THE DEVELOPMENTAL COMPETENCE OF YOUNG ADULT ADOPTEES

A dissertation submitted

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fulfillment of the requirements for the

degree of Doctor of Philosophy

by

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CHAPTER 1
INTRODUCTION

A large number of studies have investigated whether adoptees fare worse than their non-adoptive peers (e.g., Feigelman, 1997; Juffer & van IJzendoorn, 2005; Wierzbicki, 1993). Most studies, however, have focused on behavioral outcomes in childhood and adolescence (Levy-Shiff, 2001). Relatively few studies focus on the long-term implications of adoption for young adult outcomes (Palacios & Brodzinsky, 2010). It is important to investigate the long-term implications of adoption to determine how adoption impacts individuals over time. The current study investigated the long-term implications of adoption on educational, work, and romantic outcomes in young adulthood compared to individuals raised by both biological parents. In doing so, this study also addressed methodological limitations of previous studies by using propensity score methods and regression analyses to estimate the impact of adoption on young adult outcomes. In addition, the current study examined the role of adoption-related experiences in understanding individual differences in adoptee outcomes. Findings from this study identified the impact of adoption on relevant tasks in young adulthood (i.e., education, work, and romantic relationships), and the long-term impact of adoption-related experiences on these outcomes, which informs future research and theory on the outcomes of adoption.

Adoption

Adoption is defined by the U.S. Department of Health and Human Services as the “social, emotional, and legal process through which children who will not be raised by their birth parents become full and permanent legal members of another family” (Child Welfare
Information Gateway, 2014a). According to the U.S. Census Bureau, there are 1.5-2 million adopted children in the United States (U.S. Census Bureau, 2010). Adoption touches the lives of most Americans, with 40% of Americans reporting they know someone who has been adopted (Harris Interactive & Dave Thomas Foundation for Adoption, 2013). In general, researchers have viewed adoption as a positive intervention, in that adoptees fare better with their adoptive families than if they had stayed with their birth families (van IJzendoorn & Juffer, 2006). However, empirical research has largely focused on (a) comparisons of adoptees with peers reared by their biological parents and (b) factors that may account for individual differences in outcomes among adoptees. Therefore, the existing research primarily examined whether adoptees are at an increased risk for poor outcomes compared to their biologically-reared peers, and what adoption-related experiences may account for their greater propensity for poorer outcomes.

Systematic evaluations and empirical studies with large samples (N>1000) of adoptees during childhood and adolescence demonstrate adoptees have higher levels of maladjustment than their biologically-reared counterparts, as indicated by overrepresentation in clinical populations, higher levels of externalizing and internalizing behavior problems, and greater academic problems (Juffer & van IJzendoorn. 2005; Wierzbicki, 1993). In addition, during childhood and adolescence, adoptees report higher levels of substance use and more school troubles than biologically-reared individuals (Fan et al., 2002; Miller, Fan, Christensen Grotevant, & van Dulmen, 2000a). Few studies examine behavior problems of adoptees in young adulthood, but there is evidence to suggest that adult adoptees are more likely to have higher levels of internalizing and externalizing behaviors (e.g., van den Berg et al., 2008) and substance use (Yoon, Westermeyer, Warwick, & Kuskowski, 2012), compared to biologically-reared peers.
Though comparisons with non-adoptees provide important information on mean differences, they ignore the within-group variability of adoptee outcomes. Adoption-related experiences, such as age at adoption, foster care experience, and type of adoption play a role in explaining within-group variability in adoptee outcomes during childhood and adolescence (e.g., Juffer & van IJzendoorn, 2005; Oswald, Heil, & Goldbeck, 2010; Verhulst, Althaus, & Versluis-den Bieman, 1990).

**Age at adoption.** Older age at adoption is associated with increased risk for adjustment difficulties during childhood and adolescence (Verhulst et al., 1990). Though researchers have differed on a specific age ‘cut-off,’ meta-analytic findings suggest that those adopted before 12 months of age fare better than those adopted after 12 months of age (see Juffer & van IJzendoorn, 2009 for review). However, this work does not focus on young adult outcomes, leaving it unclear if age at adoption has long-term implications for adjustment.

**Foster care experience.** Most adoptions in the United States occur through the child welfare system (i.e., the foster care system; see Grotevant & McDermott, 2014 for review). Specifically, since 2002, over 650,000 adoptions in the U.S. occurred through the foster care system (Child Welfare Information Gateway, 2014b). Children and adolescents involved in the foster care system have been removed from their families by child welfare due to instances of abuse or neglect. Moreover, many youth in the foster care system report maltreatment, including neglect, physical abuse, and sexual abuse (Allen, Combs-Orme, McCarter, & Grossman, 2000; Minnis, Everett, Pelosi, Dunn & Knapp, 2006; Oswald et al., 2010). These youth also exhibit developmental delays, mental health problems, and internalizing and externalizing behavior problems during childhood and adolescence (Heflinger, Simpkins, & Combs-Orme, 2000; McIntyre & Keesler, 1986), all of which may impact young adult outcomes. However, the
differences between adoptees with foster care experience and those without foster care experience have not been examined in young adulthood.

**International adoption.** The number of international adoptions in the United States peaked in 2004 with over 22,000 international adoptions (U.S. Department of State, 2015). Since 2004, the number of international adoptions has declined, with just over 6,000 international adoptions in 2014 (U.S. Department of State, 2015). Some meta-analytic findings suggest international adoptees demonstrate fewer externalizing and internalizing behavior problems and are less often referred to mental health services than domestic adoptees during childhood and adolescence (Juffer & van Ijzendoorn, 2005). In contrast, a recently published meta-analysis showed international adoptees report more mental health problems and externalizing behavior problems than their non-adopted peers, but report similar levels of internalizing behaviors during adolescence (Askeland et al., 2016). Meta-analyses examining the young adult outcomes of international adoptees have not been conducted, but large-scale studies demonstrate that international adoptees do not differ from their non-adopted counterparts in educational and employment outcomes, but are less likely be involved in intimate relationships or be married (e.g., Tieman, van der Ende, & Verhulst, 2006). Therefore, existing research suggests international adoptees do not consistently differ from domestic adoptees in their young adult outcomes, but this question has yet to be explored in a U.S. sample.

**Transracial adoption.** A review of the literature on transracial adoption states transracial adoption is not necessarily a risk factor for emotional and behavioral problems (see Lee, 2003 for review). Indeed, many studies demonstrate transracial adoptees do not differ from same-race adoptees or biologically-reared peers in rates of emotional and behavioral problems during childhood and adolescence (e.g., Versluis-den Bieman & Verhulst, 1995). Moreover, the studies
that find transracial adoptees have more serious problems than same-race adoptees or biologically-reared individuals also show small effect sizes, which are further qualified by other factors, such as age at adoption, adverse preadoption experiences, gender, and family functioning (see Lee, 2003 for review). However, the role of transracial adoption (versus same-race adoption) in young adult outcomes remains unknown.

**Kinship Adoption.** There is little empirical work on kinship (kin) adoption, but research suggests kin adoptees experience fewer total placements and their adoptive parents report more satisfaction and a more positive relationship with the adopted child (Ryan, Hinterlong, Hegar, & Johnson, 2010). However, kin adoptive parents are more likely to be single parents and have less income (Howard & Smith, 2003; Magruder, 1994). Thus, the role of kinship adoption on young adult outcomes is unexplored in the existing literature.

In summary, empirical studies suggest adoptees are at risk for behavior problems during childhood and adolescence, as they are more likely to receive clinical treatment and report higher levels of substance use, internalizing (i.e., depression) and externalizing behaviors than biologically-reared individuals (e.g., Fan et al., 2002; Juffer & van IJzendoorn, 2005; Miller, Fan, Grotevant, Christensen, Coyl, & van Dulmen, 2000b; Wierzbicki, 1993). In addition to studies investigating how adoptees fare when compared to their biologically-reared peers, a number of studies examine the role of adoption related experiences in childhood and adolescence, including age at adoption, foster care experience, and type of adoption (i.e., international versus domestic, transracial versus same-race, kinship versus non-relative) to explain why some adoptees show poorer outcomes than others (i.e., examine within-group differences in outcomes). Though this research provides a foundation for understanding adoptee outcomes, less is known about the long-term adjustment of adoptees and how these adoption-
related experiences impact outcomes in young adulthood. In particular, minimal research examines how adoptees fare in key tasks of young adulthood, such as their educational, work, and romantic life (Masten et al., 1999; Shiner, Masten, & Tellegen, 2002).

Developmental Tasks of Young Adulthood

The term developmental task, first used by Havighurst (1952), refers to salient tasks or “benchmarks” of a given developmental period (Masten & Coatsworth, 1995). Developmental tasks are reminiscent of Erikson’s seminal work, which presume each developmental period involves distinctive tasks that require attention (Erikson, 1950). In general, young adults (e.g., Arnett, 2000) and researchers (e.g., Masten et al., 1999; Roisman, Masten, Coatsworth, & Tellegen, 2004; Schulenberg, Bryant, & O’malley, 2004) agree on the developmental tasks of young adulthood: education, employment, and romantic relationships. Indeed, progress in one of these domains is related to progress in other domains (Shulman & Nurmi, 2010). For instance, involvement in a committed romantic relationship is associated with financial success, and potential romantic partners are evaluated based, in part, on educational and financial achievements (Manning, Giordano, Longmore, & Hocevar, 2009; Sneed, Hamagami, McArdle, Cohen, & Chen, 2007). Due to the associations between these domains, it is important to examine progress in multiple developmental tasks simultaneously.

