r_{1i} \quad (8)$$

$$\pi_{2i} = \beta_{20} + \beta_{21}(Gender) + \beta_{22}(Race) + r_{2i} \quad (9)$$

Equation 7 models the score on the outcome variable at baseline for each participant as a function of the grand mean of all participants' scores at baseline, β_{00}, plus gender, race, and random error. Equations 8 and 9 model the linear and quadratic slopes, respectively, for each participant as a function of the average rate of change, linear and quadratic, respectively, plus race, gender, and random error.

Time-varying effects of the within-person variables (living situation, academic performance, romantic relations, and alcohol use) were tested by adding them individually to the Gender & Ethnicity Models (Models 3 through 6: Time-varying Effect Models) and then simultaneously (Model 7: Final Model). Testing each covariate singly allowed the evaluation of the covariation of each psychosocial competency with the specific covariate, while testing all covariates informed us about each covariation after taking into account other possible covariations. Interactions between Level 1 variables and gender were also tested in Models 3 through 6. An example of the level 1 equation for the time-varying covariate models is as follows (from Model 4):

$$\text{Level 1: } Psychosocial\ competency_{ti} = \pi_{0i} + \pi_{1i}(Time) + \pi_{2i}(Time\ squared) + \pi_{3i}(Academic\ Performance) + e_{ti} \quad (10)$$

The interaction of the time-varying covariate with gender was modeled as in Equation 11:

$$\text{Level 2: } \pi_{3i} = \beta_{30} + \beta_{31}(Gender) \quad (11)$$

The general form of the level 1 equation for Model 7 is as follows:

$$\text{Level 1: } Psychosocial\ competency_{ti} = \pi_{0i} + \pi_{1i}(Time) + \pi_{2i}(Time\ squared) + \pi_{3i}(living\ with\ parents) + \pi_{4i}(living\ in\ campus\ residence) +$$

$$\pi_{5i}(academic\ performance) + \pi_{6i}(dating\ status) +$$

$$\pi_{7i}(drunk\ prevalence) + e_{ti} \quad (12)$$

Interactions with gender and/or race were tested as in Equations 7 through 9, and 11.

For each model, within-person predictors were grand-mean centered, except for dichotomous variables and time (both were uncentered). Between-persons predictors (gender and race) were also grand-mean centered. Parameter estimates were generated using full information maximum likelihood to preserve cases containing within-person missing values. There were no between-persons missing values in the core sample of 195. In terms of level 1 variables (outcome variables and covariates), HLM treats missing values at a given point as unbalanced data. Participants with incomplete data sets (i.e., participants with missing values for some or all variables within a given collection time) thus contribute to the analysis for waves in which they have data for all the pertinent variables. Intercepts and slopes of all time-varying covariates were estimated as non-randomly varying. Intercepts and time slopes were allowed to randomly vary in all models. Fixed effects were used for the time-varying covariates because this permits the control of any unobserved variables that, while not included in the present study, may influence the associations between the psychosocial competency variables and their covariates (Allison, 2009).

Likelihood-ratio tests assessed the significance of the differences in fit between the unconditional means model and Model 1, between Model 1 and Model 2, and between Model 2 and Models 3 through 7 for each psychosocial competency. The time-varying effect models and the final model for all four psychosocial competencies provided significantly better fit to the data over the growth model with gender and race as

trajectory moderators alone (Model 2). Results from the final model (Model 7) were used for interpretative (i.e., drawing conclusions) purposes because it (a) was better fitting than Model 2, (b) was consistent with the theoretical assumption that growth trajectories are a function of multiple student experiences, and (c) controlled for potentially important predictors. Given this, post hoc probing was conducted only when there were significant interactions of race or gender with time in Model 7.

Trajectories of change in psychosocial competencies.

Autonomy.

The unconditional means model revealed that 67% of the variation in level of autonomy was within-person and 33% was between-persons. As shown in Table 7, autonomy did not change significantly over time on average. However, there was an interaction between gender and linear slope in Models 5 through 7 (Figure 1). Follow-up analyses conducted separately by gender indicated that men's level of autonomy did not change significantly over time (*slope coefficient* = .04, *S.E.* = .04, $p > .05$) but women's autonomy declined significantly (*slope coefficient* = -.08, *S.E.* = .03 $p \leq .05$).

An interaction between race and linear slope was present in Models 2 through 4. Visual inspection suggested Whites did not change in autonomy from first to fourth year while minority students decreased. The main effect of race on the linear slope did not persist when all time-varying covariates were entered in Model 7.

In terms of time-varying effects, living away from parents covaried with level of autonomy. Year-to-year, when students lived away from their parents they displayed higher levels of autonomy than when they lived with parents (Models 3 and 7). An interaction between gender and living in campus residence indicated that when women

Table 7

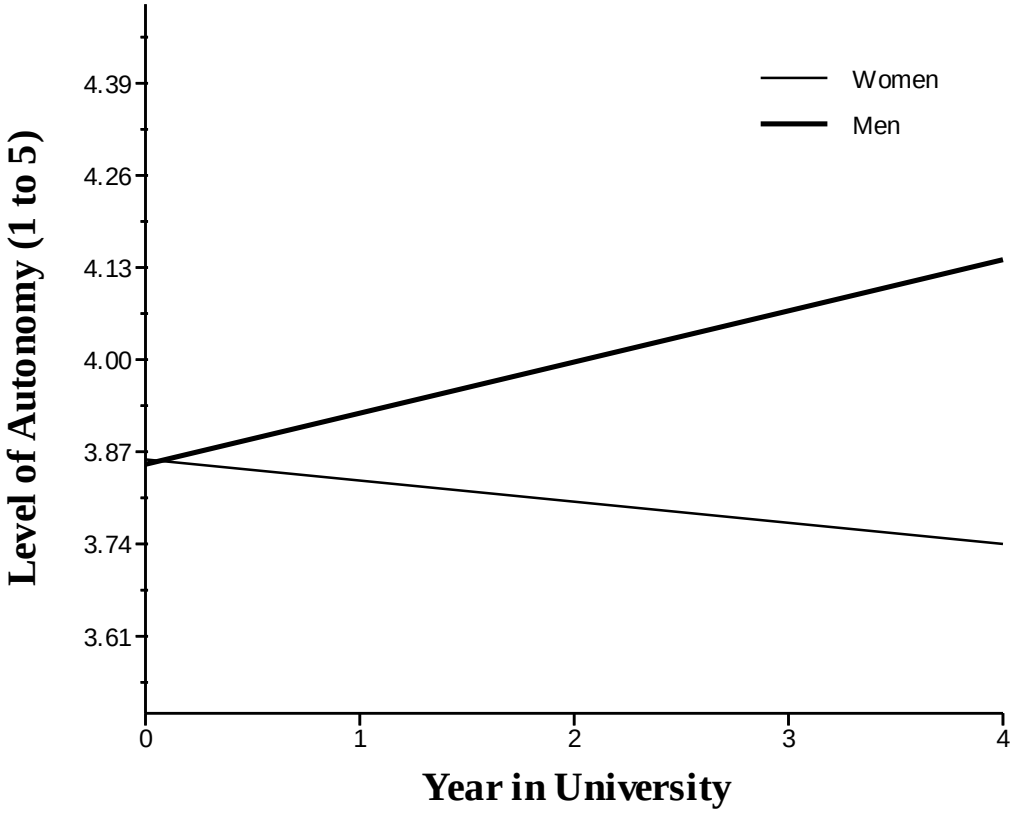
Results of Multilevel Models Predicting Trajectory of Autonomy and Covariation with Student Experiences

