

**Leaving Gets Easier as You Age: Effects of Cohabitation Dissolution on Mental Health by
Age and Gender**

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Abstract

This study examines how age and gender moderate effects of cohabitation dissolution on mental health. Drawing on data from the National Longitudinal Study of Youth 1997 (NLSY97), I applied growth curve models to analyze trajectories of depressive symptoms (N=4496) and binge drinking behaviors (N=4503) among young adults between age 20 to 36. Results indicate that cohabitation dissolution is negatively associated with the mental health of young adults, but this negative relationship weakens as individuals age. Prior experiences of cohabitation dissolution buffer the negative consequences of cohabitation dissolution and partially explain the moderating effects of age on the negative association between cohabitation dissolution and mental health. I find no gender differences in the associations between cohabitation dissolution with either depressive symptoms or binge drinking behaviors. Among the current cohorts of young adults, cohabitation dissolution is negatively related to mental health and this association is similar by gender but disparate over the life course.

Introduction

In 2004, Cherlin argued that the heterosexual marriage in American is becoming deinstitutionalized partially due to the rising cohabitation rates. Since the 1970s, the increased experience of pre-marital cohabitation constitutes a profound change in contemporary American society. Cohabitation has become a normative experience for many young people (Bumpass and Lu 2000; Chandra et al. 2005; Lisa Mincieli, Manlove, and McGarrett 2007; Schoen, Landale, and Daniels 2007; Thornton, Axinn, and Xie 2008). A recent study based on the National Survey of Family Growth found that compared with 34% in 1995 and 43% in 2002, 48% of women aged 15-44 in 2006-2010 cohabitated as a first union (Copen, Daniels, and Mosher 2013).

In contrast to a large body of literature on the association between marital transitions and mental health (e.g. Glenn and Weaver 1988; Gove, Style, and Hughes 1990; Kim and McKenry 2002; Lee, Seccombe, and Shehan 1991; Marks and Lambert 1998; Simon 2002; Stack and Eshleman 1998; Stroschein et al. 2005; Williams and Dunne-Bryant 2006), there is little research that examines the correlation between the dissolution of non-marital cohabitation and mental health. Like marriage dissolution, cohabitation dissolution not only has detrimental emotional impact but also involves the loss of resources provided by intimate relationships: economic benefits (Avellar and Smock 2005), emotional support (Kurdek and Schmitt 1987) and health regulation (Duncan, Wilkerson, and England 2006). Furthermore, the greater flexibility of cohabitation compared to marriage (Kennedy and Bumpass 2008) could yield more twists and turns in intimate relationships and may lead to psychological consequences for young adults. However, most prior studies have ignored cohabitation or combined cohabiters with either single or married respondents in their analyses. Given the high prevalence of pre-marital cohabitation and the high rates of dissolution of those intimate relationships, a greater understanding of the influence of cohabitation dissolution on subsequent mental health trajectories is needed.

Investigation of the consequences of cohabitation dissolution on subsequent mental health trajectories is a high priority because it provides crucial insight into longstanding theoretical issues. The consequence of cohabiting experiences for changes in mental health is a crucial test of the integration of life course perspectives with stress process models. According to the stress process model (Aneshensel 1992; Pearlin 1989), intimate sexual relationship dissolution is a stressful life event, which could have both short-term dramatic effects and lead to longer-term chronic stress (Amato 2000; Aseltine Jr and Kessler 1993). To embed stress in “social and experiential conditions” and link an individual’s past experiences to their present conditions, Pearlin promoted the cross-fertilization between the stress process model and the life course perspective (Pearlin 2009). The life course perspective helps scholars understand the evolution of stressors over time and their impact on the organization and reorganization of people’s lives (Aneshensel 2015). Based on the cross-fertilization of these two theoretical frameworks, this present study aims to provide empirical evidence of the association between cohabitation dissolution and mental health trajectories over the life course.

The association between cohabitation dissolution and mental health trajectories is also likely to depend on individual characteristics. Age and gender not only indicate biological difference but also have social meanings, which shape many aspects of social lives. Both the social stress model and the life course perspective emphasize the timing of transitions (Elder, Johnson, and Crosnoe 2003; Pearlin 2009). The same marital/cohabitation transitions as stressors may have

different psychological consequences depending on the timing of occurrence in the life course (George 1993, 2013). Thus, it is crucial to examine the heterogeneous effects of cohabitation dissolution on mental health by age.

Gender is another important individual characteristic that could moderate the association between cohabitation dissolution and mental health trajectories. Females are hypothesized to be more psychologically vulnerable to intimate relationship transitions, because females are more likely to experience secondary stressors after marital/cohabitation transition, including economic strain and parenting related stress (Amato 2000; Williams and Dunne-Bryant 2006). However, recent empirical evidence indicates no gender differences in the association between marital dissolution and mental health, possibly due to increasing gender equality within heterosexual relationships in recent decades (Booth and Amato 1991; Strohschein et al. 2005; Williams 2003). Distinct from the question of whether females are more vulnerable to the stress of romantic breakups, there may be gender differences in the expression of distress due to the gendered socialization process. Males are more likely to experience externalizing symptoms (e.g. impulse-control and substance use disorders) and females are more likely to experience internalizing symptoms (e.g. anxiety and mood disorders) (Kessler et al. 1993, 2005). To address the two distinct angles of gender differences, I used two potentially gendered mental health outcomes to examine how gender shapes the mental health trajectories in response to cohabitation transitions.

In this study, I used a nationally representative longitudinal data and the growth curve models to study the association between pre-marital cohabitation dissolution and mental health and their variations by age and gender. This study extends previous studies in several ways. This study is among the first (e.g. Mernitz 2017) to study the association between pre-marital cohabitation dissolution and mental health trajectories of young adults over the life course. Additionally, applying the growth curve models to a longitudinal data set with rich mental health measures and complete cohabitation histories allowed me to track the changes in the trajectories of both depressive symptoms and binge drinking behaviors in response to the dissolution of pre-marital cohabitation and their variations by age and gender over the life course. Finally, by providing an empirical study under the integration of life course perspectives with stress process models, this study provides crucial insight into longstanding theoretical issues.

Theoretical Framework and Hypotheses

Cohabitation Dissolution and Mental Health

Cohabitation shares many similarities with marriage, including co-residence, companionship, an intimate sexual relationship, and often sharing of financial resources and responsibilities (Brown and Booth 1996; Thornton, Axinn and Xie. 2008). However, scholars also believe that for most people, cohabitation and marriage are fundamentally different. Compared to marriage, cohabitation may indicate a lower commitment to a permanent relationship (Smock 2000; Waite and Gallagher 2000), less exclusivity of sexual partners (Treas and Giesen 2000; Waite and Gallagher 2000), and reduced integration with the larger community (such as family members and the church) (Nock 1995; Thornton and Young-DeMarco 2001; Waite and Gallagher 2000). Thus, the social, economic and personal cost of terminating a cohabiting relationship may be lower than is the case for a marital relationship. Besides, compared to marriage, cohabitation is often a short-lived experience in the U.S., with most cohabitations either rapidly dissolving or

transitioning to formal marriage within ten years (Bumpass and Lu 2000; Bumpass and Sweet 1989; Lichter, Qian, and Mellott 2006). Studies found that cohabiters have rates of separation that are nearly five times as high as couples who are married (Binstock and Thornton 2003; Thornton, Axinn and Xie 2008).

Despite these dissimilarities between cohabitation and marriage, few studies directly examine the association between cohabitation dissolution and mental health. Previous longitudinal studies of marriage have demonstrated that marriage dissolution has detrimental consequences on mental health indicators, including depressive symptoms and alcohol abuse behaviors (e.g. Booth and Amato 1991; Doherty, Su, and Needle 1989; Marks and Lambert 1998; Mastekaasa 1995; Menaghan and Lieberman 1986; Simon 2002; Strohschein et al. 2005; Williams and Dunne-Bryant 2006). Recent empirical studies indicate that breakups of non-marital romantic relationships are negatively associated with mental well-being (Blekesaune 2008; Dush 2013; Johnson and Wu 2002; Meadows 2009; Meadows, McLanahan, and Brooks-Gunn 2008; Rhoades et al. 2011; Sbarra and Emery 2005; Simon and Barrett 2010). In a longitudinal sample of unmarried adults ages 18 to 35, Rhoades and colleagues (2011) examined changes in psychological distress and life satisfaction pre- and post-dissolution. They found that breakups of cohabiting relationships were associated with larger declines in life satisfaction than breakups of non-cohabiting romantic relationships. Studies based on the Fragile Families and Child Wellbeing Study also found that cohabitation dissolution is associated with increased depressive symptoms and substance use (Dush 2013; Meadows 2009; Meadows et al. 2008). However, these studies are either implemented based on a cross-sectional dataset or non-nationally representative follow-up data. Consequently, it is unclear whether cohabitation dissolution increases the risk for mental disorder symptoms or vice versa and the non-nationally representative data limits a generalization of the findings to a larger population.