Educational attainment. Educational attainment is an important indicator of adjustment in young adulthood. Educational attainment is generally measured using the degrees obtained by an individual. For instance, most (91%) young adults in the U.S. complete their high school education by the age of 29 (NCES, 2015). In contrast, only 34% obtain a bachelor’s degree, even though as much as 67% enroll in a college or university (NCES, 2015). Educational attainment is
also associated with other salient developmental tasks of young adulthood, such as income and romantic relationship quality (NCES, 2015; Roisman et al., 2004).

Few studies have examined the educational attainment of adoptees during young adulthood, but some existing research suggests young adult adoptees show lower educational attainment than their biologically-reared counterparts (e.g., fewer years of education, fewer degrees obtained; Björklund, Lindahl, & Plug, 2006; Loehlin, Horn, & Ernst, 2007; Scarr & Weinberg, 1994). However, some research suggests these findings are further qualified by gender, such that male adoptees, but not female adoptees, are more likely than their biologically-reared counterparts to report attending some college, but not completing their college degree (Feigelman, 1997). The existing research on the educational outcomes of young adult adoptees focuses on between-group differences of adoptees and their non-adoptees peers, but neglects the within-group variability of adoptee outcomes.

**Employment and income.** Regardless of their educational attainment, young adults are tasked with obtaining employment to earn sustainable income. Indeed, most young adults (65%) are employed (NCES, 2015). However, unemployment rates are higher for those with less education (NCES, 2015). Income is also associated with educational attainment, such that young adults with a bachelor’s degree earn 62% more than those with a high school diploma (NCES, 2015). In addition to earning potential, success in one’s occupation is an important indicator of healthy adaptation to adulthood (Havighurst, 1952; Masten et al., 1999), whereas unemployment and underemployment have implications for mental health, such as a higher risk for depression, distress, and anxiety (Dooley, Prause, & Ham-Rowbottom, 2000; Paul & Moser, 2009).

Some research suggests adoptees report less stable employment than their biologically-reared peers (Loehlin et al., 2007), whereas other research suggests male adoptees, but not
female adoptees, report higher levels of unemployment than their biologically-reared peers (Collishaw, Maughan, & Pickles, 1998; Feigelman, 1997). There is no research to date regarding the income of young adult adoptees and their biologically-reared counterparts, but Feigelman’s (1997) work demonstrated young adult adoptees did not differ from biologically-reared peers regarding total amount of monetary assets or value of residential property. In addition, there is no research examining within-group variability of adoptee employment and income outcomes during young adulthood.

Marriage and marital satisfaction. Young adults are tasked with finding a mate and learning to live with a spouse or long-term partner (Masten et al., 1999; Shiner, Masten, & Tellegen, 2002). Eventually, 90% of people in most societies marry (Cherlin, 2009). In the U.S. over 60% of males and 70% of females report being married at least once between the ages of 30-34 (U.S. Census Bureau, 2015). Married adults, as compared to unmarried adults, demonstrate greater well-being, as indicated by longer life spans and greater physical and psychological health (e.g., Gove, Style, & Hughes, 1990; Ross, Mirowsky, & Goldsteen, 1990). In addition to marital status, the quality of the relationship has developmental importance, as high quality romantic relationships are associated with greater well-being, mental health, and physical health (House, Landis, & Umberson, 1988; Simon & Marcussen, 1999; Wickrama, Lorenz, Conger, & Elder, 1997). Similarly, a recent meta-analysis demonstrated that greater marital quality is related to lower risk of mortality (Robles, Slatcher, Trombello, & McGinn, 2014).

Meta-analytic findings suggest adoptees do not differ from their biologically-reared counterparts in romantic relationship status or quality (DeLuca, Claxton, & van Dulmen, forthcoming). However, this meta-analysis included findings from adolescence and adulthood,
and thus may not reflect outcomes specific to young adulthood. Though age was not a significant moderator for relationship status, it could not be examined as a moderator for relationship quality (DeLuca, et al., forthcoming). Moreover, this meta-analysis does not specifically examine marriage rates or marital quality. Thus, it is not clear whether adoptees and their biologically-reared peers differ on marital status or quality in young adulthood, nor whether adoption-related experiences account for within-group variability of adoptee marriage rates and quality.

In summary, little research has examined the young adult outcomes of adoptees, especially regarding their education, employment, and romantic outcomes (Palacios & Brodzinsky, 2010). It is particularly timely to examine these young adult outcomes in the United States due to the shift in age at first marriage and pursuit of further education (Arnett, 2000; Lesthaeghe & Neidert, 2006; Roisman et al., 2004; Shulman & Connolly, 2013). Moreover, investigation of young adult outcomes of adoptees will provide a more nuanced understanding of the long-term effects of adoption. Examining the long-term impacts of adoption will identify potential vulnerabilities associated with being adopted, such as adoption-related experiences.

**Limitations of the Current Research**

Though evidence indicates adoptees may struggle with educational attainment (e.g., Loehlin et al., 2007), employment and income (e.g., Feigelman, 1997), and marriage (e.g., Collishaw et al., 1998) in young adulthood, these studies have methodological and analytical limitations, including reliance on biologically-reared comparison groups and dearth of exploring within-group variability. Using biologically-reared individuals as a comparison group involves comparing two groups that may differ in more ways than just adoption status. In other words, because adoptees and biologically-reared individuals are not randomly assigned to their condition, pre-existing group differences may exist. Not accounting for potential pre-existing
group differences result in an imprecise estimate of the impact of adoption in statistical analyses (Cook, Campbell, & Day, 1979). Indeed, few studies control for relevant covariates that may explain variability in young adult outcomes. For example, Feigelman (1997) did not control for existing demographic differences across groups (i.e., age, race, and mother’s education) when predicting young adult outcomes of education, employment, and marital status and quality. Moreover, because these outcomes can be predicted by other factors, such as quality of parent-child relationships (Linder & Collins, 2005; Sroufe, 2005), the observed differences (or lack thereof) between adoptees and biologically-reared individuals may be due to a lack of accounting for relevant predictors.

Controlling for relevant confounds. A comprehensive theory of adoptee developmental adjustment is currently lacking, in part, because previous research examining adoptee outcomes fails to account for demographic factors (e.g., age, gender, ethnicity, mother’s educational attainment), relevant life experiences (e.g., maltreatment), or indicators of psychosocial adjustment (e.g., depression, externalizing behaviors, substance use, quality of parent-child, peer, and romantic relationships) associated with young adult outcomes. For instance, there is evidence of gender and ethnic differences in developmental outcomes. Women are more likely than men to be enrolled in a college or university and complete a bachelor’s degree (NCES, 2015), yet they earn less income than men at every level of educational attainment (NCES, 2015). Moreover, differences are observed across race/ethnicity, such that white individuals are more likely be employed full-time than Asian or black individuals (NCES, 2015). Exposure to maltreatment during childhood is associated with a plethora of negative outcomes, including behavior problems, drug use, risky sexual behavior, depression, and suicidal thoughts (Sternberg et al., 2006; Thornberry, Henry, Ireland, & Smith, 2010; Wilson & Widom, 2008), and thus is
important to consider when examining young adult outcomes. In addition, research suggests adoptees and biologically-reared individuals differ regarding behavioral outcomes, such that adoptees report higher levels of depression, externalizing behaviors, and substance use (e.g., Fan et al., 2002; Juffer & van IJzendoorn, 2005; Miller et al., 2000b; Wierzbicki, 1993). As such it is important to account for the differences in these groups when examining other outcomes.

Quality of close relationships may fundamentally be associated with adjustment in the face of adversity (Luthar, 2006; Masten, 2013). Thus, accounting for the quality of close relationships, such as parent-child relationships, peer relationships, and romantic relationships may explain the differences observed between biologically-reared individuals and adoptees. For instance, the parent-child relationship is internalized in the child’s working model for future relationships with those outside the family, and thus impacts the quality of later relationships, including marital relationships (Linder & Collins, 2005; Sroufe, 2005). Quality of peer relationships is positively associated with achievement in educational and employment settings, as well as romantic relationship outcomes, such that poor peer relationships, as indicated by low supportiveness and intimacy, are associated with more negative outcomes (Hartup, 1996; Roisman et al., 2004). In addition, the quality of romantic relationships during adolescence is predictive of positive adjustment in later marital relationships (Conger, Cui, Bryant, & Elder, 2000). Given the associations between these factors and outcomes in young adulthood, if adoptees and biologically-reared individuals are not matched on these relevant characteristics, it is inaccurate to attribute group differences solely to adoption status.

Unequal group sizes. In addition to the need to control for relevant covariates, comparing adoptees to biologically-raised individuals involves comparing a rare occurrence (adoption) to a frequently occurring alternative (being reared by both biological parents). This
comparison frequently results in unequal sample sizes (e.g., 10,402 biologically-reared individuals and 195 adoptees; Feigelman, 1997), which can lead to inflated estimated standard errors for the effect of adoption. Inflated estimated standard errors means there is an imprecise estimate of the impact of adoption, and thus, statistical tests may be underpowered to detect the effect, resulting in increased potential type II errors (Rosenbaum & Rubin, 1983; Rubin, 1973). Therefore, alternative methods for estimating the effect of adoption should be considered, such as propensity scores methods (discussed in more detail in the Analysis Plan).