	Model 1 Growth		Model 2 Gender & Race		Model 3 Housing		Model 4 Academic		Model 5 Dating		Model 6 Drunk		Model 7 Final	
	Coeff.	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*
Fixed Effects														
Autonomy (baseline)	3.80*	.04	3.80*	.04	3.82*	.04	3.81*	.04	3.80*	.05	3.82*	.05	3.86*	.05
Gender (Men = 1)			.00	.08	-.00	.08	.00	.09	-.03	.10	-.07	.09	-.01	.10
Race (White = 1)			.06	.09	.04	.09	.05	.09	.08	.10	.05	.10	.03	.09
Autonomy linear slope	.00	.01	.01	.01	.00	.01	-.00	.01	-.01	.02	-.00	.02	-.03	.02
Gender			.05	.03	.03	.03	.06	.03	.09*	.03	.10*	.04	.12*	.05
Race			.08*	.03	.07*	.03	.07*	.03	.06	.03	.09	.05	.08	.05
Time-varying Covariates														
Living with parents					-.05*	.02							-.07*	.03
Gender					.02	.05							.03	.06
Campus residence					.01	.03							.03	.04
Gender					.14*	.07							.13	.08
Academic performance							.08*	.04					.09*	.04

Gender				-.08	.07					-.09	.08	
Dating status (yes = 1)						.03	.04			.03	.04	
Gender						-.14	.08			-.18*	.09	
Drunk prevalence (14-day)								-.01	.02	-.02	.02	
Gender								-.07	.04	-.06	.04	
Random Effects Variance (*df*)												
Autonomy Intercept	.25 (168)*		.24 (166)*		.24 (162)*		.25 (165)*		.25 (133)*		.24 (126)*	.23 (124)*
Autonomy linear slope	.01 (168)*		.01 (166)*		.01 (162)*		.01 (165)*		.01 (133)*		.01 (126)*	.01 (124)*
χ^2 (*df*)	13.04 (3)*		10.25 (4)*		18.93 (4)*		30.23 (2)*		103.01 (2)*		193.18 (2)*	242.53 (10)*
Comparison model	UnMs		Model 1		Model 2		Model 2		Model 2		Model 2	Model 2

Note: *Coeff* = coefficient. *SE* = standard error. UnMs = unconditional means model. *N* = 195. *$p \leq .05$.

Figure 1. Autonomy trajectories across four years, conditional on gender. From Table 7, Model 7.



lived in campus residence they reported higher levels of autonomy than when they lived away from their parents but not in campus residence, whereas when men lived in campus residence they reported lower levels of autonomy than when they lived away from parents but not in campus residence. This interaction, however, was not present when covariations of autonomy with the other time-varying variables were taken into account (Model 7). As shown in Models 4 and 7, students had higher academic performance (GPA) in semesters when they scored higher on autonomy. Finally, a gender effect on the covariation of dating status with level of autonomy that was not present in Model 5 appeared in Model 7 (Figure 2). When dating, women reported higher autonomy than men, while when not dating, level of autonomy did not differ between men and women.

Industry.

The unconditional means model revealed that 68% of the variation in level of industry was within-person and 32% was between-persons. In three of the seven models in Table 8 (Models 2, 3, and 6), gender predicted industry during students' first semester at university (i.e., baseline), with women showing higher industry than men. Race predicted industry at baseline only in Model 4 (Academic Model), with White students showing higher industry than minority students.

The significant linear and quadratic slopes present in all models indicated that, on average, students' level of industry decreased between first semester at university and the end of second year and increased as they moved through third and fourth year (Figure 3). In terms of time-varying effects, when academic performance was higher, so was industry (Models 4 and 7). Finally, when students reported lower frequencies of getting

Figure 2. Within-person association between dating status and level of autonomy, conditional on gender. From Table 7, Model 7. All other predictors are held constant at the mean.