In this study, I draw on the stress process model (Aneshensel 1992; Pearlin 1989; Thoits 1995) to explain the relationship between cohabitation dissolution and mental health. The stress process model dominates the literature on the influence of intimate sexual relationship dissolution on mental health, especially the negative impact of divorce. The model suggests that intimate sexual relationship dissolution both is a stressful life event and precipitates enduring strains (Amato 2000; Aseltine Jr and Kessler 1993). Besides detrimental emotional impact, cohabitation dissolution, like marriage dissolution, plays a role in the loss of resources including: economic benefits (Avellar and Smock 2005), emotional support (Kurdek and Schmitt 1987) and health regulation (Duncan et al. 2006). Thus, acute and chronic stressors resulting from cohabitation dissolution increase the risk of negative emotional, behavioral and health outcomes.

Overall, the stress process model and the literature on divorce and breakups of non-marital romantic relationships suggests the following hypothesis:

Hypothesis 1: Cohabitation dissolution is negatively associated with mental health of young adults.

Age, Cohabitation Dissolutions and Mental Health

To understand how cohabitation dissolution may influence mental health differently over the life course, this study employs the integration of the stress process model and the life course

framework. Life course theory (Elder Jr and Rockwell 1979) is the most influential theory explaining the influences of the timing of major life events on individuals.

From the perspective of the life course (Elder Jr and Rockwell 1979), age, as a variable, has multiple meanings (developmental, social and historical): (1) chronological age indicates the developmental process of growing older; (2) social age locates people in social roles and social timetables; (3) historical age locates people in historical context and social changes. In relation to the key concept “age”, the life course perspective emphasizes “age-differentiated, socially recognized sequences of transitions” (Rossi 1980). Thus, the timing of life transitions is a key principle of life course theory (Elder et al. 2003). Cohabitation transitions may affect individuals differently depending on when they occur in the life course (George 1993), because their antecedents, consequences, and behavioral patterns vary according to timing in an individual’s life (Elder et al. 2003).

Similar to the perspective of developmental psychology (Baltes 1987; Baltes and Staudinger 1993), chronological age could reflect a level of psychological maturity and pragmatic life expertise. Older adults might be more psychologically resilient to life events than younger adults and may be better equipped to handle life transitions. However, the social meaning of age might provide a more mixed expectation. Compared with younger adults, midlife adults might have more coping experiences/strategies to rely on in the face of cohabitation loss, which could help buffer negative influences. Social age also locates people within different social expectations and timetables. There are normative and non-normative transitions in a life course. A normative marital transition means a transition into marriage at an appropriate age (Neugarten 1996; Settersten Jr and Hägestad 1996). Thus, compared with midlife adults, younger adults might have a mental health advantage in the face of cohabitation dissolution because they face less social pressure to complete a normative marriage transition.

In addition to the life course theory, another supplementary explanation is from Wheaton (1990). Combining elements of social stress and role theory, Wheaton argued that role histories and the existence of prior role chronic stress mitigate the impact of a life transition on mental health. This study examined nine life transitions, including divorce, and found that prior role histories could help buffer the negative influences of life transitions on mental health. Midlife adults tend to have more role experiences in face of marital/cohabitation transitions than young adults; thus, midlife adults could be more resilient to the negative consequences of cohabitation dissolution on mental health. In this sense, prior experience is a non-negligible confounding factor that required to be controlled for in order to examine the moderating effects of age.

Few studies that examine how age moderates the associations between marital relationship transitions and mental health. Using data from the National Survey of Families and Households, (Marks and Lambert 1998) found that midlife adults were more psychologically resilient to challenging marital transitions than young adults. Yet, there is no study exploring how the association between cohabitation dissolution and mental health varies with age. This gap is partially due to the lack of an appropriate longitudinal dataset with repeated measures of mental health and cohabitation transitions. Therefore, the current study might be the first to shed light on this question.

In light of these considerations, I propose the following hypotheses:

Hypothesis 2a: The negative association between cohabitation dissolution and mental health varies with age.

Hypothesis 2b: The existence of prior experiences of cohabitation dissolution weakens the association between cohabitation dissolution and mental health.

Hypothesis 2c: The existence of prior experiences of cohabitation dissolution partially explains moderating effects of age.

Gender, Cohabitation Dissolution and Mental Health

There are three major theoretical frameworks relevant to investigating gender differences in the association between sexual relationship dissolution and mental health among young adults.

The first possibility indicates that intimate sexual relationship dissolutions are more closely related to women's mental health than men's. The early socialization theorists argued that women place more value than men on intimate relationships from childhood to adulthood. Consequently, intimate relationships are more crucial for women's self-identity, self-conception and mental health across the life course (Chodorow 1999; Simon, Eder, and Evans 1992; Thorne 1993). Structural theorists also advocated for the first hypothesis but focus on gender inequality in social institutions. For instance, Gove's influential sex-role theory of mental illness (Gove 1972; Gove and Tudor 1973) argued that marriage is more advantageous for males' mental health, due to the unrewarding and stressful nature of female social roles in contemporary U.S. society. Furthermore, based on the social stress framework, the divorce-stress-adjustment perspective (Amato 2000) emphasized the consequences of secondary stressors after divorces, such as financial hardship, childcare burden and loss of emotional support. From the perspective of structural theorists, females are more financially and emotionally dependent on relationships; accordingly, they are more psychologically vulnerable to relationship dissolution than males.

The second possibility argues that males and females have gendered psychological responses to stress, including intimate relationship dissolution. Some scholars argue that the use of a single measure of mental health distorts the observed mental health consequences of marital dissolution among males and females (Horwitz, White, and Howell-White 1996). According to the emotional socialization hypothesis (Gordon 1981; Pollak and Thoits 1989), women and men manifest emotion in different ways due to the gendered socialization process. Females learn to express distress through internalizing emotional problems, such as symptoms of distress, depression, and anxiety, while males learn to manifest distress by externalizing emotional problems, such as antisocial behaviors and substance problems (Aneshensel, Rutter, and Lachenbruch 1991; Horwitz et al. 1996). Empirical evidence suggests gendered responses to marital transitions when males' and females' distinct expressions of distress are considered (Simon 2002; Simon and Barrett 2010). To allow for possible gendered variation in expression of consequences of cohabitation dissolution, the current study considered multiple measures of mental health, one drawing on internalizing symptoms (e.g., depression) and one on externalizing symptoms (e.g., binge drinking).

The third possibility predicts that there are no gender differences in the association between sexual relationship dissolution and mental health. An accumulating amount of empirical evidence suggests no gender differences in the effects of marital dissolution on mental health (Booth and Amato 1991; Strohschein et al. 2005; Williams 2003). Scholars who endorse the third possibility argue that the development of gender equality in families, education institutions and the workplace in the past decades (Cotter, England, and Hermsen 2008; England et al. 2007; England and Li 2006) has reduced current cohorts of women's dependence on intimate relationships for self-identity and financial security, compared to earlier cohorts of women. Besides, recent cohorts of men more emotionally invest in intimate relationships than earlier cohorts of men (Simon and Barrett 2010). Therefore, while in the past such dissolutions may have been harmful to the mental health of women, among current cohorts, males and females are similarly impacted by intimate relationship dissolutions.

Compared with a corpus of literature on the psychological consequences of marital transition, only a few studies so far have examined the associations among gender, cohabitation dissolution and mental health. A recent study (Simon and Barrett 2010), using a sample of young adults in Miami, Florida, addressed the gender differences in the mental health consequences of breakups of non-marital romantic relationships. The study found that recent breakups are more closely related to females' than males' mental health. However, the research is based on a cross-sectional study in Miami without repeated measures of mental health and relationship transitions, making it hard to address the effects selection into and out of intimate relationships and limiting its capacity to generalize to a larger population. Thus, this current study might be the first to examine the gender differences in mental health trajectories in response to the cohabitation dissolution using a nationally representative longitudinal dataset.

Social Causation and Social Selection

This study examines the association rather than a causal relationship between cohabitation dissolution and mental health trajectories. Nevertheless, causal reasoning is helpful for providing a more scientific interpretation of the variability in this association and improving the longitudinal design of this current study. This section will discuss the debate between social causation and social selection, and introduce the techniques used in this study to alleviate the confounding effects derived from the social selection.