**Within-group variability.** Comparing adoptees to biologically-reared individuals also ignores the within-group variability of adoptees (i.e., not all adoptees demonstrate poorer young adult outcomes). Despite the fact that most adoptees fall in the normal range of adjustment, adoptees are still more likely to experience extreme levels of adjustment issues (Miller et al., 2000a; Sharma, McGue, & Benson, 1996). Thus, there is within-group variability in adoptee outcomes. In order to understand for whom and under what circumstances adoption has a positive (or negative) impact on young adult outcomes, researchers must also consider experiences associated with adoption, such as age at adoption, foster care experience, and type of adoption (i.e., international versus domestic adoption, transracial versus same-race adoption, and kin versus non-kin adoption). Accurately estimating the long-term implications of these adoption-related experiences will extend and inform existing research and theory on the outcomes of adoptees.

**Current Study**

The proposed study aimed to extend the previous literature by investigating adoptees young adult outcomes of education, employment, and marriage. To date, little research has examined the long-term implications of adoption on the relevant tasks of young adulthood (i.e.,
educational attainment, employment and income, and marriage status and quality; Masten et al., 1999; Roisman et al., 2004; Schulenberg et al., 2004). Moreover, the current study informs the existing literature by utilizing a more conservative test (i.e., propensity score analyses) for the effects of adoption on young adult outcomes. Past research on this topic is limited by the use of biologically-reared individuals as a comparison for adoptees, without controlling for relevant confounds or matching sample sizes (e.g., Feigelman, 1997). In addition, previous research does not examine within-group variability of the young adult outcomes of adoptees. The current study fills this gap in the literature by testing whether adoption-related experiences (e.g., age of adoption, foster care experience, and type of adoption) explain within-group differences in the young adult outcomes of adoptees. In summary, there were three aims of the current study: (1) to replicate and add to the limited literature on the young adult outcomes of adoptees; (2) to extend this body of literature by utilizing propensity score methods, which provides a more precise estimate of the long-term impact of adoption by accounting for relevant confounds and differences in sample sizes of adoptees and biologically-reared individuals; (3) to compare the young adult outcomes of adoptees based on adoption-related experiences, while controlling for relevant outcomes. As such, this work offers a more accurate measure of the impact of adoption on young adult outcomes and identifies specific adoption-related experiences that have long-term contributions to the outcomes of adoptees.
CHAPTER II
AIMS AND HYPOTHESES

Aim 1. Examine differences in young adult outcomes between adoptees and biologically-reared individuals

   Aim 1a. Replicate and extend previous findings using regression analyses. First, I examined the outcomes of adoptees and biologically-reared individuals utilizing a statistical technique commonly used in previous research: regression. Though previous work has examined these outcomes, no single study has simultaneously examined all outcomes of interest in one sample. Therefore, I extended the previous literature by examining the educational attainment, full-time employment rate, annual income, marital status, and marital quality of adoptees and biologically-reared individuals. Based on previous research, I hypothesized that biologically-reared individuals, as compared to adoptees, would show higher levels of educational attainment (e.g., Feigelman, 1997; Loehlin et al., 2007; Scarr & Weinberg, 1994), higher rates of full-time employment and levels of income (e.g., Collishaw et al., 1998; Feigelman, 1997), and higher rates of marriage and marital satisfaction (e.g., Collishaw et al., 1998; Lindblad, Hjern, & Vinnerljung, 2003; Tieman et al., 2006) in young adulthood. These regression analyses were compared to subsequent analyses using propensity scores. Covariates were included based on the results of preliminary, bivariate analyses for each outcome of interest (see Analysis Plan).

   Aim 1b. Examine young adult outcomes of adoptees and biologically-reared individuals utilizing propensity score analyses. I extended the existing literature by using a
more conservative test (i.e., propensity score methods) to examine the impact of adoption on young adult outcomes of educational attainment, full-time employment, annual income, marital status, and marital quality. This analysis controlled for (via matching techniques) potential existing differences between adoptees and biologically-reared individuals (see Figure 1). Specifically, the same covariates used in the regression analyses were used to match adoptees with biologically-reared individuals in sample. Thus, the propensity score analyses are parallel to the regression analyses, as they include the same covariates. As an example, the covariates used in the regression model to investigate educational attainment were also used for matching participants in the propensity score analysis examining educational attainment. The propensity score analyses were compared to the analyses from Aim 1a (i.e., regression analyses). Because propensity score provide a more conservative test, I hypothesized the propensity score analyses would show an attenuated effect of adoption on young adult outcomes of educational attainment, employment, income, and marital status and quality.

**Aim 1c. Examine young adult outcomes of female adoptees and biologically-reared individuals and male adoptees and biologically-reared individuals separately.** Because gender differences are observed in many of the outcomes of interest (e.g., NCES, 2015), follow-up analyses comparing adoptees and biologically-reared individuals were also conducted separately for female and male samples. Thus, a regression analysis and propensity score analyses was conducted for females and males for each dependent variable.

**Aim 2. Examine the impact of adoption-related experiences on young adult outcomes of adoptees**

**Aim 2a. Extend previous findings on the impact of adoption-related experiences on young adult outcomes using regression analyses.** To my knowledge, no published study has
examined the role of age at adoption, foster care experience, international versus domestic adoption, transracial versus same-race adoption, and kinship versus non-relative adoption in the young adult outcomes of educational attainment, employment, income, and marital status and quality. However, based on previous literature examining adoptees during childhood and adolescence, I expected those adopted at an older age, adopted with foster care experience, domestic adoptees, and transracial adoptees to show poorer outcomes in educational attainment, employment, income, and marital status and quality than those adopted at a younger age, adopted without foster care experience, international adoptees, and same-race adoptees, respectively (e.g., Heflinger, Simpkins, & Combs-Orme, 2000; Juffer & van IJzendoorn, 2005; Juffer & van IJzendoorn, 2009; Ryan, Hinterlong, Hegar, & Johnson, 2010; Versluis-den Bieman & Verhulst, 1995). Given the lack of research on kinship adoption, I did not have a specific hypothesis regarding how kin-adoptees would differ from non-kin adoptees in young adult outcomes of educational attainment, employment, income, and marital status and quality. These research questions were explored utilizing a statistical technique commonly used in previous research: regression. Covariates for regression models were included based on the results of preliminary, bivariate analyses for each outcome of interest (see Analysis Plan) and thus were parallel to those used in the Aim 1 analyses.

**Aim 2b. Examine the impact of adoption-related experiences on young adult outcomes of adoptees using propensity score analyses.** To further extend the existing literature, I investigated within-group differences in adoptees’ young adult outcomes due to adoption-related experiences by utilizing propensity score methods. As with the propensity score analyses used in Aim 1b, this analysis controlled for (via matching techniques) potential individual differences between adoptees to more accurately estimate the impact of each of
adoption-related experience. The covariates used in the regression analyses were also used for matching procedures for all parallel propensity score analyses. Based on previous literature, I expected those adopted at an older age, adopted with foster care experience, domestic adoptees, and transracial adoptees to show poorer outcomes in educational attainment, employment, income, and marital status and quality than those adopted at a younger age, adopted without foster care experience, international adoptees, and same-race adoptees, respectively (e.g., Heflinger, Simpkins, & Combs-Orme, 2000; Juffer & van IJzendoorn, 2005; Juffer & van IJzendoorn, 2009; Ryan, Hinterlong, Hagar, & Johnson, 2010; Versluis-den Bieman, & Verhulst, 1995). Similar to Aim 2a, I did not have a specific hypothesis regarding how kin-adoptees would differ from non-kin adoptees in young adult outcomes of educational attainment, employment, income, and marital status and quality, after known confounds were taken into account.
CHAPTER III

METHOD

Participants

The current study used data from the National Longitudinal Study of Adolescent to Adult Health (Add Health). Add Health is a longitudinal study comprised of four waves of data from a nationally representative sample of adolescents who were between seventh and twelfth grade at the initial wave during the 1994-1995 school year, and between 24-32 years of age at the final wave during 2008. Given previous work demonstrating inconsistencies between questionnaire and interview identification of adoptees in the Add Health study (Miller et al., 2001), the current study identifies adoptees using a triangulation of adoption status from multiple data sources, as recommended and utilized in previous research (e.g., Fan et al., 2002; Grotevant et al., 2006). Thus, within this data there are 11,938 individuals raised by both biological parents and 609 adoptees. Based on wave one data, most of the participants were female (50.9% adopted, 52.2% biologically-raised) and white (45.9% adopted, 46.8% biologically-raised).

Procedure

Add Health consists of four waves of in-home interviews, with wave one taking place between 1994-1995, wave two taking place one year later, wave three taking place during 2001-2002 (when respondents were between 18-26 years old), and wave four taking place during 2008 (when respondents were between 24-32 years old). Add Health collected interview data about respondents, including their social, economic, psychological, and physical well-being, as well as
contextual indicators, such as family, peer, school, neighborhood, and community data. Thus, this dataset provides a unique opportunity to include a breadth of individual and contextual risk and resilience factors.