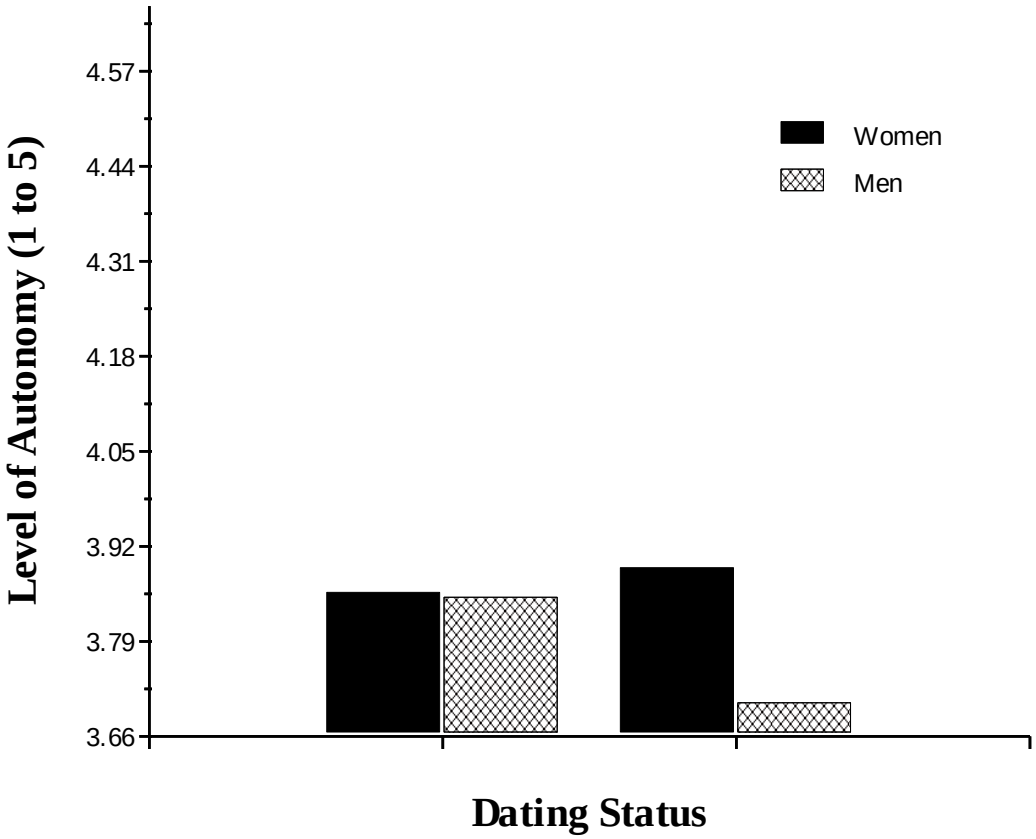


Table 8

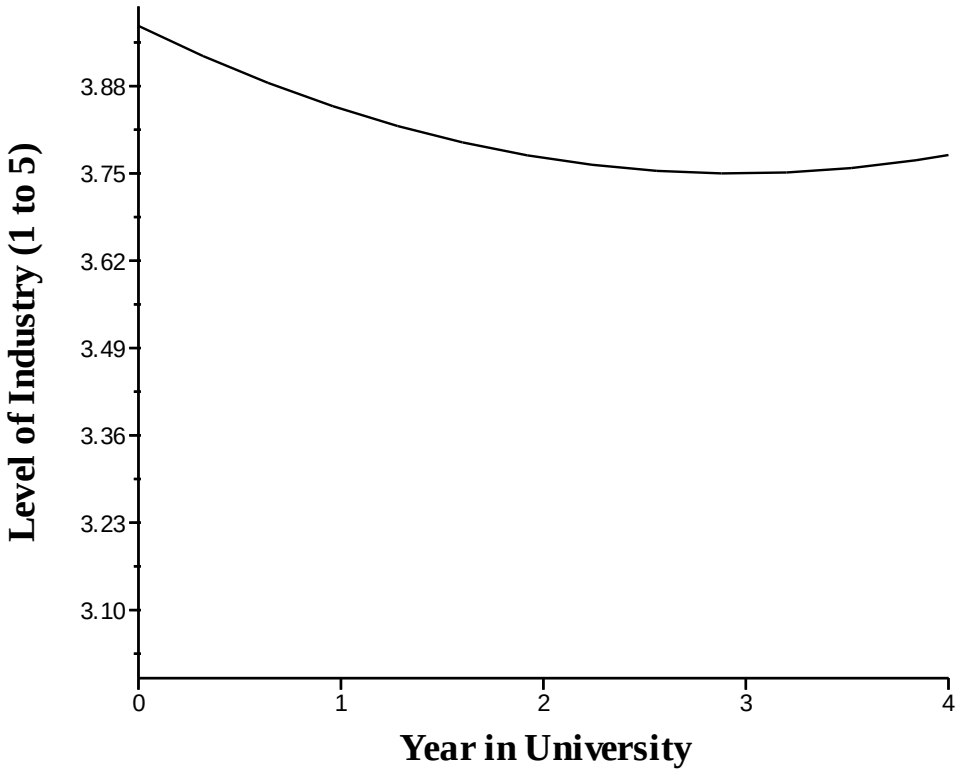
Results of Multilevel Models Predicting Trajectory of Industry and Covariation with Student Experiences

	Model 1 Growth		Model 2 Gender & Race		Model 3 Housing		Model 4 Academic		Model 5 Dating		Model 6 Drunk		Model 7 Final	
	Coeff.	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*
Fixed Effects														
Industry (baseline)	3.93*	.04	3.93*	.04	3.95*	.04	3.96*	.04	3.91*	.05	3.94*	.05	3.97*	.05
Gender (Men = 1)			-.16*	.08	-.17*	.07	-.13	.08	-.16	.10	-.22*	.09	-.09	.10
Race (White = 1)			.17	.09	.17	.09	.18*	.09	.18	.11	.17	.11	.20	.11
Industry linear slope	-.13*	.03	-.13*	.03	-.14*	.03	-.15*	.04	-.12*	.04	-.14*	.05	-.17*	.05
Gender			.02	.07	.02	.07	.01	.08	.11	.09	.16	.09	.17	.10
Race			.00	.08	.01	.09	.00	.08	-.05	.10	.00	.11	-.01	.11
Industry quadratic slope	.03*	.01	.04*	.01	.04*	.01	.03*	.01	.03*	.01	.04*	.01	.03*	.01
Gender			-.00	.02	.00	.02	-.00	.02	-.02	.02	-.03	.03	-.03	.03
Race			.01	.02	.01	.03	.01	.03	.02	.03	.01	.03	.01	.04
Time-varying Covariates														
Living with parents					-.03	.02							-.04	.02
Gender					-.00	.05							-.06	.05
Campus residence					.04	.03							.05	.04
Gender					-.01	.07							-.06	.08

Academic performance						.15*	.03					.17*	.03
Gender						.00	.06					.07	.06
Dating status (yes = 1)								.02	.04			.05	.05
Gender								-.15	.08			-.17	.09
Drunk prevalence (14-day)										-.04*	.02	-.03	.02
Gender										-.00	.04	-.03	.04
Random Effects Variance (*df*)													
Industry Intercept	.22 (111)*		.21 (109)*		.21 (108)*		.19 (107)*		.22 (97)*		.21 (79)*		.20 (72)*
Industry linear slope	.01 (111)		.01 (109)		.01 (108)		.01 (107)		.01 (97)		.01 (79)*		.01 (72)*
Industry quadratic slope	.00 (111)		.00 (109)		.00 (108)		.00 (107)		.00 (97)		.00 (79)*		.00 (72)*
χ^2 (*df*)	26.54 (7)*		11.99 (6)		18.60 (4)*		43.43 (2)*		90.26 (2)*		163.98 (2)*		228.00 (10)*
Comparison model	UnMs		Model 1		Model 2		Model 2		Model 2		Model 2		Model 2

Note: *Coeff* = coefficient. *SE* = standard error. UnMs = unconditional means model. *N* = 195. *$p \leq .05$.

Figure 3. Industry trajectory across four years of university. From Table 8, Model 7.



drunk they displayed higher levels of industry (Model 6), but this covariation disappeared when the other potential time-varying predictors were included (Model 7).

Identity.

The unconditional means model revealed that 72% of the variation in level of identity was within-person and 28% was between-persons. As shown in Table 9, on average, there was no significant change in identity across time. However, there was an interaction between gender and linear slope in Models 5 and 7 (Figure 4). Separate tests by gender indicated that men's level of identity did not change significantly (Model 7; *slope coefficient* = .06, *S.E.* = .03, $p > .05$) while women's level of identity decreased significantly (*slope coefficient* = -.09, *S.E.* = .03, $p \leq .05$).

In Models 6 and 7 there was also an interaction between race and linear slope (Figure 5). Separate significance tests for the slopes indicated that, on average, White students did not change significantly in their levels of identity across the four years (Model 7, *slope coefficient* = -.02, *S.E.* = .02, $p > .05$) while minority students significantly decreased in identity (*slope coefficient* = -.12, *S.E.* = .06, $p \leq .05$).

In terms of time-varying effects, year-to-year, when students lived away from their parents they displayed higher levels of identity than when they lived with their parents (Models 3 and 7). In addition, students had higher GPAs in semesters when they reported higher levels of identity (Models 4 and 7). Finally, when all time-varying covariates were modeled together (Model 7), dating arose as a significant predictor of level of identity. On occasions when students reported dating they reported higher levels of identity than on occasions when they were not involved romantically.