In the literature linking marital transition and mental health, an alternative explanation for the social causation hypothesis (i.e., that transition causes changes in mental health) is the social selection hypothesis, which argues that individuals are differently select into and out of relationship unions based on their mental health condition. Regarding the selection into different relationship unions, while empirical evidence demonstrates that this selection effect is not responsible for differences in mental well-being between individuals in marriage and cohabitation (Brown 2000; Horwitz and White 1998; Kim and McKenry 2002; Lamb, Lee, and DeMaris 2003; Marcussen 2005), it is still a crucial research concern (Hedel et al. 2018; Perelli-Harris and Styrc 2018; Soons, Kalmijn, and Teachman 2009; Van Hedel et al. 2016; Yamaguchi and Kandel 1985). For example, the study of Yamaguchi and Kandel (1985) found that the reason cohabitation is more associated with illegal drug use than marriage is due to unobserved factors that are related to both individuals' selective commitment to different kinds of unions and the use of illegal drugs. Recent studies (Hedel et al. 2018; Van Hedel et al. 2016) based on

longitudinal psychotropic medication purchases in Finland found cohabiting individuals do not have worse mental health than married individuals after controlling for observed and unobserved confounders and the initial difference between them is likely due to selection. A study based on the British Cohort Study found the similar results that matching the childhood characteristics eliminates the gap in mental health between marriage and cohabitation (Perelli-Harris and Styrac 2018). To exclude the selection effect into different types of relationship unions, the current study avoids comparing individuals in cohabitations to those who are single or in marriages. The within-subjects approach focuses on individuals who have at least one cohabitation experience before marriage and compares their mental health condition pre-and post-cohabitation dissolution.

The other important concern in research on relationship transition and mental health is nonrandom selection out of cohabitation unions. People are differently selected out of cohabitation relationships and into marriage or singlehood (e.g. Brown 2004; Manning and Smock 2002). Unlike studies on marital transitions, few studies consider selection effects out of cohabitation when studying the influences of cohabitation dissolution on mental health. The general consensus in the literature on marital transition is that social causation effects are more important and influential than selection effects (e.g. Simon 2002; Williams 2003; Williams and Dunne-Bryant 2006), even though there is some evidence supporting the social selection hypothesis (e.g. Edwards et al. 2018; Yamaguchi and Kandel 1997). A recent study implemented a co-relative analyses based on a Swedish National Sample and found evidence for both the social causation and social selection effects (Edwards et al. 2018). Until now, most research has tried to address selection effects by controlling for pre-divorce mental health conditions and making use of fixed-effects models. In order to control for unobserved heterogeneity in whose relationships end and to what they transition, I applied growth curve models to control for the initial mental health condition and included an indicator of final marital status in the model. Final marital status captures cohabiters' final choice, indicating whether they are out of cohabitation union and into marriage union. Moreover, I also used fixed-effects models and controlled for two types of pre-dissolution mental health conditions as supplementary sensitivity analyses.

Methods

Data

I conducted my analysis on the National Longitudinal Survey of Youth 1997 (NLSY97), a nationally representative, longitudinal dataset initiated in 1997 and collected on an annual basis since then. The respondents were born between 1980 and 1984, and they were 30 to 36 at the time of their most recent interview (2015-2016). In round one, 8984 individuals were initially interviewed, and nearly 80% (7103) of the round-one respondents were interviewed in the most recent interview. The NLSY97 gathered detailed cohabitation and marital history information monthly between 1994 and 2016. Concerning the measures of mental health, MHI-5 items were collected in 2000, 2002, 2004, 2006, 2008, 2010 and 2015. Information on the quantity and frequency of alcohol consumption (in the past 30 days prior to interview) was collected annually between 1997 and 2015.

Sample Restriction

Because depressive symptoms and binge drinking indicators were collected in different waves, this study utilized seven waves of data between 2000 and 2015 (N=8729, Person-Years=51173) to study the association between cohabitation dissolution and depressive symptoms and fourteen waves of data between 1999 and 2015 (N=8449, Person-Years=84563) to study the association between cohabitation dissolution and binge drinking behaviors (Appendix: Table 1).

Based on these two samples, I restricted the analytic sample in several ways. First, I restricted the age of respondents to between 20 and 36, considering the youngest respondents is 20 in the earliest wave collecting MHI-5 scores. This restriction dropped about 1.3 percent of cases and 12.9 percent of total person-years of the depressive symptoms sample and about 3.2 percent of cases and 17.4 percent of total person-years of the binge drinking sample. Secondly, because people who have cohabitation experiences before marriage are demographically and socioeconomically different than people who do not, I selected respondents who have at least one non-marital cohabitation experience before marriage for both the depressive symptoms and binge drinking samples. This restriction dropped about 47.5 percent of cases and 56.3 percent of total person-years of the depressive symptoms sample and about 43.4 percent of cases and 50.3 percent of total person-years of the binge drinking sample.

Second, previous studies demonstrated that there are multiple differentiating factors resulting in selection into different marital status (single, marriage and cohabitation). Those factors include age and education (Bumpass and Sweet 1989; Kenney and McLanahan 2006), race (Kenney and McLanahan 2006; Raley 1996) and income and employment stability (Rindfuss and VandenHeuvel 1990), and those factors are also related to mental health. Thus, this heterogeneity in demographic characteristics indicates it may introduce bias if I estimate the association between cohabitation dissolution and mental health in the full sample. Additionally, only people who have experiences of cohabitation are exposed to the risk of cohabitation dissolution. Thus, the analyses are all based on the people who have at least one cohabitation experience before marriage.

Third, because I am interested in pre-marital cohabitation experiences, I focused on the part of follow up before marriage. I dropped person-years after respondents married (dropping 6.1 percent of person-years for the depressive symptoms sample and 8.3 percent of person-years for the binge drinking sample). Finally, I dropped cases if they had any missing values of variables in my analysis (dropping less than 1 percent of cases and person-years for both the depressive symptoms sample and the binge drinking sample). After these restrictions, the total sample size is 4496 and the number of person-years is 12788 for the depressive symptoms sample. The total sample size is 4503 and the number of person-years is 20514 for the binge drinking sample².

Measures

Depressive Symptoms

The NLSY97 used a five-item short version of the Mental Health Inventory (MHI5) to measure depressive symptoms, which was developed by Veit and Ware in the late 1970s (Veit and Ware

² I showed descriptive statistics for two full samples of the NLSY97 for depressive symptoms and binge drinking in Appendix Table 2 (with age restriction and clearance of cases with missing values).

1983). Respondents reported the frequency in the past month of being nervous, feeling calm and peaceful, feeling downhearted and blue, being happy and feeling so down in dumps that nothing could cheer them up. The respondents reported based on a four-point scale: all of the time, most of the time, some of the time and none of the time. I combined information from these five items and calculated MHI-5 scores according to the guidance of the Multiple Sclerosis Quality of Life Inventory Manual³. The total scores range between 0 and 100, with higher scores indicating more depressive symptoms. The Cronbach's α is over 0.98 for each wave and the mean of seven waves is 0.985.

Binge Drinking

I used an indicator of binge drinking to measure alcohol use. The definition of binge drinking is the consumption of five or more drinks on one occasion (Wechsler and Austin 1998; Wechsler and Nelson 2001). Binge drinking is detrimental to health and generally results in acute impairment and is responsible for a significant amount of alcohol-related death (Chikritzhs et al. 2001). The NLSY97 collected a measure of binge drinking, which is based on a question that asked respondents the number of days in the past month they had five or more drinks per day. The indicator ranges between 0 and 30.

Cohabitation Dissolution Transition

One significant feature of the NLSY97 is that it collected detailed history of cohabitation/marriage, employment and education of respondents. I summarized a yearly cohabitation history based on monthly cohabitation status. The NLSY97 gathered monthly cohabitation status from 1994 to 2016 (268 months). Combing this information with its corresponding monthly partner ID, I summarized a yearly cohabitation history (1994-2016). By aggregating monthly information to yearly information, I matched the measure of cohabitation dissolution transition to that for mental health, since NLSY97 did not collect mental health information by month. The measure I created to track cohabitation dissolution between 1999 and 2015 captures whether respondents have experienced dissolution of cohabitation in the past year (Yes/No). The cohabitation dissolution indicator is a time-varying variable which tracks all the dissolutions respondents experienced from 1999 to 2015.

Prior Experiences of Cohabitation Dissolution

Besides the history of cohabitation dissolution events for the given years, I also constructed a measure of prior experiences of cohabitation dissolution by year. This measure indicates whether respondents had prior experiences of cohabitation dissolution before the focal cohabitation dissolution event for a given year. Prior experience of cohabitation dissolution is a time-varying variable (Yes/No) which records respondents' prior experiences prior to the year under consideration.