**Measures**

**Control variables.** Control variables were selected based on empirically validated risk factors for poor adjustment in young adulthood. These variables include factors that are observable for all persons in the sample (regardless of adoption status): age, gender, ethnicity, mother’s education, maltreatment, depression and externalizing behaviors during adolescence, and substance use during adolescence. See Table 1 for a list of all variables and their corresponding wave of assessment.

**Age.** Age of participants was calculated based on birth month and year, which was measured in the first wave of data collection. Specifically, the difference between the date of the wave four (young adult) assessment and the birthdate of each individual was calculated.

**Gender.** The biological sex of each participant was indicated at the first wave of data collection.

**Ethnicity.** At the first wave of data collection, participants were asked, “What is your race?” Participants indicated if they were White, Black or African American, American Indian or Native American, Asian or Pacific Islander, or Other. Participants were also asked whether they were “of Hispanic or Latino origin?” Based on these items, a categorical variable for ethnicity was created.

**Mother’s education.** Previous research using the Add Health dataset used mother’s level of education as an indicator of socioeconomic status (e.g., Grotevant et al., 2006). Mother’s education was reported in the parent questionnaire in wave one. Mothers’ responses are coded
as: 1 = less than high school, 2 = high school graduate or GED, 3 = some college or post-secondary school, 4 = college graduate, 5 = graduate or professional education, which is in line with previous research (e.g., Grotevant et al., 2006).

**Maltreatment.** At wave three, all participants were asked about maltreatment experiences. One item was used to assess whether participants ever experienced neglect, or physical or sexual abuse while in the custody of a biological parent. In addition, adoptees were asked if they were ever in an adoptive or foster placement where they experienced neglect, or physical or sexual abuse. These indicators were be combined into one dichotomous variable, designating whether each participant has experienced some form of maltreatment from any caregiver.

**Depression.** Depression was assessed using a modified version of the CES-D that is included in Add Health, which has been shown to demonstrate reliability and validity (e.g., Longmore, Manning, Giordano, & Rudolph, 2004). This scale consists of nine items on a 4-point scale, which were asked at waves one, two, and three. Example items include, “You were bothered by things that usually don’t bother you,” “You had trouble keeping your mind on what you were doing,” and, “You felt depressed.” These items demonstrated good internal reliability at waves one ($\alpha = .79$), two ($\alpha = .80$), and three ($\alpha = .81$).

**Externalizing behaviors.** Externalizing behavior problems included aggressive and nonaggressive behaviors, modeled after previous research (Grotevant et al., 2006; Mata & van Dulmen, 2012). In total, 10 items were used from waves one, two, and three to assess behavior during the last 12 months. Example items include whether participants pulled a knife or a gun on someone, shot or stabbed someone, or deliberately damaged property. These dichotomous items were then summed to create a score of externalizing behaviors.
**Substance use.** Tobacco, alcohol, and marijuana use was assessed at waves one, two, and three. To assess alcohol use, participants were asked, “During the past 12 months, on how many days did you drink 5 or more drinks (for males) or 4 or more drinks (for females) in a row?” Response options were: none, 1 or 2 days, once a month or less, 2 or 3 days per month, 1 or 2 days a week, and almost every day or daily. To assess cigarette use, participants were asked, “During the past 30 days, on how many days did you smoke cigarettes?” To assess marijuana use, participants were asked, “During the past 30 days, how many times did you use marijuana?” These variables have been used in previous research (e.g., Lim & Lui, 2016) to measure substance use using the Add Health dataset.

**Parent-adolescent relationship quality.** During the first wave of data collection, participants responded to five questions regarding their relationship with their parents. For instance, participants indicated how much they felt that their parents cared about them, understood them, and paid attention to them. In line with previous research (Grotevant et al., 2006), these five items were averaged to create a composite measure of quality of parent-adolescent relationships. These items demonstrated good internal reliability ($\alpha = .76$).

**Adolescent peer relationships quality.** In the first wave, participants were asked five questions about their best male and female friend. In the second wave, participants were asked to discuss either one male and one female friend or five female and five male friends. In both waves, participants answered five questions, indicating whether or not: they had gone to the friend’s house during the past week, hung out after school in the past seven days, spent time together during the previous weekend, talked about a problem during the past week, or talked on the phone during the past week. In line with previous research (Ehrlich, Hoyt, Sumner, McDade, & Adam, 2015), these items were averaged for closest male friend and closest female friend. For
both waves, only data from closest same-sex friend were used. These items demonstrated moderate internal reliability at waves one (male friend $\alpha = .68$, female friend $\alpha = .73$) and two (male friend $\alpha = .64$, female friend $\alpha = .70$).

**Adolescent romantic relationship quality.** To assess the level of romantic relationship quality in adolescence from wave two, six items were used from the second wave of data collection. These items measured whether specific positive romantic relationship experiences occurred, such as “I met my partner’s parents”, “I told other people that we were a couple”, and “We thought of ourselves as a couple.” The score for romantic relationship quality in adolescence was created based on a composite of these items, which has been used in previous research to measure relationship quality (van Dulmen & Goncy, 2006). Levels of romantic relationship quality were also assessed using the third wave of data collection. Four items were used to determine the level of romantic relationship satisfaction and commitment. Participants indicated their response on a 5-point scale ranging from completely to not at all. This scale is based on a measure of romantic relationship quality that has been used in previous research to measure satisfaction (Joyner & Campa, 2006). These items demonstrated good internal reliability at waves two ($\alpha = .78$), and three ($\alpha = .81$).

**Adoption-related experiences.** Factors specific to adoptees were examined to tease apart within-group variability in young adult outcomes. Specifically, age at adoption, foster care experience, and type of adoption were examined (i.e., international versus domestic, transracial versus same-race, and kin versus non-kin). Adoption experiences were assessed at wave three of the Add Health study, such that respondents retrospectively reported on lifetime experiences.

**Age at adoption.** Adoptees reported their age (in months and years) at the time of adoption. In line with previous meta-analyses (e.g., Juffer & van IJzendoorn, 2009), this variable
was dichotomized to reflect those adopted before 12 months of age versus those adopted after 12 months of age.

**Foster care experience.** Foster care experience of adoptees was established with a dichotomous question about whether they had ever lived in a foster home. Those who answered “yes” were considered to have foster care experience \((n = 137)\).

**International and domestic adoption.** Adoptees reported whether theirs was an international adoption. Specifically, they were asked, “were both of your adoptive parents living in the United States and you were living in another country?” Those who answered “yes” \((n = 47)\) were considered international adoptees.

**Transracial and same-race adoption.** Adoptees reported whether theirs was a transracial adoption. Fifty-three adoptees reported that they were of a different race than both of their adoptive parents.

**Kin and non-kin adoption.** Adoption by kin (a blood relative) was established with a dichotomous question. Sixty-eight adoptees indicated a blood relative adopted them.

**Young adult outcomes.** Dependent variables are assessed based on the Add Health wave four information when participants were in their late twenties and early thirties. The outcomes of educational attainment, full-time employment, income, and marital status and quality were examined based on developmentally relevant tasks during young adulthood (e.g., Roisman et al., 2004; Schulenberg et al., 2004). At least one indicator for all four developmental outcomes was used.

**Educational attainment.** In line with previous research examining education outcomes using the Add Health data (e.g., Queirós, Wehby, & Halpern, 2015), one indicator was used for educational attainment. Specifically, participants reported the highest level of education achieved
at the date of assessment. The 13 response options ranged from 8th grade or less to completing post baccalaureate professional education or doctoral degree. These response options are commonly coded into a 4-level ordinal variable representing educational levels less than high school, high school graduate, some education beyond high school, and college graduate or higher (e.g., Queirós, Wehby, & Halpern, 2015).

**Employment.** Employment was assessed using two items at wave four: a dichotomous indicator of whether or not the participant was currently working for pay ten or more hours per week, and the number of hours worked per week. Those who indicated they were currently working for pay at least 40 hours a week were considered to have full-time employment.

**Income.** Income was assessed through participant-report of personal earnings (before taxes) in the previous year, which is consistent with previous research using the Add Health data (e.g., Queirós, Wehby, & Halpern, 2015). Specifically, participants were asked “In {2006/2007/2008}, how much income did you receive from personal earnings before taxes—that is, wages or salaries, including tips, bonuses, and overtime pay, and income from self-employment?” For participants who responded, “Don’t know,” a follow up question (“What is your best guess of your personal earnings before taxes?”) was used to provide more complete data. After assessing the presence of outliers and extreme scores, all values greater than three standard deviations above the mean were taken in to this value.