Table 9

Results of Multilevel Models Predicting Trajectory of Identity and Covariation with Student Experiences

	Model 1 Growth		Model 2 Gender & Race		Model 3 Housing		Model 4 Academic		Model 5 Dating		Model 6 Drunk		Model 7 Final	
	Coeff.	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*
Fixed Effects														
Identity (baseline)	3.67*	.05	3.67*	.05	3.70*	.05	3.69*	.05	3.66*	.06	3.70*	.05	3.71*	.06
Gender (Men = 1)			-.06	.09	-.09	.10	-.03	.10	-.09	.11	-.15	.10	-.07	.12
Race (White = 1)			.11	.11	.08	.10	.13	.11	.12	.12	.08	.12	.06	.12
Identity linear slope	.02	.01	.02	.01	.02	.01	.01	.02	.00	.02	-.00	.02	-.04	.02
Gender			.03	.03	.04	.03	.04	.03	.08*	.03	.13*	.03	.15*	.04
Race			.05	.03	.04	.03	.04	.03	.04	.04	.12*	.05	.13*	.06
Time-varying Covariates														
Living with parents					-.06*	.02							-.06*	.03
Gender					.06	.04							.02	.06
Campus residence					-.03	.03							-.00	.04
Gender					.03	.07							.04	.08
Academic performance							.09*	.04					.10*	.04
Gender							-.02	.07					-.05	.07

Dating status (yes = 1)					.06	.05	.11*	.05
Gender					-.09	.11	-.13	.11
Drunk prevalence (14-day)						-.02	.02	-.03	.02
Gender						-.02	.04	-.02	.04
Random Effects Variance (*df*)								
Identity Intercept	.37 (168)*	.37 (166)*	.37 (162)*	.36 (165)*	.36 (133)*	.37 (127)*	.33 (125)*	
Identity linear slope	.01 (168)*	.01 (166)*	.01 (162)*	.01 (165)	.00 (133)	.00 (127)	.00 (135)	
χ^2 (*df*)	6.72 (3)	5.83 (4)	12.80 (4)*	40.85 (2)*	155.91 (2)*	254.87 (2)*	315.49 (10)*	
Comparison model	UnMs	Model 1	Model 2	Model 2	Model 2	Model 2	Model 2	

Note: *Coeff* = coefficient. *SE* = standard error. UnMs = unconditional means model. $N = 195$. $*p \leq .05$.

Figure 4. Identity trajectories across four years of university, conditional on gender. From Table 9, Model 7.

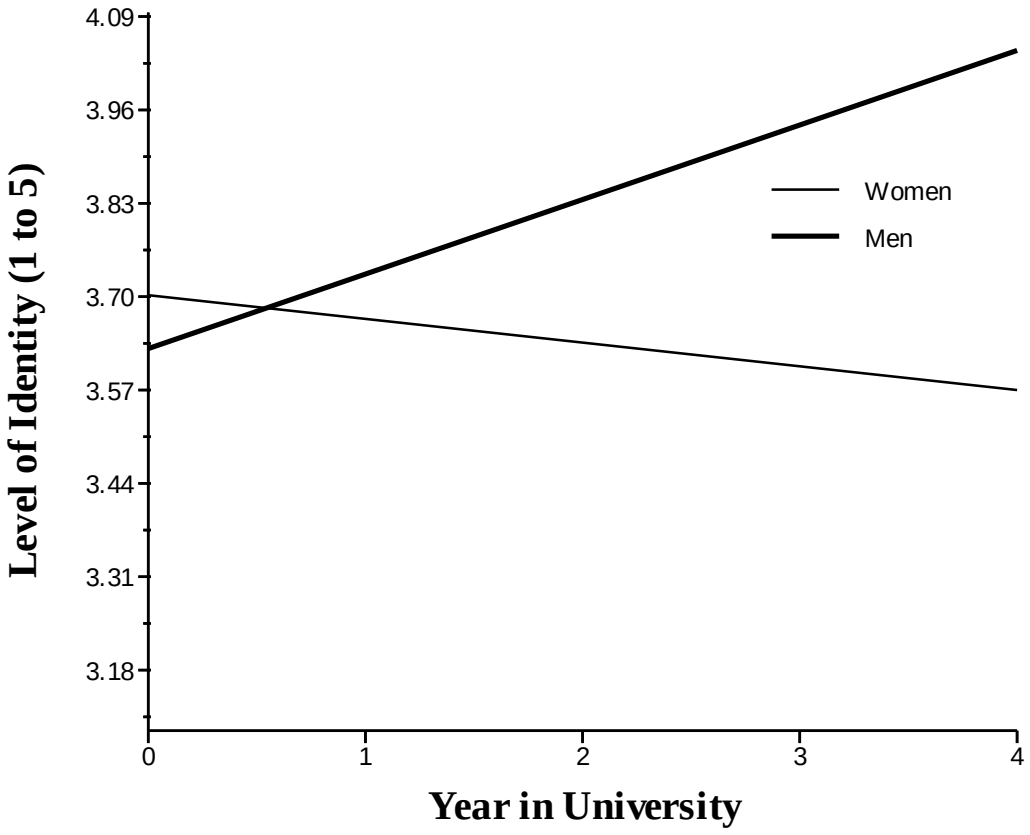
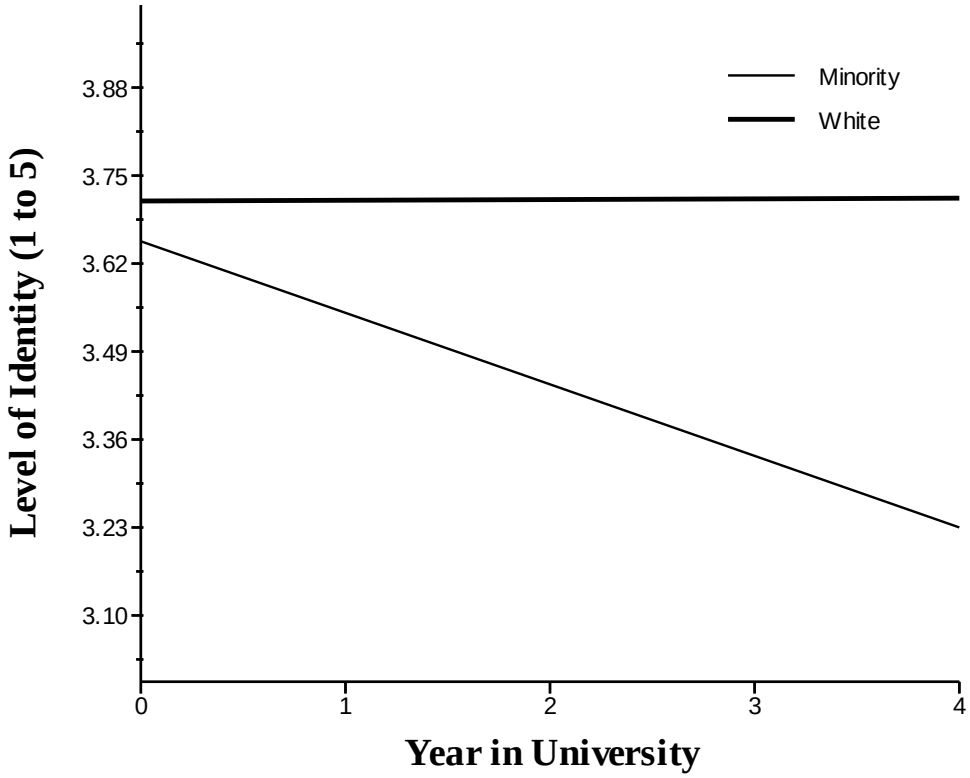


Figure 5. Identity trajectories across four years of university, conditional on race. From Table 9, Model 7.