Control Variables

³ According to the Multiple Sclerosis Quality of Life Inventory Manual, I weighed the frequencies of five items separately, summed them into a composite index and transformed it into an index ranging from 0 to 100. https://www.nationalmssociety.org/NationalMSSociety/media/MSNationalFiles/Brochures/MSQLI_-_A-User-s-Manual.pdf

All analyses include a dichotomous variable for gender (female=1), a time-varying variable for age (years), a categorical variable for race/ethnicity (Black, Hispanic, Mixed Race, Non-Black and Non-Hispanic), a categorical variable for the highest degree received by the latest interview (None, GED, High School Diploma, Associate/Junior College, Bachelor's Degree, Master's Degree and Above), a dummy variable for final marital status (married=1) in the latest interview in my sample and a time-varying variable for the number of children residing in the household at the time of interview. The dummy variable capturing the final marital status indicates two types of people. The first type of people exits the sample through marriage, and the second type of people stays unmarried across all the interviews. In addition, in order to examine possible moderation effects of age and gender on the associations of cohabitation dissolution with depressive symptoms/binge drinking, I created an interaction term between age and cohabitation dissolution and an interaction term between gender and cohabitation dissolution. To test the explanation of the buffering effects of prior experiences relative to the moderating effects of age, I also included an interaction term between prior experience and cohabitation dissolution, an interaction term between prior experience and age, and an interaction term between prior experience, cohabitation dissolution, and age.

Analytic Strategy

I used growth curve models to analyze how cohabitation dissolution changes trajectories of mental health and how age and gender moderate the association between cohabitation dissolution and mental health trajectories. Growth curve models (Fitzmaurice, Laird, and Ware 2012), a form of generalized mixed models, are good at handling variations within subjects and across subjects. I used a two-level model: the first-level units are observations within individual subjects, and the second-level units are individual subjects. Age was used as an indicator of time, ranging from 20 to 35. Some studies have reported a nonlinear relationship between age and mental health (Mirowsky and Ross 1992; Simon 2002); thus, I also examined a squared term in the model but found no non-linear relationship between age and depressive symptoms between the ages of 20 and 35. However, the association between age and binge drinking is non-linear between the ages of 20 and 35. Thus, I included a squared term for age in analyses of binge drinking.

In the first level, the trajectories of mental health include both an intercept (π_{0i}) and a slope (π_{1i}). The intercept indicates mental health condition at age 20 (since age is centered at 20). The slope indicates the rate of change in mental health over time, as respondents age. r_{it} is the within-subject residual. For the analysis of binge drinking, I also included a squared term for age. To test different hypotheses in this paper, I modified model specifications of the second level according to demand.

$$Y_{it} = \pi_{0i} + \pi_{1i}(Age - 20)_{it} + r_{it} \text{ (depressive symptoms)}$$

$$Y_{it} = \pi_{0i} + \pi_{1i}(Age - 20)_{it} + \pi_{2i}Age_{it}^2 + r_{it} \text{ (binge drinking)}$$

To test Hypothesis 1, in the second level, the intercept is modeled as a function of cohabitation dissolution and control variables, including gender, race, education, final marital status and the

number of children ($c=1$ to $c=11$). The slope is modeled as a function of intercept β_{10} and residual e_{1i} .

$$\pi_{0i} = \beta_{00} + \beta_{01} \text{Cohabitation Dissolution} + \sum_{c=1}^{11} \alpha_{0c} Z_{ci} + e_{0i}$$

$$\pi_{1i} = \beta_{10} + e_{1i}$$

To test Hypothesis 2a, in the second level the intercept is modeled as a function of cohabitation dissolution and control variables, including gender, race, education, final marital status and the number of children ($c=1$ to $c=11$). The slope is modeled as a function of cohabitation dissolution, intercept β_{10} and residual e_{1i} . The cohabitation dissolution variable in the slope models shows how the association between cohabitation dissolution and mental health covaries with age.

$$\pi_{0i} = \beta_{00} + \beta_{01} \text{Cohabitation Dissolution} + \sum_{c=1}^{11} \alpha_{0c} Z_{ci} + e_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11} \text{Cohabitation Dissolution} + e_{1i}$$

To test Hypothesis 2b, in the second level the intercept is modeled as a function of cohabitation dissolution, prior experience of dissolution, an interaction term between cohabitation dissolution and prior experience of dissolution and control variables, including gender, race, education, final marital status and the number of children ($c=1$ to $c=11$). The prior experience and interaction term included in the intercept is to control for the impact of prior experience and its buffering effects on the influences of cohabitation dissolution on the mental health intercept. The slope is modeled as a function of cohabitation dissolution, prior experience, an interaction term between cohabitation dissolution and prior experience, intercept β_{10} and residual e_{1i} . The prior experience and interaction term included in the slope models is to control for the effects of prior experiences and their buffering effects on the influence of cohabitation dissolution on mental health change rate.

$$\pi_{0i} = \beta_{00} + \beta_{01} \text{Cohabitation Dissolution} + \beta_{02} \text{Prior Experience} + \beta_{03} \text{Cohabitation Dissolution} \times \text{Prior Experience} + \sum_{c=1}^{11} \alpha_{0c} Z_{ci} + e_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11} \text{Cohabitation Dissolution} + \beta_{12} \text{Prior Experience} + \beta_{13} \text{Cohabitation Dissolution} \times \text{Prior Experience} + e_{1i}$$

To test hypotheses of gender difference, in the second level the intercept is modeled as a function of cohabitation dissolution and control variables, including gender, race, education, final marital status and the number of children ($c=1$ to $c=11$). The slope is modeled as a function of intercept β_{10} and residual e_{1i} . The interaction term included in the intercept is to test whether the association between cohabitation dissolution and mental health is moderated by gender.

$$\pi_{0i} = \beta_{00} + \beta_{01} \text{Cohabitation Dissolution} + \beta_{02} \text{Cohabitation Dissolution} \times \text{Female} + \sum_{c=1}^{11} \alpha_{0c} Z_{ci} + e_{0i}$$

$$\pi_{1i} = \beta_{10} + e_{1i}$$

Results

Descriptive results

In Table 1, I show weighted descriptive statistics for the two analytic samples of the NLSY97. The mean MHI-5 score is around 31.51 percent in the depressive symptoms sample. The mean number of days that respondents reported 5 or more drinks per day was 2.29 in the binge drinking sample. The mean number of pre-marriage cohabitation experiences is about 1.38 in the depression sample and about 1.38 in the binge drinking sample⁴. Among the depression and binge drinking samples, 53.52 percent and 51.25 percent of the cohabiting people had experiences of cohabitation dissolution, and 28.46 percent and 28.25 percent of them had prior experiences before the focal cohabitation dissolution. Around 41.75 and 44.21 percent of people got married eventually by age 35 in the depressive sample and the binge drinking sample, respectively.

[Table 1, about here]

Dissolution of cohabitation is negatively associated with mental health

The results in Table 2 demonstrate that among those with cohabitation experiences, the dissolution of cohabitation is associated with more depressive symptoms and binge drinking behaviors, supporting Hypothesis 1.

Table 2 shows the results of depressive symptoms and binge drinking behaviors, respectively. The baseline model is with only the key independent variables, cohabitation dissolution, and time (age) variables. In the baseline models, the intercept represents the initial value of depressive symptoms/binge drinking at age 20, controlling for cohabitation dissolution. The slope of age represents a decreasing trend over time for depressive symptoms. The trend of binge drinking behavior is non-linear. Binge drinking behaviors first increase and then decrease with age. The dissolution of cohabitation significantly increases MHI-5 scores by 2.80 units ($p < 0.001$) and increases the number of days with exhibited binge drinking behaviors by 0.61 units ($p < 0.001$).

In the adjusted models with control variables, the intercept represents the initial value of depressive symptoms/binge drinking behaviors at age 20, controlling for all other variables. The slopes of age in the two adjusted models indicate the trend of depressive symptoms and binge drinking behaviors along with time, controlling for the other variables. The negative associations of cohabitation dissolution with the outcomes remain statistically significant in the two adjusted models after accounting for the control variables. The dissolution of cohabitation significantly increases MHI-5 scores by 2.59 units ($p < 0.001$) and increases the number of days with exhibited binge drinking behaviors by 0.64 units ($p < 0.001$). The adjusted models show that females have higher values of depressive symptoms than males, and males exhibit more binge drinking behaviors than females.

⁴ I did not include this information in Table 1 since it is not included in analytic models. The mean of cohabitation experiences is around one; thus, I did not examine multiple cohabitation dissolutions in analyses.