**Marital Status and Quality.** Two indicators for marriage were used from wave four of the Add Health dataset. Specifically, participants were asked if they are currently married, which was used as an indicator of marital status. Levels of marital quality were also assessed using four items from the fourth wave of data collection. Participants indicated their relationship satisfaction and commitment on a 5-point scale ranging from completely to not at all. This scale
for romantic relationship quality has been used in previous research to measure satisfaction (Joyner & Campa, 2006). These items demonstrated good internal reliability ($\alpha = .88$).
CHAPTER IV
ANALYSIS PLAN

Propensity Score Methods

To accurately estimate the impact of adoption on young adult outcomes, researchers need to consider relevant confounds. Researchers often control for some confounds and use ordinary least squares (OLS) regression to estimate the treatment effect of adoption. The regression coefficient of the dichotomous variable for treatment condition represents the net impact of the treatment on the dependent variable. Thus, if the model includes all covariates and meets assumptions, this coefficient should provide an unbiased estimate of the average treatment effect (Guo & Fraser, 2010). However, the ignorable treatment assignment assumption is often violated in adoption studies, meaning that assignment to treatment conditions (i.e., adoption versus biological-rearing) is not independent of the outcomes of each condition (Guo & Fraser, 2010). In other words, the ignorable treatment assignment assumption states that adoption status is independent of young adult outcomes if all observable covariates are held constant. However, this is unlikely because researchers often include few if any control variables (e.g., Feigelman, 1997) and/or the treatment alters the social/environmental conditions, which then alters potential outcomes (Guo & Fraser, 2010). Given these concerns, the OLS regression technique is often less desirable for estimating a treatment effect in non-experimental designs (Guo & Fraser, 2010).
One statistical technique that can incorporate multiple relevant confounds and appropriately account for non-ignorable treatment assignment is propensity score methods. Propensity score methods offer a way to evaluate treatment effects when using non-experimental data (Guo & Fraser, 2010). Propensity score methods offer an unbiased estimate of the treatment effect for non-experimental data by balancing covariates present for each group, regardless of sample size differences (Rosenbaum & Rubin, 1983). Non-experimental methods are used when examining the outcomes of adoptees, as it is impossible and unethical to randomize subjects to the treatment group (i.e., assign individuals to be adopted). However, these non-experimental methods can be biased due to self-selection (e.g., Dehejia & Wahba, 2002), and this bias will be substantial if researchers do not control for key covariates (Guo & Fraser, 2010). In addition, propensity score methods account for unequal sample sizes, which can lead to inflated estimated standard errors and an increased potential type II errors (Rosenbaum & Rubin, 1983; Rubin, 1973). To account for these issues, propensity score methods use matching procedures, such as nearest-neighbor matching, which pair or match individuals from each group based on observable covariates (Dehejia & Wahba, 2002). Propensity scores reduce these multidimensional covariates to a one-dimensional score, which allows propensity scores to be treated the same as survey weights in analyses (Guo & Fraser, 2010); thus, individuals with the same propensity score should be equivalent on measured confounds, regardless of whether they are in the group of individuals who were adopted or reared by biological parents.

Though causality can only be inferred from an experimental design with random assignment (Cook et al., 1979), propensity scores simulate the randomization present in controlled trials. By using this simulated randomization, the impact of adoption on young adult outcomes is estimated by considering empirically-validated confounds. Therefore, by using this
method, I investigated whether the differences observed between adoptees and biologically-reared individuals can be better explained by relevant confounds.

**Within-group comparisons.** Propensity score methods can also be used to make within-group comparisons for adoptees. Within-group comparisons shed light on for whom and under what circumstances adoption is associated with better (or worse) outcomes. Specifically, after accounting for confounds, adoptees were compared to one another to determine the impact of adoption-related experiences. Thus, using propensity score methods, the impact of age at adoption, foster care experience, and type of adoption (international versus domestic, kinship versus non-relative, transracial versus same-race) was estimated. Though research has indicated age at adoption, foster care experience, and type of adoption may be important for predicting adoptee outcomes (e.g., Gunnar & van Dulmen, 2007; Juffer & van IJzendoorn, 2005; Juffer & van IJzendoorn, 2009; Lee, 2003; Verhulst et al., 1990), much of this work has been limited to childhood and adolescence. Thus, by examining the effects of these adoption-related experiences on young adulthood adult outcomes, I investigated whether these experiences have long-term implications, which informs future intervention and prevention efforts for adoptees.

**Preliminary Analyses**

**Identifying covariates.** Determining relevant confounds is of vital importance for propensity score methods to satisfy the assumption of the ignorable treatment assignment (i.e., there are no unobserved differences between treatment and control groups after confounds are accounted for; Rubin & Thomas, 1996). In general, researchers are advised to be “liberal” when selecting variables associated with treatment assignment and/or the outcome of interest (Stuart, 2010). However, when researchers are working with smaller samples, they may not be able to include a large set of confounds. In such cases, researchers should give priority to confounds
related to the outcome (even if they are unrelated to the treatment condition) because they decrease variance without increasing bias of the estimated treatment effect (Brookhart et al., 2006). As such, the selection of variables included in propensity score analysis was based on existing theory and empirical findings (Rubin, 2001), and extended beyond demographic information (Shadish, Clark, & Steiner, 2008).

Guided by these recommendations, estimates of the effect of adoption on young adult outcomes potentially included demographic variables, such as age (NCES, 2015), gender (Collishaw et al., 1998; Feigelman, 1997; NCES, 2015), ethnicity (NCES, 2015; Sue & Okazaki, 1990), and mother’s education (e.g., Case et al., 2005; Zhan, 2006), which have been shown to impact educational, employment, and/or marital outcomes. In addition to these demographic characteristics, the quality of close relationships, such as parent-child (Bowlby, 1969; Linder & Collins, 2005; Mack, 2001; Sroufe, 2005), peer (Hartup, 1996; Roisman et al., 2004), and romantic relationships (Collins, Welsh, & Furman, 2009; Conger et al., 2000) were also considered. In addition, maltreatment experience (Sternberg et al., 2006; Thornberry et al., 2010; Wilson & Widom, 2008), depression and externalizing behaviors (Juffer & van IJzendoorn, 2005), and substance use (Fan et al., 2002; Miller et al., 2000a) were considered as potential confounds. To ensure these covariates were relevant in the current sample, preliminary correlational analyses were conducted to examine the associations between the covariates and the dependent variables. Simulations suggest variables related to the outcome should always be included in propensity score analyses (e.g., Brookhart et al., 2006), but no cut-off values are discussed. Therefore, I included variables associated with outcomes at $r = .10$ or higher. The relevant variables for each outcome were included for both the regression and propensity score analyses to allow for parallel comparisons across analytical techniques.
**Statistical power.** It is difficult to conduct power analyses prior to propensity score analyses because the size of the observed differences between groups is not yet known and typical methods for power analysis (i.e., Cohen, 1988) do not provide estimators for propensity score methods (Guo & Fraser, 2010). In part, power depends on the ratio of control participants to treated participants (e.g., the ratio of biologically-reared individuals to adoptees). For instance, because this ratio is large, I determined the best structure for matching was utilizing 1:1 ratio of adoptees to biologically-reared individuals. Though this decision involved discarding a large number of (biologically-reared) observations, this should did not affect statistical power because power is largely based on the number of observations in the treatment group (i.e., adoptees), meaning that decreasing the number of observations of controls has little impact (Ho, Imai, King, & Stuart, 2007). In addition, power actually increases when groups are more similar (which was present due to matching), as the standard deviations are reduced, allowing for better precision in the estimates (Smith, 1997). Therefore, nearest-neighbor matching procedures were utilized, as this matching technique pairs a treated participant with a control participant with the closest (i.e., nearest) propensity score.

**Aim 1 Analyses**

The focus of Aim 1 was to examine differences in young adult outcomes between adoptees and biologically-reared individuals. First, analyses were conducted to replicate previous findings utilizing regression analyses, which are common in the literature (see Björklund et al., 2006 and Tieman et al., 2006 for examples). Thus, five regression analyses were conducted to assess adoption status (versus biologically-reared status) as a predictor of young adult (1) educational attainment, (2) full-time employment, (3) annual income, (4) marital status, and (5) marital quality, after controlling for covariates identified in preliminary bivariate analyses. Next,
propensity score methods were utilized to conduct an alternative test for the impact of adoption status (versus biologically-reared status) on young adult outcomes of education, employment, income, and marital status and satisfaction. Propensity score methods incorporated the same covariates identified in preliminary analyses, but also simulated the randomization present in controlled trials, as individuals with the same propensity score should be equivalent on all measured confounds, regardless of which group they are in (Guo & Fraser, 2010). All propensity score matching procedures were implemented using the MatchIt package in R. Following nearest-neighbor matching procedures (i.e., one-to-one matching with the smallest distance between observations) plots were examined to identify whether the distribution of propensity scores demonstrated overlap between groups (Guo & Fraser, 2010). In other words, I examined whether the range of estimated propensity scores were identical (i.e., completely overlap) for adoptees and biologically-reared individuals. Thus, when the outcomes of the treated and matched non-treated participants are compared, the difference reflects the sample average treatment effect (Guo & Fraser, 2010), which, in the current study, refers to the impact of adoption. The results of the regression analyses and propensity score analyses were compared using effect sizes of the impact of adoption status on the young adult outcomes examined.