Intimacy.

The unconditional means model revealed that 77% of the variation in level of intimacy was within-person and 23% was between-persons. As shown in Table 10, gender differences in intimacy during students' first semester at university (i.e., baseline) were present in Models 2 through 7, with women showing higher intimacy than men. The significant linear and quadratic slopes present in all models indicated that, on average, students' level of intimacy increased between first semester at university and the end of second year and decreased as they moved through third and fourth year (Figure 6). In terms of time-varying effects, only dating status covaried with intimacy. Year-to-year, students reported higher intimacy when they were involved in a romantic relationship than when they were not.

I was also interested in the potential covariation of perceived affection in the romantic relationship with intimacy. As perceived affection in a romantic relationship was only applicable for students who reported dating at least once across all data waves, a subsample of these participants was created to analyze this potential covariation. For thoroughness, all multilevel models of change predicting covariation of student experiences with intimacy across the four years were re-tested using this subsample, using perceived affection as a time-varying covariate instead of dating status. The unconditional means model for this subsample revealed that 69% of the variation in level of intimacy was within-person and 31% was between-persons. As shown in Table 11, the same patterns in terms of intercept, trajectory, and covariations were present for this subsample as for the core sample, with one exception. The moderating effects of gender on the intimacy intercept in Model 7 for the core sample was not present in the "ever

Table 10

Results of Multilevel Models Predicting Trajectory of Intimacy and Covariation with Student Experiences

	Model 1 Growth		Model 2 Gender & Race		Model 3 Housing		Model 4 Academic		Model 5 Dating		Model 6 Drunk		Model 7 Final	
	Coeff.	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*
Fixed Effects														
Intimacy (baseline)	3.62*	.04	3.62*	.04	3.63*	.05	3.62*	.04	3.50*	.05	3.58*	.05	3.52*	.05
Gender (Men = 1)			-.33*	.09	-.32*	.10	-.34*	.09	-.30*	.10	-.33*	.10	-.26*	.11
Race (White = 1)			.12	.09	.13	.09	.13	.10	.13	.10	.16	.11	.14	.10
Intimacy linear slope	.10*	.04	.10*	.04	.10*	.04	.10*	.04	.12*	.04	.14*	.05	.13*	.05
Gender			-.06	.08	-.08	.08	-.08	.08	-.08	.09	-.10	.10	-.10	.10
Race			.01	.09	.02	.09	.03	.09	-.04	.11	-.04	.12	-.03	.12
Intimacy quadratic slope	-.02*	.01	-.02*	.01	-.02*	.01	-.02*	.01	-.03*	.01	-.03*	.01	-.04*	.01
Gender			.01	.02	.01	.02	.01	.02	.02	.02	.03	.03	.03	.03
Race			.01	.03	.00	.03	.00	.03	.02	.03	.03	.03	.02	.03
Time-varying Covariates														
Living with parents					-.01	.02							-.02	.02
Gender					-.03	.05							-.04	.05
Campus residence					.03	.03							.02	.03
Gender					.07	.06							.00	.07

Academic Performance				.00 .03			.03 .04
Gender				.02 .06			.03 .08
Dating status (yes = 1)					.20* .04		.19* .04
Gender					-.03 .09		-.04 .10
Drunk prevalence (14-day)						-.01 .01	-.01 .02
Gender						-.04 .03	-.04 .03
Random Effects Variance (*df*)							
Intimacy Intercept	.33 (111)*	.30 (109)*	.30 (108)*	.29 (107)*	.23 (98)*	.27 (79)*	.24 (72)*
Intimacy linear slope	.06 (111)*	.06 (109)*	.07 (108)*	.07 (107)*	.01 (98)	.04 (79)	.02 (72)
Intimacy quadratic slope	.00 (111)*	.00 (109)*	.00 (108)*	.00 (107)*	.00 (98)	.00 (79)	.00 (72)
χ^2 (*df*)	37.08 (7)*	25.23 (6)*	13.14 (4)*	22.63 (2)*	124.67 (2)*	195.45 (2)*	228.61 (10)*
Comparison model	UnMs	Model 1	Model 2	Model 2	Model 2	Model 2	Model 2

Note: *Coeff* = coefficient. *SE* = standard error. UnMs = unconditional means model. *N* = 195. *$p \leq .05$

Figure 6. Intimacy trajectory across four years. From Table 10, Model 7.

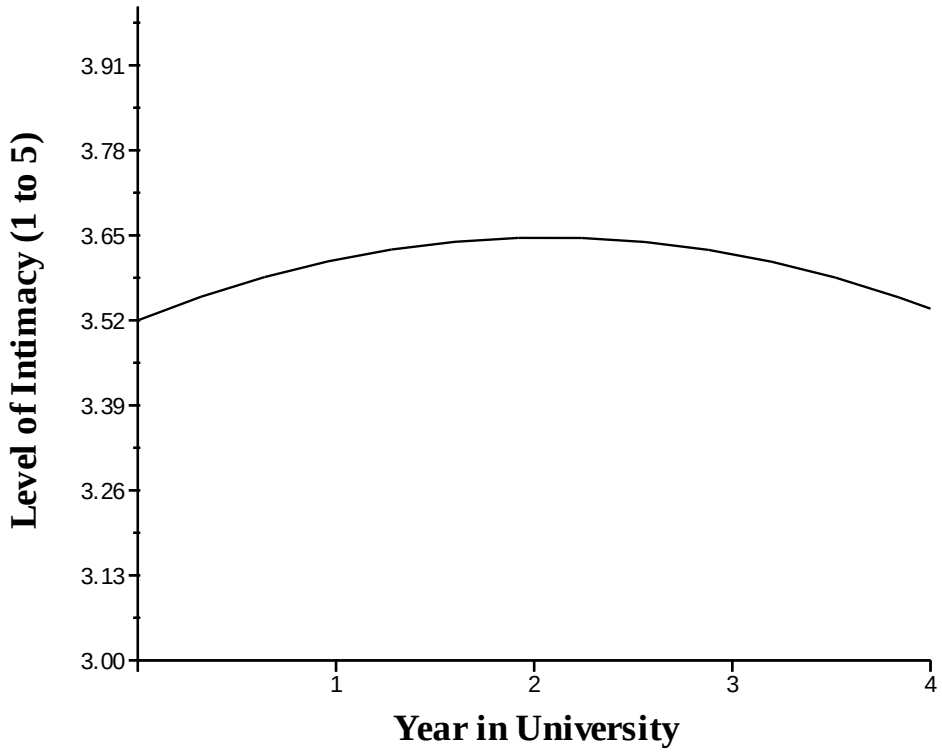


Table 11

Results of Multilevel Models Predicting Trajectory of Intimacy and Covariation with Student Experiences for Students who Ever Dated