[Table 2, about here]

Age differences in the association between the dissolution of cohabitation and mental health

In Table 3, I examined the moderation effects of age on the association between cohabitation dissolution and depressive symptoms/binge drinking behaviors. To test Hypothesis 2a, I added an interaction term between age and cohabitation dissolution. In the model of depressive symptoms, the slope of cohabitation dissolution represents an increase in the MHI-5 scores by 3.90 units ($p < 0.001$) at age 20. The interaction term indicates that as people get older, the association between dissolution and depression weakens by 0.21 units ($p < 0.01$) with a unit increase in age. Likewise, in the model of binge drinking, the slope of cohabitation dissolution is 1.48 units ($p < 0.001$), indicating that a breakup of cohabitation at age 20 results in an increase of 1.48 days of binge drinking behaviors. As people get older, the association between dissolution and binge drinking behaviors weakens by 0.03 units ($p < 0.05$) with a unit increase in age. These results support Hypothesis 2a that age moderates the association between cohabitation dissolution and mental health. Even though the magnitude of moderating effects is relatively small, the negative consequences of cohabitation dissolution decrease as people get older.

To control for the confounding influence of prior experiences, I included an indicator for prior experiences of cohabitation dissolution on both the intercepts and the change rate of MHI-5 and binge drinking indicators. The results are shown in Table 3, Figure 1 and Figure 2. In the model of depressive symptoms, the slope of cohabitation dissolution represents an increase in the MHI-5 scores by 10.45 units ($p < 0.001$) for people who have no prior experience at age 20. For people who have prior experience, the MHI-5 scores increase by only 8.67 units ($\beta = 10.45 + 8.36 - 10.14 = 8.67$, $p < 0.05$). As young people age, the effects of cohabitation dissolution declines by 0.24 units ($p < 0.001$) for people have no prior experience. For people who have prior experience, the effects of cohabitation decrease by 0.2 units ($\beta = -0.24 - 0.30 + 0.38 = -0.2$, $p < 0.05$) with an increase in age.

Figure 1 shows different trajectories of three types of people and both their initial intercepts and change rates are different. People who never had experiences of cohabitation dissolution have the best mental health at age 20 (MHI-5=29.48); people who had experiences of cohabitation dissolution but without prior experiences have the worst mental health at age 20 (MHI-5=29.48+10.45=39.93); people who had cohabitation dissolution but with prior experiences have mental health in the middle (MHI-5=29.48+8.67=38.15). However, when people get older, the MHI-5 scores of three types of people converge, indicating that the negative consequences of cohabitation dissolution decline over time. The results also suggest that prior experiences could also moderate the effects of cohabitation dissolution on depressive symptoms and explain part of the moderating influences of age.

Likewise, Figure 2 shows that prior experiences also have significant influence in the model of binge drinking behaviors. Shown in Table 3, in the model of binge drinking behaviors, the slope of cohabitation dissolution indicates an increase in the MHI-5 scores by 2.14 units ($p < 0.001$) for people who have no prior experience at age 20. The MHI-5 scores for people who have prior cohabitation dissolutions increase by 1.27 units ($\beta = 2.14 + 1.62 - 2.49 = 1.27$, $p < 0.05$). As people get older, the effects of cohabitation breakups first increase and then decrease for the three types of

people (Figure 2). These three types of people have different initial values and trajectories of binge drinking behavior. People who had cohabitation dissolution without prior experience have the most binge drinking behaviors at the inception and people who had cohabitation dissolution with prior experience have the second most binge drinking behaviors at the age 20, while people who did not experience cohabitation dissolution had the lowest value of binge drinking behaviors initially. However, as young people get older, the differences in their binge drinking behaviors narrow. These results indicate that prior experiences could buffer the effects of cohabitation on binge drinking behaviors and explain part of the moderating influences of age.

In sum, the null hypotheses of 2a, 2b, and 2c are rejected. As people get older, the negative consequence of cohabitation dissolution on mental health decreases. People might be more psychologically resilient to breakups of cohabitation as they get older. Prior experiences of cohabitation breakups could buffer the negative consequences of cohabitation dissolution and partially explain the moderating effects of age on the negative consequences of cohabitation dissolution on both depressive symptoms and binge drinking behaviors.

[Table 3, about here]

[Figure 1 and Figure 2, about here]

Gender differences in the associations between the dissolution of cohabitation and mental health

To test the hypotheses of gender differences, I first modeled women and men separately and then modeled them together in a combined sample. In the model of depressive symptoms, both men and women have more depressive symptoms when cohabitation dissolutions occur, with an increase in MHI-5 scores by 2.57 units ($p < 0.001$) and 2.08 units ($p < 0.001$), respectively. Likewise, in the model of binge drinking behaviors, both men and women have more days of binge drinking when cohabitation dissolutions occur, with an increase of 0.66 days ($p < 0.001$) and 0.6 days ($p < 0.001$), respectively. In the combined sample including both men and women, I included a gender interaction term with cohabitation dissolution. The results suggest no gender difference in the association between cohabitation and mental health; thus, I did not show the results of the full sample in Table 3. It is noteworthy that the final marital status, which helps to control for the selection out of cohabitation, is only statistically significant in the sample of men. Men who selected out of cohabitation union and into marriage union are less likely to have depressive symptoms ($\beta = -2.76$, $p < 0.001$).

In summary, the results suggest no gender difference in the associations of cohabitation dissolution with either depressive symptoms or binge drinking behaviors.

[Table 4, about here]

Sensitivity Analysis

In this study, I used growth curve models controlling for the initial MHI-5 scores/the number of days of binge drinking at age 20 in the analyses. Both the method and indicator of initial mental health chosen for analyses influence the study results. Most previous studies used fixed-effects

models, controlling for the mental health condition before marital transition based on two-wave panel datasets (e.g. Simon 2002; Williams 2003).

As supplementary analyses, I have tried different types of models and indicators of initial mental health in this study. Table 3 and Table 4 in the Appendix show the results of a fixed-effects model controlling for mental health condition before each cohabitation dissolution (MHI-5 scores or binge drinking indicators) and results of a random intercept two-level model controlling for the baseline MHI-5 scores or binge drinking indicators (at age 15).

Both the results of the fixed-effects model and the results of the random intercept two-level model show that dissolution cohabitation would lead to negative psychological consequences, though the magnitudes are slightly different. In addition, the models controlling for the baseline mental health condition indicate that age could moderate the influences of cohabitation dissolution on mental health, and that there are no gender differences in the negative psychological consequences of cohabitation dissolution.

In addition, the distribution of the binge drinking indicator is zero-inflated and over-dispersed⁵. Thus, I have tried zero-inflated negative binomial models with random effects to examine the association between cohabitation dissolution and binge drinking behaviors, and the moderation effects of age and gender. Appendix Table 5 replicates the results in Table 2 and shows that cohabitation dissolution is associated with more binge drinking behaviors. Appendix Table 6, replicating the results in Table 3, indicates that the increase in binge drinking behaviors resulted from cohabitation dissolution decreases as people get older. Additionally, after controlling the confounding influences of prior experiences of cohabitation dissolution, the moderation effects of age are still statistically significant. Lastly, I did not find any gender difference in the association between cohabitation dissolution and binge drinking behaviors in these models, consistent with the main results presented.

Conclusion and Discussion

This study addresses the important and timely issue of whether there are negative consequences of cohabitation dissolution against the background of the deinstitutionalization of marriage (Cherlin 2004). Even though the argument about whether cohabitation is a step process or an alternative to marriage remains unsettled, premarital cohabitation has already become a normative experience for young Americans (Bumpass and Lu 2000). The short-lived nature of cohabitation unions (Bumpass and Lu 2000; Bumpass and Sweet 1989; Lichter et al. 2006) augments the relationship instability of young adults and puts them at risk of more twists and turns in intimate relationships.

This study focused on the association between cohabitation dissolution and mental health trajectories, an almost unexplored study topic in the previous literature. Consistent with the results of prior studies examining the association between marital dissolution and mental health, the current study reveals that cohabitation dissolution among young adults age 20 to 35 is

⁵ I included the results of model comparison between zero-inflated Poisson models with random effects and zero-inflated negative binomial models with random effects in Appendix Table 8. The results of AIC indicate that zero-inflated negative binomial models with random effects are with better performance.

associated with increased depressive symptoms and binge drinking behaviors. This finding suggests that even though the form of intimate relationships has experienced major changes in the past decades and despite the dissimilarities between cohabitation and marriage, the breakups of cohabitation, just like marital dissolution, result in psychological harm in young adults.

Furthermore, this study finds that the association between cohabitation dissolution and mental health are heterogeneous over the life course. As young adults get older, they appear to become more psychologically resilient to transitions in cohabitation relationships. Few studies that shed light on age trajectories of mental health in this context, or that have examined different resilience to relationship transitions over time. Thus, this study provides an empirical assessment regarding the effect of the timing of cohabitation transitions on mental health. Elder and his colleagues (2003) argued that timing is a crucial concept in the life course, because the same life events may affect individuals differently depending on the timing of occurrence in the life course (George 1993). Individuals at different developmental stages may interpret the same event in different ways (Wheaton 1990). As people get older, however, they may become more psychologically mature and are more flexible in handling major life events.