**Aim 2 Analyses**

Aim 2 examined the impact of adoption-related experiences of young adult outcomes of education, employment, income, and marital status and quality. Regression analyses were conducted to extend previous findings on the long-term impact of adoption-related experiences. Similar to Aim 1, for each adoption-related experience (i.e., age at adoption, foster care experience, and type of adoption), five regression analyses were conducted to assess the adoption-related experience as a predictor of young adult (1) educational attainment, (2)
employment, (3) income, (4) marital status, and (5) marital satisfaction, after controlling for the covariates identified in preliminary, bivariate analyses. Next, propensity score methods were used to match adoptees based on the covariates identified in preliminary analyses, using 1:1 nearest-neighbor matching procedures. Unlike the analyses from Aim 1, the analyses for Aim 2 matched adoptees on these confounds (as opposed to matching adoptees with biologically-reared individuals). By controlling for these confounds, analyses for Aim 2 identified the unique impact of (a) age at adoption, (b) foster care experience, (c) international versus domestic adoption, (d) transracial versus same-race adoption, and (e) kinship versus non-relative adoption on young adult outcomes of educational attainment, employment, income, marital status, and marital quality.
CHAPTER V

RESULTS

Preliminary Analyses

Preliminary correlational analyses were conducted to examine the associations between control variables and each dependent variable (i.e., educational attainment, full-time employment, annual income, marital status, and marital quality). These preliminary analyses ensure the hypothesized covariates (i.e., age, gender, ethnicity, mother’s educational attainment, quality of parent-adolescent, peer, and romantic relationships, maltreatment experience, depression, and externalizing behavior problems, and substance use) were relevant to the current sample. As seen in Table 2, the following variables met or exceeded the proposed minimum threshold ($r \geq .10$) for educational attainment: gender, mother’s educational attainment, depression from waves one, two and three, externalizing behaviors from waves one and two, and substance abuse from waves one, two, and three. However, due to concerns about multicollinearity, only gender, mother’s educational attainment, depression at wave three, externalizing behaviors at wave two, and substance abuse at wave three were included for all regression and propensity score analyses with educational attainment as the dependent variable. Four variables were associated with full-time employment at or above the minimum threshold (gender, and depression from waves one, two, and three). However, due to concerns regarding multicollinearity, only gender and depression at wave three were included for all regression and propensity score analyses with employment as the dependent variable. Five variables were
associated with annual income at or above the minimum threshold (gender, mother’s educational attainment, and depression at waves one, two, and three). Due to concerns about multicollinearity, only gender, mother’s educational attainment, and depression at wave three were included for all regression and propensity score analyses with annual income as the dependent variable. Four variables were associated with marital status at or above the minimum threshold (current age at wave 4, externalizing behavior problems at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three), all of which were included for regression and propensity score analyses with marital status as the dependent variable. Six variables were associated with marital quality at or above the minimum threshold (depression at waves one, two, and three, externalizing behaviors at wave two, parent-adolescent relationship at wave one, and romantic relationship satisfaction at wave three). Due to concerns regarding multicollinearity, only depression at wave three, externalizing behaviors at wave two, parent-adolescent relationship at wave one, and romantic relationship satisfaction at wave three were included for regression and propensity score analyses with marital quality as the dependent variable. Because propensity score matching requires data on all confounds in order to appropriately match participants across groups, all regression analyses were similarly restricted using listwise deletion to handle missing data.

**Aim 1 Results**

**Descriptives.** The focus of Aim 1 was to examine differences in young adult outcomes between adoptees and biologically-reared individuals. Means and standard deviations for all dependent variables for Aim 1 are reported in Table 3. This table reflects the means and standard deviations for the sub-samples included in each analysis (i.e., those with complete data for all variables in each analysis). A summary table for all Aim 1 regression and propensity score
analyses are presented in Table 4. In addition, because follow-up analyses were conducted separately for males and females, Table 5 displays the means and standard deviations for all outcome variables for males and females separately. Table 6 summarizes the regression and propensity score analyses conducted separately for males and females.

**Educational attainment.** To examine whether biologically-reared individuals, as compared to adoptees, showed higher levels of educational attainment in young adulthood (n = 4,389), I conducted a hierarchical multiple regression with confounds entered at step one (i.e., gender, mother’s educational attainment, depression from wave three, externalizing behaviors from wave two, and substance abuse from wave three) and adoption status entered at step two. Results revealed the proposed model accounted for 22.7% of the variance in educational attainment. Specifically, gender (β = .11, p < .001) and mother’s educational attainment (β = .41, p < .001) were positively associated with educational attainment in young adulthood, indicating that females reported higher levels of educational attainment as compared to males, and those with mothers who had more education also reported higher levels of educational attainment themselves. In contrast, depression from wave 3 (β = -.11, p < .001, externalizing behaviors from wave 2 (β = -.09, p < .001), and substance abuse from wave three (β = -.11, p < .001) were inversely associated with educational attainment. Adding adoption status to the model produced a significant change in model fit, F (1, 4382) = 7.50, p = .006. Results showed a negative association between adoption status and educational attainment (β = -.04, p = .006), such that adoptees reported lower educational attainment (M = 2.98, SD = 0.88) than biologically-reared individuals (M = 3.07, SD = 0.88) after controlling for gender, mother’s educational attainment, depression from wave three, externalizing behaviors from wave two, and substance abuse from wave three.
Propensity score methods were also used to determine whether biologically-reared individuals, as compared to adoptees, showed higher levels of educational attainment in young adulthood. The original 4,389 participants in the regression analyses were matched based on their scores on all relevant confounds for educational attainment (i.e., gender, mother’s educational attainment, depression at wave three, externalizing behaviors at wave two, and substance abuse at wave three) using nearest-neighbor matching procedures. In other words, each adoptee was matched with a biologically-reared individual that had the closest or “nearest” propensity score. This matching procedure resulted in a subsample with a 1:1 ratio of adoptees and biologically-reared individuals, and 92 individuals in each group (total \( n = 184 \)). To demonstrate the result of the matching procedures, example jitter plots and histograms are provided in Figures 3 and 4. The jitter plots represent each participant as a circle, plotted according to his or her propensity score. Jitter plots serve two purposes: (a) to display the number of matched and unmatched treatment and control units based on a propensity score and (b) to display the existing overlap of propensity scores between the matched treatment and control units. The histograms display the frequency of a given propensity score for treatment and control units before and after matching. The histograms offer a way of evaluating the matching procedure, as the histograms for the treatment and control samples should be more similar after matching than before matching. Following these matching procedures, a t-test was conducted to examine whether biologically-reared individuals, as compared to adoptees, showed higher levels of educational attainment in young adulthood. Results showed that adoptees (\( M = 2.98, SD = 0.88 \)) demonstrated significantly lower levels of educational attainment as compared to biologically-reared individuals (\( M = 3.30, SD = 0.80 \)), \( t(182) = 2.64, p = .009 \).
Follow-up analyses for gender. Follow-up analyses were conducted separately for females and males (i.e., the same model was run separately for males only and females only). For females \((n = 2,393)\), the final regression model predicted 22.9\% of the variability in educational attainment. Specifically, mother’s educational attainment \((\beta = .40, p < .001)\), depression at wave three \((\beta = -.14, p < .001)\), externalizing behaviors at wave two \((\beta = -.09, p < .001)\), and substance abuse at wave three \((\beta = -.12, p < .001)\) were significantly associated with educational attainment, whereas adoption status was not \((\beta = -.03, p = .12)\). As such, adding adoption status to the model did not significantly improve model fit, \(F(1, 2387) = 2.42, p = .12\). Propensity score analyses were also used to examine whether females reared by biologically parents, as compared to female adoptees, showed higher levels of educational attainment. Female participants from the regression analyses were matched based on their scores on all relevant confounds using nearest-neighbor matching procedures with a 1:1 ratio of female adoptees and biologically-reared individuals, which resulted in 43 females in each group (total \(n = 86\); see Figures 5 and 6 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test revealed that the educational attainment of female adoptees \((M = 3.12, SD = 0.91)\) did not differ significantly from females reared by biological parents \((M = 3.28, SD = 0.96)\), \(t(84) = 0.81, p = .42\).

For males \((n = 1,996)\), the final regression model predicted 20.5\% of the variability in educational attainment. Specifically, mother’s educational attainment \((\beta = .41, p < .001)\), depression at wave three \((\beta = -.08, p < .001)\), externalizing behaviors at wave two \((\beta = -.09, p < .001)\), and substance abuse at wave three \((\beta = -.10, p < .001)\) were significantly associated with educational attainment. Adding adoption status to the model significantly improved model fit, \(F(1, 1990) = 4.68, p = .03\), as adoption status was significantly associated with educational
attainment for males ($\beta = -0.04, p = .03$). Results showed male adoptees reported lower levels of educational attainment ($M = 2.86, SD = 0.84$) than biologically-reared males ($M = 2.95, SD = 0.91$). For propensity score analyses, the sample of 1,996 participants from the regression analyses were matched on all confounds using nearest-neighbor matching procedures with a 1:1 ratio of male adoptees and biologically-reared individuals, which resulted in 49 males in each group (total $n = 98$; see Figures 7 and 8 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test was conducted, which demonstrated male adoptees ($M = 2.86, SD = 0.84$) and male biologically-reared individuals ($M = 3.12, SD = 0.90$) did not differ significantly in their level of educational attainment, $t(96) = 1.50, p = .14$.