	Model 1 Growth		Model 2 Gender & Race		Model 3 Housing		Model 4 Academic		Model 5 Affection		Model 6 Drunk		Model 7 Final	
	Coeff.	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*
Fixed Effects														
Intimacy (baseline)	3.75*	.05	3.75*	.05	3.76*	.05	3.75*	.05	3.76*	.07	3.71*	.05	3.73*	.07
Gender (Men = 1)			-.29*	.11	-.30*	.11	-.28*	.11	-.28*	.14	-.25*	.12	-.25	.16
Race (White = 1)			-.04	.11	-.03	.11	-.04	.11	.15	.18	-.03	.13	.03	.16
Intimacy linear slope	.16*	.05	.17*	.05	.17*	.04	.18*	.05	.21*	.07	.22*	.05	.23*	.08
Gender			-.10	.09	-.11	.08	-.13	.09	-.19	.15	-.15	.10	-.15	.16
Race			-.05	.10	-.04	.10	-.02	.10	-.31	.23	.02	.14	-.04	.23
Intimacy quadratic slope	-.04*	.01	-.04*	.01	-.04*	.01	-.04*	.01	-.05*	.02	-.05*	.01	-.05*	.02
Gender			.02	.02	.02	.02	.03	.02	.06	.04	.04	.03	.05	.05
Race			.02	.03	.02	.03	.01	.03	.09	.05	.01	.04	.04	.06
Time-varying Covariates														
Living with parents					-.00	.02							.01	.03
Gender					-.01	.05							-.01	.07
Campus residence					.01	.03							.03	.03

Gender			.03	.06							.11	.07
Academic performance					-.01	.04					.03	.05
Gender					.03	.08					-.14	.10
Relationship Affection							.10*	.03			.09*	.04
Gender							-.10	.06			-.10	.07
Drunk prevalence (14-day)									.00	.01	.02	.02
Gender									-.01	.04	-.03	.04
Random Effects Variance (*df*)												
Intimacy Intercept	.23 (84)*		.21 (82)*		.21 (81)*		.21 (80)*		.24 (38)*		.23 (65)*	.26 (26)*
Intimacy linear slope	.04 (84)*		.04 (82)*		.04 (81)*		.04 (80)		.09 (38)*		.02 (65)	.09 (26)
Intimacy quadratic slope	.00 (84)		.00 (82)		.00 (81)		.00 (80)		.00 (38)		.00 (65)	.01 (26)
χ^2 (*df*)	41.07 (7)*		14.32 (6)*		11.43 (4)*		10.38 (2)*		170.89 (2)*		108.03 (2)*	226.51 (10)*
Comparison model	UnMs		Model 1		Model 2		Model 2		Model 2		Model 2	Model 2

Note: *Coeff* = coefficient. *SE* = standard error. UnMs = unconditional means model. $N = 119$. $*p \leq .05$.

dated" subsample. In terms of perceived affection, on occasions when students reported higher perceived affection in their romantic relationship they also reported higher levels of intimacy. This covariation was present when affection was modeled individually (Model 5) and along with the other potential time-varying covariates (Model 7).

Summary of multilevel modeling results.

In summary, men did not experience significant change in autonomy across four university years while women experienced a decline in autonomy across this period. On occasions when participants lived away from parents and reported higher academic performance, they also reported higher autonomy. Dating women reported higher autonomy than dating men. In terms of industry, both men and women experienced a decrease in industry between first semester and the end of second year followed by an increase. On occasions when participants reported higher academic performance they also reported higher industry. For identity, men's levels of identity did not change over time while women's levels of identity decreased. White students' identity level did not change over time while minority students' identity decreased. On occasions when participants lived away from their parents, reported higher academic performance, and reported dating, they also reported higher levels of identity. Finally, women started university with higher levels of intimacy than men, but both men and women experienced an increase in intimacy between first semester and the end of second year followed by a decrease. On occasions when participants reported dating, they also reported higher levels of intimacy and, participants who ever dated reported higher perceived affection in their romantic relationship on occasions when they reported higher intimacy.

CHAPTER IV

Discussion

The present study addressed a gap in developmental literature that has become more important in recent decades as more youth enter into post-secondary education, extending their transition to adulthood. Specifically, more needs to be known about the development of psychosocial competencies important for successful adaptation to adult life during this extended transition to adulthood. For this reason, I wanted to first investigate the average trajectories of change in the psychosocial competencies of autonomy, industry, identity, and intimacy. Analyses using multilevel models of change showed the presence of change over time in selected competencies (i.e., industry and intimacy). Second, I was interested in examining the potential moderating effects of gender and race on trajectories of change. For autonomy and identity, growth was conditional on one or both of these participant characteristics. Finally, I wanted to investigate the potential covariation of student experiences (living situation, academic performance, romantic relationships, and alcohol use) with psychosocial competencies and the possible moderating effects of gender on these covariations. Multilevel analyses investigating these covariates presented an interesting picture. The results for each psychosocial competency are examined separately in following sections so that the set of results can be outlined, understood, and interpreted.

Autonomy

Considering autonomy, a gender difference in slope was observed such that men, on average, did not change in their level of autonomy while women, on average, decreased. While the trajectory of change in autonomy for both men and women does not

follow the U shape that I speculated, the general finding that autonomy changes for some people during the transition to adulthood is in accord with Erikson's (1968) perspective. Erikson (1968) proposed that, while autonomy is most intensely developed during childhood, change in this competency might occur in the transition to adulthood due to the new and more complex social environments that are encountered at this time. While Whitbourne et al. (2009) also observed changes in autonomy in the form of a small positive linear slope from college through midlife, they did not find that gender moderated the trajectory of change. There is, however, other empirical support for the moderating effects of gender on autonomy. Specifically, adult men usually show higher levels of autonomy than adult women (e.g., Bekker & van Assen, 2008; Nolen-Hoeksema, Larson, & Grayson, 1999). The gender difference in trajectories of change observed in the present study potentially identify the transition to adulthood as a period of differentiation between men and women for this competency, as autonomy at baseline was not significantly different between men and women. This then would be a key period for intervention to aid women to gain more autonomy - a desired outcome since low autonomy has been associated with the development of psychopathologies such as depression (van Assen & Bekker, 2009).