In this study, I also controlled for a compelling confounder, prior experience of cohabiting relationship dissolutions, to exclude the supplemental explanation of role histories (Wheaton 1990). The results demonstrate that previous experience could moderate the association between cohabitation dissolution and mental health and could also partially explain the age differences in the association between cohabitation dissolution and mental health. The transition less influences people who have prior experiences before the recent breakup, but after controlling for the prior experiences, the effects of cohabitation dissolution still robustly decrease with age. There are variations in the negative consequences of cohabitation dissolution by age that cannot be fully explained by the accumulation of prior experiences, which supports the major statement of life course theory: age has multiple meanings (developmental, social and historical). Excluding cumulative experiences of relationship transitions, age still has other meanings in our social life that moderate the negative correlations between cohabitation dissolution and mental health.

This study also assesses whether there are gender differences in the association between cohabitation dissolution and mental health trajectories. This current study fails to find a gender difference in the associations of cohabitation dissolution with either depressive symptoms or binge drinking behaviors, which supports the notion that there are similar consequences of breakups for men's and women's mental health among current cohorts of young adults.

There are multiple possible explanations for this finding. Firstly, socialization theory, structural theory, and the emotional socialization hypothesis were proposed and examined in the 1980s and 1990s (Aseltine Jr and Kessler 1993; Gordon 1981; Horwitz et al. 1996; Kessler et al. 1993; Menaghan and Lieberman 1986; Pollak and Thoits 1989; Simon and Marcussen 1999). However, the current cohort of young adults was born in the 1980s and grew up in a different social context than earlier cohorts of people. In the past decades, women's employment has increased dramatically (Cotter, England, and Hermsen. 2008); women have almost equal access to educational opportunities (England et al. 2007; England and Li 2006). The development of gender equality and the relaxation of gender norms have weakened different gender expectations for males and females. Consequently, females and males are more likely to express their distress

similarly when faced with significant events in their lives. Secondly, even though cohabitation and marriage share many similarities, cohabitation union is regarded as a deinstitutionalized relationship union (Cherlin 2004). Cherlin argued that marriage had been transformed from institutional marriage to individualized marriage, the latter emphasizing personal choice and expanded self-development. Likewise, Brines and Joyner (1999) maintained that the bond of cohabitation is formed by egalitarian individualism, while marriage is bonded by joint utility maximization. Thus, cohabiters are more likely to support egalitarian gender relations and nontraditional family roles (Thomson, McLanahan, and Curtin 1992). If this is the case, the gender equality in cohabitation could potentially explain why the cohabitation dissolution does not have gendered influences on the mental health of young adults in the US.

This study is subject to several limitations. Even though this study tries to exclude the selection effects into and out of cohabitation, this issue is not fully resolved. By focusing on subjects who have at least one experience of cohabitation, this study excludes the selection effect into cohabitation. However, the selection effect out of cohabitation cannot be entirely eliminated by controlling for the final marital status. Future work could solve this issue through more sophisticated analytic strategies, such as instrumental variables techniques. Secondly, the latest wave of the NLSY97 was collected in 2016; thus, the majority of the 1980-1984 birth cohorts have not finished their marital and cohabitation histories. I cannot compare the influences of the cohabitation dissolution over a more extended range of age or examine the effects of different marital union transitions on mental health. Using the later waves of the NLSY97, future scholars could track the trajectories of mental health across complete marital and cohabitation histories and compare the transitions of different marital unions. Thirdly, the NLSY97 did not collect information about relationship quality and marriage plan in cohabitation history; I cannot distinguish the varying quality of cohabitation. Prior studies based on marital transition and mental health indicated that marital quality is strongly associated with psychological well-being and the consequences of marital dissolution (e.g. Kim and McKenry 2002; Waite and Gallagher 2000; Williams 2003). A recent study examining the effects of non-romantic relationships on mental health found that having had plans for marriage was associated with more significant reductions in life satisfaction and higher relationship quality was related to smaller declines in life satisfaction following a break-up (Rhoades et al. 2011). Thus, in order to comprehensively examine the effects of cohabitation dissolution, information on marital plans and relationship quality should be explored in future studies.

Despite the limitations, this study extends previous studies in several ways. Firstly, this study is the first to study the association between pre-marital cohabitation dissolution and mental health trajectories of young adults over the life course. Secondly, applying the growth curve models to a longitudinal data with rich mental health measures and complete cohabitation history, allowed me to track the changes in the trajectories of both depressive symptoms and binge drinking behaviors in response to the dissolution of pre-marital cohabitation and their variations by age and gender over the life course. Thirdly, through providing a crucial empirical test of the integration of life course perspectives with stress process models, this study provides crucial insight into longstanding theoretical issues.

Findings in this article point to a reconsideration of the research on intimate sexual relationships and mental health. Previous research often focuses on marital relationships rather than

cohabitation relationships, even though cohabitation has become a normative experience for American young adults. The flexibility of cohabitation introduces more variations in the association between intimate sexual relationships and mental health over the life course. I call for future work in this area to combine the stress process model with the life course approach, tracking the association between multiple types of intimate sexual relationship and mental health trajectories across the life course.

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Table 1. Means, Standard Deviation, and Sample Size by Data Set: the National Longitudinal Study of Youth 97(NLSY97)

	Depressive Symptoms	Binge Drinking
Dependent Variables		
MHI-5 Scores, mean (SE)	31.51 (0.16)	
Number of Days Had 5+ Drinks Per Day, mean (SE)		2.29 (0.03)
Independent Variables		
Cohabitation Dissolution, %		
No	46.48	48.75
Yes	53.52	51.25
Prior Experience of Cohabitation Dissolution, %		
No	71.54	71.75
Yes	28.46	28.25
Control Variables		
Age, year, mean (SE)	26.72 (0.04)	26.71 (0.03)
Gender, %		
Male	47.67	47.32
Female	52.33	52.68
Race/Ethnicity, %		
Black	18.21	15.04
Hispanic	13.77	12.95
Mixed Race	1.32	1.33
Non-Black/Non-Hispanic	66.70	70.68
Highest Education Degree, %		
None	10.75	8.16
GED	17.72	15.29
High School Diploma	42.23	42.96
Associate/Junior College	7.77	8.19
Bachelor's Degree	15.13	17.72
Master's Degree and Above	0.06	7.68
Number of Children Residing, mean (SE)	0.56 (0.01)	0.48 (0.01)
Final Marital Status		
Non-married	58.24	55.79
Married	41.76	44.21
N	4496.00	4503.00
Person Years	12788.00	20514.00

Note: Sample statistics are weighted by the 1997 baseline weights. Sample statistics are based on Person Years. SD=Standard Deviation.

Table 2. Growth Curve Models Examining the Effects of Cohabitation Dissolution on Depressive Symptoms and Binge Drinking

	Depressive Symptoms		Binge Drinking	
	Baseline	Adjusted	Baseline	Adjusted
	b (SE)	b (SE)	b (SE)	b (SE)
Cohabitation Dissolution	2.80 (0.29)***	2.59 (0.29)***	0.61 (0.06)***	0.64 (0.06)***
Age	-0.47 (0.04)***	-0.40 (0.04)***	0.05 (0.02)*	0.45 (0.09)***
Age2			-0.01 (0.00)***	-0.01 (0.00)***
Female		4.58 (0.43)***		-1.33 (0.09)***
Race/ethnicity				
Black		-1.26 (0.50)*		-0.85 (0.11)***
Hispanic		-1.61 (0.54)**		-0.44 (0.12)***
Mixed Race		0.76 (2.11)		0.38 (0.45)
Non-Black/Non-Hispanic (ref.)				
Highest Education Degree				
None		3.95 (0.69)***		0.39 (0.16)*
GED		1.21 (0.59)*		0.28 (0.13)*
High School Diploma (ref.)				
Associate/Junior College		-0.10 (0.80)		-0.04 (0.17)
Bachelor's Degree		-1.51 (0.63)*		-0.19 (0.13)
Master's Degree and Above		-1.10 (0.91)		-0.44 (0.18)*
Number of Children		-0.48 (0.19)*		-0.15 (0.04)***
Final Married		-1.92 (0.61)**		0.10 (0.13)
Intercept	32.31	30.53	1.88	2.85
N	4496	4496	4503	4503
Person Years	12788	12788	20514	20514
-2Log Likelihood	-53265.835	-53100.019	-57157.014	-56919.36

* p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Table 3. Growth Curve Models Examining the Moderation Effects of Age on the Consequences of Cohabitation Dissolution

	Depressive Symptoms		Binge Drinking	
	Cohabitation Dissolution * Age	Cohabitation Dissolution * Prior Experience * Age	Cohabitation Dissolution * Age	Cohabitation Dissolution * Prior Experience * Age
	b (SE)	b (SE)	b (SE)	b (SE)
Cohabitation Dissolution	3.90 (0.52)***	10.45 (2.14)***	1.48 (0.41)***	2.14 (0.48)***
Cohabitation Dissolution * Age	-0.21(0.069)**	-0.30 (0.08)***	-0.03 (0.02)*	-0.06 (0.02)**
Prior Experience		8.36 (3.75)*		1.62 (0.83)*
Cohabitation Dissolution * Prior Experience		-10.14 (4.46)*		-2.49 (0.97)**
Prior Experience * Age		-0.28 (0.14)*		-0.06 (0.03)*
Cohabitation Dissolution * Prior Experience * Age		0.38 (0.16)*		0.09 (0.03)**
Age	-0.27 (0.057)***	-0.24 (0.07)***	0.44 (0.09)***	0.44 (0.10)***
Age2			-0.01 (0.00)***	-0.01 (0.00)***
Finally Married	-1.89 (0.61)**	-1.94 (0.61)***	0.10 (0.13)	0.10 (0.13)
Intercept	29.76	29.48	2.75	2.68
N	4496	4496	4503	4503
Person Years	12788	12788	20514	20514
-2Log Likelihood	-53095.465	-53090.26	-56917.246	-56913.359

Note: Results in this table are adjusted by control variables including gender, race, highest education degree, and the number of children.