**Full-time employment.** Logistic regression analyses were conducted to investigate whether biologically-reared individuals, as compared to adoptees, were more likely to be employed full-time (i.e., 40 hours per week) after accounting for relevant confounds (i.e., gender, and depression at wave three; $n = 7,084$). The proposed model did not represent the data well, $\chi^2 (3) = 388.43, p < .001$. Gender was significantly associated with full-time employment status, such that males were more likely to report full-time employment than females ($B = .88, p < .001$). More specifically, the odds of having full-time employment were 2.41 times as large for males, as compared to females. Participants with higher levels of depression at wave three ($B = -0.37, p < .001$) were less likely to report full-time employment. However, adoption status was not significantly associated with full-time employment status ($B = .17, p = .14$).

Propensity score analyses were also used to examine whether biologically-reared individuals, as compared to adoptees, were more likely to be employed full-time. For propensity score analyses, the sample of 7,084 participants from the regression analyses were matched on all confounds using nearest-neighbor matching procedures with a 1:1 ratio of adoptees and
biologically-reared individuals, which resulted in 341 individuals in each group (total $n = 682$; see Figures 9 and 10 for jitter and histogram plots of matching procedures). Following these matching procedures, a chi-square test was conducted to examine whether the proportion of individuals employed full-time was different for adoptees and biologically-reared individuals. The association between full-time employment and adoption status was not significant, $\chi^2 (1) = 1.93, p = .17$, suggesting that adoptees and biologically-reared individuals did not differ in their likelihood of employment after matching samples on gender and depression.

**Follow up analyses for gender.** Follow-up analyses were conducted separately for females and males. For females ($n = 3,994$), the proposed regression model fit the data well, $\chi^2 (2) = 19.63, p < .001$. For females, depression at wave three ($B = -.30, p < .001$) was significantly associated with full-time employment, such that higher levels of depression were associated with a lower likelihood of employment. However, adoption status was not significantly associated with full-time employment status for females ($B = .04, p = .81$). For propensity score analyses, the sample of 3,994 females from the regression analyses were matched on all confounds using nearest-neighbor matching procedures with a 1:1 ratio of adoptees and biologically-reared individuals, which resulted in 189 females in each group (total $n = 378$; see Figures 11 and 12 for jitter and histogram plots of matching procedures). Following these matching procedures, a chi-square test was conducted and, for females, the association between full-time employment and adoption status was not significant $\chi^2 (1) = 1.06, p = .30$, such that the proportion of biologically-reared females (46.6%) employed full-time was not significantly different from the proportion of female adoptees employed full-time (51.9%).

For males ($n = 3,090$), the proposed regression model fit the data well, $\chi^2 (2) = 31.47 p < .001$. For males, depression at wave 3 ($B = -.50, p < .001$) was significantly associated with full-
time employment, such that higher levels of depression were associated with less likelihood of employment. Adoption status was also significantly associated with full-time employment status ($B = .36, p = .04$), such that a larger percentage of biologically-reared males (69.8%) than male adoptees (61.8%) were employed full-time. For propensity score analyses, male participants from the regression analyses were matched based on their scores on all relevant confounds using nearest-neighbor matching procedures with 1:1 ratio of male adoptees and biologically-reared individuals, which resulted in 152 males in each group (total $n = 304$; see Figures 13 and 14 for jitter and histogram plots of matching procedures). Following these matching procedures, a chi-square test was conducted and, for males, the association between full-time employment and adoption status was not significant $\chi^2(1) = 1.76, p = .19$, such that the proportion of biologically-reared males (69.1%) employed full-time was not significantly different from the proportion of male adoptees employed full-time (61.8%).

**Annual income.** A hierarchical multiple linear regression was conducted to investigate whether biologically-reared individuals, as compared to adoptees, showed higher levels of annual income, after controlling for gender, mothers’ educational attainment, and depression at wave three ($n = 6,458$). The final regression model predicted 9.4% of the variability in annual income. Mothers’ educational attainment was positively associated with respondent annual income ($\beta = .17, p < .001$), whereas gender ($\beta = -.21, p < .001$) and depression from wave three ($\beta = -.11, p < .001$) were negatively associated with annual income. Adding adoption status to the model did not significantly improve model fit, $F (1, 6453) = 3.57, p = .059$, as adoption status ($\beta = -.02, p = .059$) was not significantly associated with annual income, after controlling for gender, mother’s educational attainment, and depression.
Propensity score methods were also used to determine whether biologically-reared individuals, as compared to adoptees, showed higher levels of annual income in young adulthood. The sample of 6,458 participants from the regression analyses were matched on all confounds using nearest-neighbor matching procedures with a 1:1 ratio of adoptees and biologically-reared individuals, which resulted in 307 individuals in each group (total \( n = 614 \); see Figures 15 and 16 for jitter and histogram plots of matching procedures). Following these matching procedures, a \( t \)-test showed that adoptees (\( M = 32,264, SD = 31,229 \)) and biologically-reared individuals (\( M = 36,771, SD = 30,381 \)) did not differ significantly in their reported annual income, \( t(612) = 1.81, p = .07 \).

**Follow-up analyses for gender.** Follow-up analyses compared annual income for females and males separately. For females (\( n = 3608 \)), the final regression model predicted 5.8% of the variability in annual income. Specifically, mothers’ educational attainment (\( \beta = .20, p < .001 \)) and depression at wave three (\( \beta = -.12, p < .001 \)) were significantly associated with annual income. However, for females, adding adoption status to the model did not show significant improvement in model fit, \( F(1, 3604) = 2.09, p = .15 \), as adoption status was not significantly associated with annual income (\( \beta = -.02, p = .15 \)). For the propensity score analyses, the sample of 3,608 females from the regression analyses were matched on all confounds using nearest-neighbor matching procedures with a 1:1 ratio of adoptees and biologically-reared individuals, which resulted in 161 females in each group (total \( n = 322 \); see Figures 17 and 18 for jitter and histogram plots of matching procedures). Following these matching procedures, a \( t \)-test revealed that female adoptees’ annual income (\( M = 26,665, SD = 26,720 \)) did not differ significantly from the annual income of females reared by biologically parents (\( M = 31,246, SD = 27,538 \)), \( t(320) = 1.52, p = .13 \).
For males (n = 2,850), the final regression model predicted 3.5% of the variability in annual income. Specifically, mother’s educational attainment (β = .14, p < .001) and depression at wave 3 (β = -.11, p < .001) significantly predicted annual income. Adding adoption status to the model did not significantly improve model fit for males, F (1, 2,846) = 1.58, p = .21, as adoption status was not significantly associated with annual income (β = -.02, p = .21). Propensity score analyses were also used to examine whether males reared by biologically parents, as compared to male adoptees, show higher levels of annual income. Nearest-neighbor matching procedures for the male sample included a 1:1 ratio of male adoptees and biologically-reared individuals, which resulted in 146 males in each group (total n = 292; see Figures 19 and 20 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test was conducted, which demonstrated male adoptees (M = 48,437, SD = 34,599) and male biologically-reared individuals (M = 40,117, SD = 27,335) did not differ in their level of annual income, t(290) = 0.46, p = .65.

**Marital status.** Logistic regression analyses were conducted to investigate whether biologically-reared individuals, as compared to adoptees, were more likely to be married after accounting for relevant confounds (i.e., age, externalizing behaviors at wave three, substance abuse at wave three, and romantic relationship quality at wave three; n = 1,810). The proposed model did not represent the data well, χ² (5) = 197.37, p < .001. Participants who were older (B = .23, p < .001) and reported higher levels of romantic relationship quality at wave three (B = .12, p < .001) were more likely to be married. In contrast, participants who had higher levels of externalizing behaviors at wave three (B = -.21, p = .001) or substance abuse at wave three (B = -.02, p < .001) were less likely to be married. However, adoption status was not significantly associated with marital status (B = .35, p = .14).
Propensity score analyses were also used to examine whether biologically-reared individuals, as compared to adoptees, were more likely to be married. The sample of 1,810 participants from the regression analyses were matched on all confounds using nearest-neighbor matching procedures with a 1:1 ratio of adoptees and biologically-reared individuals, which resulted in 87 individuals in each group (total $n = 172$; see Figures 21 and 22 for jitter and histogram plots of matching procedures). Following these matching procedures, a chi-square test was conducted to examine whether the proportion of individuals married was different for adoptees and biologically-reared individuals. The association between marital status and adoption status was not significant, $\chi^2 (1) = 1.14, p = .29$, such the proportion of biologically-reared individuals (55.8%) who were married did not differ significantly from the proportion of adoptees (47.7%) who were married.

**Follow-up analyses for gender.** Follow-up analyses were conducted separately for males and females. For females, ($n = 1,071$), the proposed regression model did not fit the data well, $\chi^2 (5) = 87.65, p < .001$. Results showed that, for females, age ($B = .22, p < .001$) and romantic relationship quality at wave three ($B = .11, p < .001$) were positively associated with the likelihood of being married, whereas substance abuse at wave three ($B = -.02, p = .01$) was negatively associated with the likelihood of being married. Adoption status was not significantly associated with marital status for females ($B = .40, p = .20$). For the propensity score analyses, the sample of 1,071 females from the regression analyses were matched on all confounds using nearest-neighbor matching procedures with a 1:1 ratio of adoptees and biologically-reared individuals, which resulted in 46 individuals in each group (total $n = 92$; see Figures 23 and 24 for jitter and histogram plots of matching procedures). Following these matching procedures, a chi-square test was conducted and, for females, the association between marital status and
adoption status was not significant $\chi^2 (1) = 0.39, p = .53$, such that the proportion of married biologically-reared females (54.3%) was not significantly different from the proportion of married female adoptees (47.8%).