Living situation and academic performance are two student experiences that covaried with autonomy. For men and women, occasions when they lived away from their parents were associated with higher autonomy than occasions when they lived with their parents. This finding is to be expected. Living away from parents requires emerging adults to deal with at least some daily tasks and experiences independently from parental supervision and input than when living in the parental home. These experiences can

potentially aid in the development of self-reliance, thus increasing the individual's sense of how well they can function on their own – thereby increasing their autonomy.

Higher autonomy was also associated with occasions when emerging adults had higher GPAs. This makes sense, as academic work in post-secondary institutions is of a more independent nature than academic work in high school. For this reason, when university students are able to more effectively handle academic work - and thus perform better academically, they would feel more competent to work on their own and be autonomous.

Interestingly, gender moderated the covariation of dating status with autonomy: dating women reported higher levels of autonomy than dating men. This pattern may be explained by findings that higher social support is associated with higher autonomy and better coping with stress (e.g., Khan & Husain, 2010; Mikulincer & Shaver, 2007), and that women are more likely to see romantic relationships as a source of social support than men (Shulman & Scharf, 2000). It is possible then that, for women, the romantic relationship is a further source of social support, increasing their sense of ability to undertake tasks and responsibilities on their own (i.e., autonomy).

Industry

The rate of change in industry was significant across the four years and showed a trajectory of change in, as previously speculated, a quadratic form, with emerging adults' industry dropping during the first two years and increasing some during the last two years of university. Whitbourne et al. (2009) observed an increase in industry from the early 20s to the early 30s and stabilization from then on in one of their cohorts. Together, Whitbourne et al.'s (2009) and the present findings imply that, after a period of instability

during the first few years of college, individuals' sense of productivity and ability to master work tasks increases during young adulthood and may stabilize by midlife.

The academic environment emerging adults encounter when entering post-secondary education requires levels of self-discipline, engagement, and work habits that were not necessary for academic success at the high school level (Arnett, 2004). Many youth first entering this new and more complex environment would not have yet developed the necessary academic habits and tools and thus would encounter difficulties in achieving the same levels of success they had in their previous, less complex academic environment. This experience could lower their sense of effectiveness and aptitude - thereby decreasing self-perceptions of industry (Erikson, 1950). Once they realized their level of industry was lacking, this competency would be revised. With appropriate support and increased familiarity with their new environment, they would start to develop the tools necessary to reach their desired level of academic success. As this occurs, students would feel more effective and able to tackle their academic tasks - thereby increasing in industry (Erikson, 1950). As individuals leave post-secondary education and become involved in careers in their fields of previous study, they might continue to feel increasingly effective and industrious. The possible pattern of change in industry across the university years and through midlife that is suggested by the present study in combination with Whitbourne et al.'s (2009) findings is thus in agreement with Erikson's (1950) perspective.

Furthermore, the covariations of academic performance and level of industry found in the present study also supports this interpretation. Participants reported higher levels of industry when they had higher GPAs than when they had lower GPAs. The

association between academic performance and industry was expected, as Erikson's (1950) concept of industry competency is based specifically on adaptation to school and work tasks.

Identity

In accord with the speculations presented after the literary review of identity development, there was no overall mean change in identity. However, an interaction of gender and time indicated that men maintained more or less the same levels of identity across their university years, while women showed losses on average. Similar to autonomy, levels of identity at baseline did not differ by gender, indicating that this period in the transition to adulthood is one of differentiation in identity integration. This difference in trajectory of change for men and women may be related to differences in the environments in which boys and girls start to integrate their identity during adolescence. Research has shown that, during adolescence, boys are given greater independence from their families and are encouraged to develop autonomy while girls are given less family independence and are more encouraged to develop connectedness (Gavazzi & Sabatelli, 1990; Moore, 1987) For these reasons, girls are exposed and develop more within the family context than boys, who experience a wider social context during adolescence. The social environment of post-secondary educational institutions exposes youth to a larger social environment at a point when they have more freedom to explore than they did during adolescence. These new opportunities for role exploration outside the norm for women during adolescence may lead them to question parts of their identity that had previously been clear to them, decreasing their sense of self-knowledge or identity as was found in the present study. Men, who are usually allowed to socialize more broadly

during adolescence, may find the social environment of university less different from their previous experiences in terms of potential role explorations, thus maintaining their already-attained sense of self-knowledge (i.e., identity), as was found in the present study.

A race difference in trajectories of change for identity were also identified: White students maintained their level of identity across time while minority students' identity levels decreased. This is in accord with previous findings of racial differences in levels of psychosocial development in university students (e.g., Itzkowitz & Petrie, 1986; Ojano Sheehen & Pearson, 1995; Taub & McEwen, 1991). However, as the present study did not collect information about students' level of identification with their racial groups or any other race- or ethnic-related characteristics, the potential sources for the identified racial difference could not be inferred. Furthermore, as this was the only race difference to emerge, it may not be a robust or meaningful finding.

Living situation, academic performance, and dating status covaried with level of identity. Specifically, participants reported higher identity integration on occasions when they were living away from parents, had higher GPAs, or were involved in a romantic relationship. Research on individuation during late adolescence and emerging adulthood has shown an association between higher levels of individuation from one's parents and a stronger sense of self-knowledge or identity integration (e.g., Reis & Youniss, 2004; Schwartz et al., 2005). It has been theorized that involvement in extensive exploration, independent decision making, and opportunities that lead to improvements in intellectual, vocational, and psychosocial areas also lead to positive developmental individuation (Côté, 2002). Living away from parents potentially provides emerging adults with an

environment that (1) is less controlled by parental rules and regulations, and (2) provides more opportunities for exploration and independent decision making than the living environment of the parental home, allowing for further identity integration. The present findings then provide empirical support for this proposition. Furthermore, while living away from home during post-secondary education has been linked with increased frequency of problem behaviours (e.g., increased likelihood of heavy drinking: Fromme, Corbin, & Kruse, 2008; more sexual partners: MacDonald et al., 1990), the present findings imply that living away from parents during the transition to adulthood can also have positive developmental outcomes.

In terms of academic performance, the present findings are in line with Erikson's (1968) perspective. Part of the process of identity integration that takes place prior to adulthood involves a revision of previously acquired competencies. As these competencies are reviewed and altered to possess more adaptive value for the challenges of adult life, the individual's sense of identity or self-knowledge increases (Erikson, 1968). For this reason, individuals who sense they have the necessary levels of industry to tackle the academic and even career tasks would be further along the competency revision process and show higher identity integration. As previously stated, academic success would convey to the individual that they are effective and competent when it comes to academic tasks - their level of industry is of adaptive value for the academic environment of post-secondary institutions.