* p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Figure 1. The Age Trajectory of MHI-5 Scores

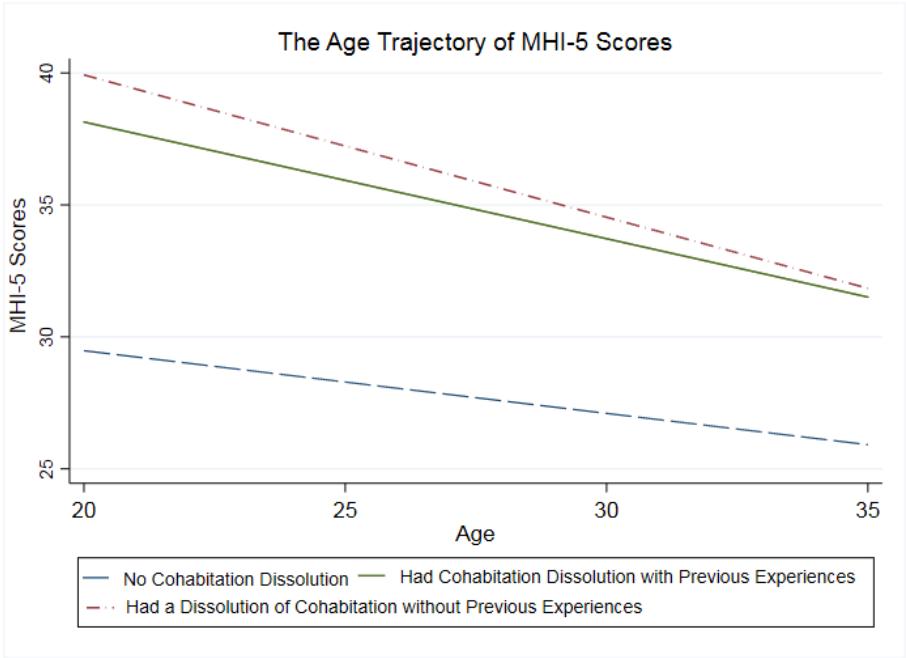


Figure 2. The Age Trajectory of Binge Drinking

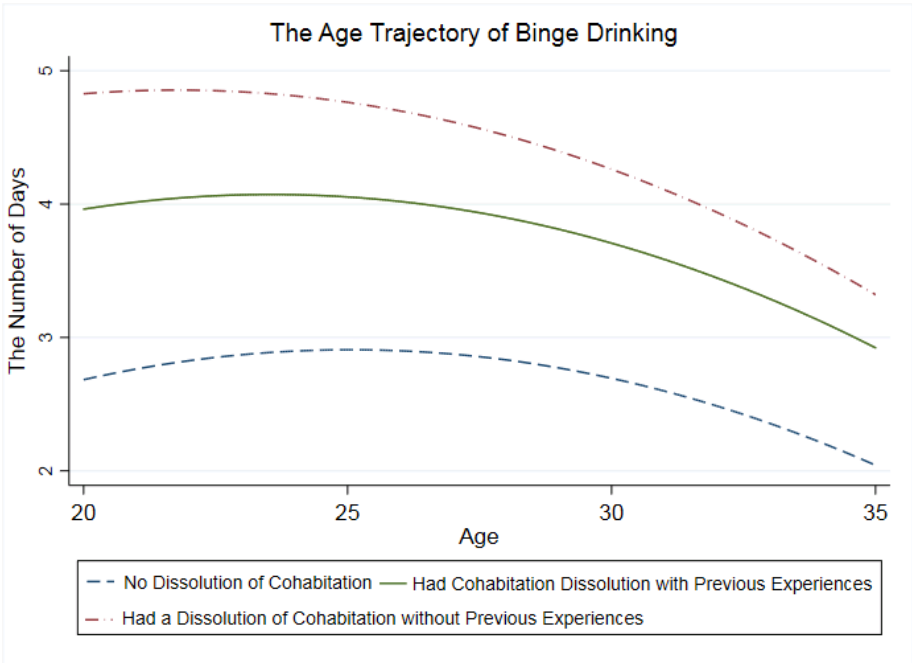


Table 4. Growth Curve Models Examining the Moderation Effects of Gender on the Consequences of Cohabitation Dissolution

	Depressive Symptoms		Binge Drinking	
	Men	Women	Men	Women
	b (SE)	b (SE)	b (SE)	b (SE)
Cohabitation Dissolution	2.57 (0.44)***	2.08 (0.39)***	0.66 (0.11)***	0.60 (0.06)***
Age	-0.43 (0.05)***	-0.37 (0.05)***	0.12 (0.05)*	0.02 (0.03)
Age²			-0.01 (0.00)***	-0.01 (0.00)**
Race/ethnicity				
Black	-1.09 (0.71)	-1.34 (0.71)	-1.00 (0.19)***	-0.70 (0.11)***
Hispanic	-2.24 (0.78)**	-0.99 (0.76)	-0.57 (0.21)**	-0.32 (0.12)**
Mixed Race	-2.18 (3.31)	2.82 (2.76)	1.27 (0.82)	-0.36 (0.43)
Non-Black/Non-Hispanic (ref.)				
Highest Education Degree				
None	3.43 (0.94)***	4.55 (1.02)***	0.38 (0.26)	0.45 (0.17)**
GED	0.15 (0.77)	2.65 (0.91)**	0.21 (0.21)	0.39 (0.14)**
High School Diploma (ref.)				
Associate/Junior College	-0.18 (1.25)	0.18 (1.05)	-0.17 (0.33)	0.04 (0.16)
Bachelor's Degree	-0.84 (0.99)	-1.80 (0.83)*	-0.42 (0.24)	-0.02(0.12)
Master's Degree and Above	-1.47 (1.58)	-0.85 (1.12)	-0.58 (0.38)	-0.36 (0.16)*
Number of Children	-0.64 (0.32)*	-0.49 (0.25)*	-0.13 (0.09)	-0.18 (0.04)***
Finally Married	-2.76 (0.86)***	-1.14 (0.85)	0.27 (0.23)	-0.10 (0.13)
Intercept	31.29	34.45	2.89	1.47
N	2205	2291	2240	2263
Person Years	5964	6824	9596	10918
-2Log Likelihood	-24788.295	-28304.534	-28505.584	-27278.596

* p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Appendix

Table 1. Years in Which MHI-5 Scores and Alcohol Abuse Questions Were Asked in the NLSY97

Year	Question	
	MHI-5	Number of Days Had 5+ Drinks Per Day
1999		X
2000	X	X
2001		X
2002	X	X
2003		X
2004	X	X
2005		X
2006	X	X
2007		X
2008	X	X
2009		X
2010	X	X
2011		
2012		
2013		
2014		
2015	X	X

Table 2. Means, Standard Deviation, and Full Sample Size by Data Set: National Longitudinal Study of Youth 97(NLSY97)

	Depressive Symptoms Full Sample	Binge Drinking Full Sample
Dependent Variables		
MHI-5 Scores, mean(SE)	29.82 (0.08)	
Number of Days Had 5+ Drinks Per Day, mean (SD)		2.11 (0.02)
Independent Variables		
Cohabitation Dissolution, %		
No	84.73	84.98
Yes	15.27	15.02
Prior Experience of Cohabitation Dissolution, %		
No	84.31	84.04
Yes	15.69	15.96
Control Variables		
Age, year, mean (SE)	26.28 (2.30)	26.31 (0.02)
Gender, %		
Male	51.08	51.34
Female	48.92	48.66
Race/Ethnicity, %		
Black	14.93	12.07
Hispanic	12.72	12.02
Mixed Race	1.27	1.19
Non-Black/Non-Hispanic	71.09	74.72
Highest Education Degree, %		
None	7.00	5.44
GED	11.57	10.10
High School Diploma	39.68	39.10
Associate/Junior College	8.62	8.86
Bachelor's Degree	22.77	25.14
Master's Degree and Above	10.36	11.35
Number of Children Residing, mean (SE)	0.55 (0.01)	0.49 (0.01)
Final Marital Status		
Non-married	39.44	38.41
Married	60.56	61.59
N	8585.00	7737.00
Person Years	44404.00	69687.00

Note: Sample statistics are weighted by the 1997 baseline weights. Sample statistics are based on Person Years. SD=Standard Deviation.