The covariation of dating with higher identity integration in the present study corresponds to theoretical propositions in the area of psychosocial development. As developmental tasks previously identified as characteristic of adolescence have extended

into emerging adulthood, and developmental tasks characteristic of young adulthood have shifted to emerge during this period (Arnett, 2000), the development of identity and intimacy may overlap more at the present time than ever before. In addition, Erikson (1982) argued that while identity and intimacy development are independent processes, a stronger sense of self knowledge (i.e., a higher level of identity integration) allows the individual to experience higher levels of intimacy. Indeed, he stated that "the condition of a true twoness is that one must first become oneself" (p. 101). As involvement in romantic relationships has been linked to higher intimacy (Montgomery, 2005), it is reasonable to deduce an indirect link between dating status and identity integration.

Intimacy

Intimacy levels at the beginning of university differed by gender such that women showed higher initial levels of intimacy than men. This converges with the findings of Whitbourne et al. (2009), who also showed higher baseline levels of intimacy in women than in men. In terms of trajectories of change, intimacy changed across time following a curvilinear path with increases across the first half of the period of study and declines throughout the latter half. While this trajectory of change does not follow the pattern of linear increase that had been speculated for this psychosocial competency, there is both theoretical and empirical support for the present findings. Attending post-secondary education exposes youth to a concentration of people around their age in numbers they likely never experienced before (Arnett, 2004). The likelihood of meeting other youth with similar characteristics (e.g., personality, ethnic background, intelligence) is therefore higher. As intimate relationships, romantic or otherwise, are more likely to occur between people who share similar characteristics (Michael, Gagnon, Laumann, & Kolata, 1995),

the social environment during university affords increased exploration of opportunities conductive to the development of intimacy compared to the social environment of high school.

As individuals progress through the transition to adulthood, exploration with romantic intimate relationships becomes more prevalent and serious (Arnett, 2004). Individuals starting to explore more serious romantic relationships do so with the skills they used in forming intimate friendships and short-lasting romantic partnerships, which could be insufficient to effectively develop this new type of relationship and could affect how able they feel they can connect meaningfully with others - thereby decreasing their intimacy. The decrease in intimacy during the latter part of the university years that was observed in the present study potentially evidences this occurrence.

In their longitudinal study spanning from college through midlife, Whitbourne et al. (2009) observed gender differences both in initial levels of intimacy and the trajectory of change. Women started with higher intimacy levels than men, but men's rate of gain across time was faster than women's and thus men caught up with women in level of intimacy during midlife. While Whitbourne et al.'s (2009) study and the present one focused on somewhat different age periods, initial levels of intimacy were measured on individuals of approximately the same age in both cases (around 18 years old). It is thus interesting to note that the final model did not find gender differences in either initial level or trajectory of change in intimacy. Courting, sexual, and intimacy behaviours have changed in considerable ways since the 1960s and 1970s (e.g. both genders experience more romantic partners and premarital sexual contact is more accepted: Arnett, 2004), which is when Whitbourne et al.'s (2009) participants were first interviewed while in

college. These changes have potentially narrowed the gap between men and women in terms of sexual intimacy, which could translate into absence of gender differences in intimacy at the beginning of post-secondary education. This possibly new pattern is not, however, necessarily positive. According to Kimmel (2008), young women in present times have changed their sexual behaviours and intimacy requirements to mirror those of young men as they try to survive a social world highly dominated by the rules of machismo during emerging adulthood.

Dating status was the only student experience that covaried with intimacy across time. Participants reported higher intimacy on occasions when they were dating than when they were not dating. While the challenges of dating could lead the individual to question their ability to connect meaningfully with others, involvement in a romantic relationship evidences a willingness to do so, as well as ownership of adequate, if not fully effective, interpersonal capabilities. Thus, when involved in a romantic relationship, individuals potentially sense that they are more capable to connect with others and form more affectionate relationships than when they are not dating. In line with this proposition, the present study found that the level of affection experienced in the romantic relationship was associated with intimacy competence. Participants reported higher intimacy on occasions when they felt there was more affection between themselves and their romantic partners than when they felt there was less affection between them.

Summary of General Trends

The present findings of selective change in all four psychosocial competencies support Erikson's (1968) perspective that the period before adulthood is one not only of

new competency development (i.e., identity and intimacy), but also of revision and change in competencies faced previously (i.e., autonomy and industry). Furthermore, the findings of selected gender differences in trajectories of change and covariation between competencies and student experiences are consistent with the developmental systems perspective. Consideration of multiple developmental contexts, including the biological and social, are necessary to gain accurate understanding of human development (Lerner, 1996). The general findings identifying time-varying covariates of within-person change in some psychosocial competencies are also consistent with Erikson's (1982) perspective. He believed that the transitional period into adulthood is a critical "turning point" when concurrent key experiences and the revision of past experiences have the potential to shape the individual's life course in either positive or negative ways. Empirical support for this position has increased in the last few decades. Experiences in the areas of interpersonal relationships, education, and career during the transition to adulthood have been identified as potential turning points in the developmental paths of some youths, with specific choices leading to positive outcomes during adulthood even in the presence of strongly adverse experiences during childhood (Masten & Powell, 2003; Rutter, 2000; Sampson & Laub, 1993).

Strengths and Limitations

There were several shortcomings in the present study that constrain the conclusions that can be drawn from the present results. First, the low number of non-White participants limited the analyses that could be carried out to potentially identify race differences in developmental paths, specifically potential three-way interactions among race, gender, and time. Furthermore, statistical power limitations due to the small

sample and subsample sizes potentially limited the present analyses' ability to detect gender, race, or time-varying covariates' effects and to accurately estimate the population effect sizes of the identified effects. This low number also limits the generalizability of the present findings. The sample for the current study is, however, a good cross-section of the undergraduate population at the University of Alberta, particularly with respect to gender, living arrangements, and broad area of study.

Second, the rate and nature of attrition in the present study might limit generalizability. Specifically, as males and participants at higher risk (i.e., with higher drunk prevalence at baseline) were more likely to drop out, my findings may be more representative of women and emerging adults at lower risk. Third, the four psychosocial competencies studied were measured using a single measure for each competency, and these were self-report measures. In this respect, the possible effects of self-serving biases and social desirability on participants' responses cannot be ruled out. The use of multiple measures for each psychosocial competency as well as collecting participants' competency reports from other sources (e.g., parents and close friends), could provide more accurate representations of the target constructs.

Some strengths of the research should also be noted. The development of psychosocial competencies during the lengthening transition to adulthood has received too little attention. The present analyses provided important insight into emerging adult psychosocial development. By longitudinally addressing development in multiple psychosocial competencies, the present study was able to analyze not only how experiences within the domain of each competency were associated with changes in it (e.g., academic performance in the domain of industry and living situation in the domain

of autonomy), but also how they were associated with competencies in other domains (e.g., dating status in the domain of industry). This approach to psychosocial development is more in accord with Eriksonian theory than research focusing on one psychosocial issue in isolation, which has tended to be the more common practice (Whitbourne et al., 2009). Furthermore, this approach to understanding psychosocial development during the transition to adulthood has the potential to inform practitioners about the interplay between contexts in which emerging adults are developing, allowing for more effective interventions to improve student development.

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