Table 3. Fixed Effects Models Examining the Effects of Cohabitation Dissolution on Depressive Symptoms

	Depressive Symptoms			
	Control Pre-dissolution MHI-5	Control Baseline MHI-5	Cohabitation Dissolution * Age	Cohabitation Dissolution * Gender
	b (SE)	b (SE)	b (SE)	b (SE)
Cohabitation Dissolution	1.18 (0.37)**	2.33 (0.29)***	6.80 (1.81)***	2.43 (0.43)***
Cohabitation Dissolution * Age			-0.17 (0.07)*	
Cohabitation Dissolution * Female				-0.18 (0.58)
Baseline MHI-5		0.34 (0.01)***	0.34 (0.01)***	0.24 (0.01)***
Pre-dissolution MHI-5	-0.16 (0.01)***			
Age	-0.47 (0.05)***	-0.38 (0.03)***	-0.27 (0.06)***	-0.38 (0.03)***
N	4112	4162	4162	4162
Person Years	11146	11882	11882	11882
R2 or -2Log Likelihood	0.11	-48967.956	-48964.816	-48967.906

* p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Table 4. Fixed Effects Models Examining the Effects of Cohabitation Dissolution on Binge Drinking

	Binge Drinking			
	Control Pre-dissolution MHI-5	Control Baseline MHI-5	Cohabitation Dissolution * Age	Cohabitation Dissolution * Gender
	b (SE)	b (SE)	b (SE)	b (SE)
Cohabitation Dissolution	0.49 (0.09)***	0.66 (0.06)***	1.53 (0.40)***	0.66 (0.09)***
Cohabitation Dissolution * Age			-0.03 (0.02)*	
Cohabitation Dissolution * Female				0.003 (0.13)*
Baseline Binge Drinking		0.29 (0.01)***	0.28 (0.01)***	0.29 (0.01)***
Pre-Dissolution Binge Drinking	0.039 (0.01)***			
Age	0.22 (0.12)	0.46 (0.09)***	0.44 (0.09)***	0.46 (0.09)***
Age2	-0.04 (0.001)*	-0.01 (0.00)***	-0.01 (0.00)***	-0.01 (0.001)***
N	3883	4021	4021	4021
Person Years	15733	19049	19049	19049
R2 or -2Log Likelihood	0.11	-52918.607	-52930.737	-52918.607

* p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Table 5. Zero-Inflated Negative Binomial Models with Random Effects Examining the Impacts of Cohabitation Dissolution on Binge Drinking Behaviors

	Binge Drinking	
	Baseline	Adjusted
	b (SE)	b (SE)
Cohabitation Dissolution	0.29 (0.03)***	0.31 (0.03)***
Age	-0.05 (0.004)***	-0.04 (0.004)***
Female		-0.86 (0.05)***
Race/ethnicity		
Black		-0.65 (0.06)***
Hispanic		-0.28 (0.06)***
Mixed Race		-0.01 (0.24)
Non-Black/Non-Hispanic (ref.)		
Highest Education Degree		
None		0.26 (0.08)**
GED		0.21 (0.07)**
High School Diploma (ref.)		
Associate/Junior College		-0.03 (0.09)
Bachelor's Degree		-0.05 (0.07)
Master's Degree and Above		-0.23 (0.10)*
Number of Children		-0.09 (0.02)***
Final Married		0.04 (0.07)
Intercept	0.22 (0.04)***	0.89 (0.06)***
N	4503	4503
Person Years	20514	20514
Zero-inflation	0.17 (0.01)	0.17 (0.01)
Dispersion Parameter	1.30 (0.06)	1.29 (0.06)
-2Log Likelihood	-34253.2	-33997.9

* p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Table 6. Zero-Inflated Negative Binomial Models with Random Effects Examining the Moderation Effects of Age on the Consequences of Cohabitation Dissolution

	Binge Drinking	
	Cohabitation Dissolution * Age	Cohabitation Dissolution * Prior Experience * Age
	b (SE)	b (SE)
Cohabitation Dissolution	0.45 (0.05)***	0.50 (0.06)***
Cohabitation Dissolution * Age	-0.02 (0.01)**	-0.02 (0.01)***
Prior Experience		0.19 (0.11)
Cohabitation Dissolution * Prior Experience		-0.26 (0.13)*
Prior Experience * Age		-0.03 (0.01)*
Cohabitation Dissolution * Prior Experience * Age		0.04 (0.02)*
Age	-0.03 (0.01)***	-0.02 (0.01)**
Female	-0.85 (0.05)***	-0.85 (0.05)***
Race/ethnicity		
Black	-0.65 (0.06)***	-0.65 (0.06)***
Hispanic	-0.28 (0.06)***	-0.28 (0.06)***
Mixed Race	-0.01 (0.24)	-0.01 (0.24)
Non-Black/Non-Hispanic (ref.)		
Highest Education Degree		
None	0.26 (0.08)**	0.26 (0.08)**
GED	0.21(0.07)**	0.21 (0.07)**
High School Diploma (ref.)		
Associate/Junior College	-0.03 (0.09)	-0.03 (0.09)
Bachelor's Degree	-0.06 (0.07)	-0.07 (0.07)
Master's Degree and Above	-0.23 (0.10)*	-0.09 (0.02)***
Number of Children	-0.10 (0.02)***	-0.10 (0.02)***
Finally Married	0.04 (0.07)	0.04 (0.07)
Intercept	0.81(0.06)***	0.76 (0.07)***
N	4503	4503
Person Years	20514	20514
Zero-inflation	0.17 (0.01)	0.17 (0.01)
Dispersion Parameter	1.29 (0.06)	1.29 (0.06)
-2Log Likelihood	-33993.2	-33989.5

* p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Table 7. Zero-Inflated Negative Binomial Models with Random Effects Examine the Moderation Effects of Gender on the Consequences of Cohabitation Dissolution

	Binge Drinking	
	Men	Women
	b (SE)	b (SE)
Cohabitation Dissolution	0.19 (0.04)***	0.46 (0.04)***
Age	-0.04 (0.004)***	-0.05 (0.01)***
Race/ethnicity		
Black	-0.56 (0.08)***	-0.74 (0.09)***
Hispanic	-0.27 (0.08)***	-0.28 (0.09)**
Mixed Race	0.36 (0.34)	-0.31 (0.35)
Non-Black/Non-Hispanic (ref.)		
Highest Education Degree		
None	0.22 (0.11)*	0.33 (0.14)*
GED	0.08 (0.09)	0.41 (0.12)***
High School Diploma (ref.)		
Associate/Junior College	-0.12 (0.13)	0.05 (0.13)
Bachelor's Degree	-0.20 (0.10)*	0.07 (0.10)
Master's Degree and Above	-0.20 (0.15)	-0.22 (0.12)
Number of Children	-0.05 (0.03)	-0.14 (0.03)***
Finally Married	0.12 (0.01)	-0.05 (0.10)
Intercept	0.94 (0.07)***	-0.08 (0.08)
N	2240	2263
Person Years	9596	10918
Zero-inflation	0.18 (0.01)	0.13 (0.03)
Dispersion Parameter	1.52 (0.08)	0.97 (0.09)
-2Log Likelihood	-19108.5	-14847.1

* p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Table 8. Comparison Between Zero-inflated Poisson Models and Zero-inflated Negative Binomial Models

	Model	dAIC	df
Zero-inflated Negative Binomial	Baseline	0	6
Zero-inflated Poisson		8854.4	5
Zero-inflated Negative Binomial	Adjusted	0	17
Zero-inflated Poisson		8306.6	16
Zero-inflated Negative Binomial	Cohabitation Dissolution * Age	0	18
Zero-inflated Poisson		8163.8	17
Zero-inflated Negative Binomial	Cohabitation Dissolution * Prior Experience * Age	0	22
Zero-inflated Poisson		8082.4	21
Zero-inflated Negative Binomial	Men	0	16
Zero-inflated Poisson		5476.4	15
Zero-inflated Negative Binomial	Women	0	16
Zero-inflated Poisson		2263.6	15