For males ($n = 738$), the proposed regression model did not fit the data well, $\chi^2 (5) = 107.09, p < .001$. Specifically, for males, age ($B = .25, p < .001$) and romantic relationship quality at wave three ($B = .13, p < .001$) were positively associated with the likelihood of being married, whereas externalizing behaviors at wave three ($B = -.20, p = .006$) and substance abuse at wave three ($B = -.02, p = .001$) were negatively associated with the likelihood of being married. Adoption status was not significantly associated with marital status for males ($B = .26$, $p = .45$). For the propensity score analyses, the sample of 738 males from the regression analyses were matched on all confounds using nearest-neighbor matching procedures with a 1:1 ratio of adoptees and biologically-reared individuals, which resulted in 40 individuals in each group (total $n = 80$; see Figures 25 and 26 for jitter and histogram plots of matching procedures). Following these matching procedures, a chi-square test revealed, for males, the association between marital status and adoption status was not significant $\chi^2 (1) = 0.20, p = .66$, such that the proportion of married biologically-reared males (52.5%) was not significantly different from the proportion of married male adoptees (47.5%).

**Marital quality.** A hierarchical multiple linear regression was planned to investigate whether biologically-reared individuals, as compared to adoptees, show higher levels of marital quality after controlling for depression at wave three, externalizing behaviors at wave two, parent-child relationship quality at wave one, and romantic relationship quality at wave three. However, this analysis would have included only ten adoptees. Therefore, regression analyses were not conducted for marital quality, but group means are reported in Table 3. Follow-up
analyses were conducted to examine romantic relationship quality (regardless of marital status), controlling for depression at wave three, externalizing behaviors at wave three, parent-child quality at wave one, and romantic relationship quality at wave three. Results showed that a final regression model predicted 5.7% of the variability in romantic relationship quality. Specifically, depression at wave three ($\beta = -0.09, p < .001$), externalizing behavior at wave two ($\beta = -0.08, p < .001$), parent-child closeness ($\beta = 0.08, p < .001$), and romantic relationship quality at wave three ($\beta = 0.15, p < .001$) were significantly associated with marital quality. However, adding adoption status to the model did not significantly improve model fit, $F(1, 1959) = 2.42, p = .12$, and it was not significantly associated with romantic relationship quality ($\beta = -0.03, p = .12$).

Propensity score analyses were planned to determine whether biologically-reared individuals, as compared to adoptees, showed higher levels of marital quality in young adulthood. However, when the participants were matched based on their scores on all relevant confounds only 10 individuals remained in each group (total $n = 20$). Due to the small sample size, follow up analyses were conducted to examine romantic relationship quality (regardless of marital status), controlling for depression at wave three, externalizing behaviors at wave three, parent-child relationship quality at wave one, and romantic relationship satisfaction at wave three. In this case, nearest-neighbor matching procedures, including in a 1:1 ratio of adoptees and biologically-reared individuals, resulted in 91 individuals in each group (total $n = 182$; see Additional analyses were conducted to examine marital quality with a measure using the IOS scale (Joyner & Campa, 2006). Results were consistent with the previously discussed analyses. Results showed the final regression model ($n = 1970$) predicted 6.4% of the variability in romantic relationship quality. Specifically, depression at wave three ($\beta = -0.09, p < .001$), externalizing behavior at wave two ($\beta = -0.08, p < .001$), parent-child closeness ($\beta = 0.10, p < .001$), and romantic relationship quality at wave three ($\beta = 0.15, p < .001$) were significantly associated with romantic relationship quality at wave four. However, adding adoption status to the model did not significantly improve model fit, $F(1, 1964) = 1.46, p = .23$, and it was not significantly associated with marital quality ($\beta = -0.03, p = .23$).
Figures 27 and 28 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test showed that adoptees ($M = 13.65$, $SD = 3.53$) and biologically-reared individuals ($M = 13.75$, $SD = 3.58$) did not differ significantly in the quality of their romantic relationship, $t(180) = 0.19$, $p = .85$.

**Follow-up analyses for gender.** Follow-up analyses were planned to compare marital quality for males and females separately. However, the proposed regression model would have included only six adoptees. As such, regression analyses for marital quality were not conducted, but group means are reported in Table 5. Follow-up analyses were conducted to examine romantic relationship quality (regardless of marital status) for females. The proposed model ($n = 1,225$) predicted 5.6% of the variability in romantic relationship quality. Specifically, depression at wave three ($\beta = -.12$, $p < .001$), parent-child relationship quality ($\beta = .10$, $p = .001$), and romantic relationship satisfaction at wave three ($\beta = .14$, $p < .001$) were significantly associated with romantic relationship quality at wave four. However, adding adoption status to the model did not significantly improve model fit, $F (1, 1219) = 0.15$, $p = .70$, and it was not significantly associated with romantic relationships quality at wave four ($\beta = .01$, $p = .70$).\(^2\)

Propensity score analyses were also conducted to examine romantic relationship quality (regardless of marital status), controlling for depression at wave three, externalizing behaviors at wave three, parent-child relationship quality, and romantic relationship satisfaction at wave three.

\(^2\) Additional analyses were conducted to examine romantic relationship quality with a measure using the IOS scale (Joyner & Campa, 2006) for females. Results were consistent with the previously discussed analyses. Results showed the final regression model ($n = 1,226$) predicted 6.7% of the variability in romantic relationship quality at wave four. Specifically, depression at wave three ($\beta = -.11$, $p < .001$), parent-child relationship quality ($\beta = -.11$, $p < .001$) and romantic relationship quality at wave three ($\beta = .15$, $p < .001$) were significantly associated with marital quality. However, adoption status was not significantly associated with marital quality for females ($\beta = .02$, $p = .48$) and adding it to the model did not significantly improve model fit, $F (1, 1220) = 0.50$, $p = .48$.\(^2\)
three. Nearest-neighbor matching procedures for the female sample included a 1:1 ratio of female adoptees and biologically-reared individuals, which resulted in 54 females in each group (total n = 108; see Figures 29 and 30 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test was conducted, which demonstrated female adoptees ($M = 14.28$, $SD = 3.12$) and female biologically-reared individuals ($M = 14.69$, $SD = 2.32$) did not differ significantly in the quality of their romantic relationship, $t(106) = 0.77$, $p = .44$.

For males, the proposed regression model examining marital quality in adoptees and biologically-reared individuals would have included four adoptees. Therefore, regression analyses were not conducted for marital quality, but the means and standard deviations across groups are reported in Table 5. Follow-up analyses were conducted to examine romantic relationship quality (regardless of marital status) for males. The proposed model ($n = 740$) explained 6.7% of the variability in romantic relationship quality at wave four. Specifically, externalizing behaviors at wave two ($\beta = -.13$, $p = .001$) and romantic relationship quality at wave three were the only confounds significantly associated with males’ romantic relationship quality. Adoption status was significantly associated with males’ romantic relationship quality ($\beta = .10$, $p = .006$) and adding it to the model did not significantly improve model fit, $F (1, 734) = 7.70$, $p = .006$.³ Again, due to the small sample of individuals with data on all indicators,

³ Additional analyses were conducted to examine romantic relationship quality with a measure using the IOS scale (Joyner & Campa, 2006) for males. Results were mostly consistent with the previously discussed analyses. Results showed the final regression model ($n = 744$) predicted 6.7% of the variability in romantic relationship quality. Externalizing behaviors at wave two ($\beta = -.13$, $p < .001$), parent-child relationship quality ($\beta = .08$, $p = .04$), and romantic relationship quality at wave three ($\beta = .14$, $p < .001$) were significantly associated with romantic relationship quality. Adoption status was significantly associated with romantic relationship quality for males ($\beta = -.10$, $p = .008$) and adding it to the model did not significantly improve model fit, $F (1, 738) = 7.08$, $p = .008$. 
propensity score analyses were conducted to examine romantic relationship quality (regardless of marital status), controlling for depression at wave three, externalizing behaviors at wave three, parent-child relationship quality at wave one, and romantic relationship satisfaction at wave three. Nearest-neighbor matching procedures for the male sample included a 1:1 ratio of male adoptees and biologically-reared individuals, which resulted in 37 males in each group (total $n = 74$; see Figures 31 and 32 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test was conducted, which demonstrated male adoptees ($M = 12.73, SD = 3.91$) and male biologically-reared individuals ($M = 14.27, SD = 2.72$) did not differ significantly in the quality of their romantic relationship, $t(72) = 1.97, p = .053$.

**Aim 2 Results**

**Descriptives.** The focus of Aim 2 was to examine differences in young adult outcomes of adoptees based on adoption-related experiences, including differences based on age at adoption, foster care experience, international versus domestic adoption, transracial versus same-race adoption, and kinship versus non-relative adoption. Within-group differences based on adoption related experiences were examined for the young adult outcomes of educational attainment, employment, income, marital status, and marital quality. The correlations between adoption-related experiences and outcomes are reported in Table 7. Descriptive information for all adoption-related experiences is reported in Table 8. Descriptive information for outcome variables are presented based on adoption related experiences in Tables 9-13. Based on preliminary analyses for Aim 1, covariates were identified for educational attainment (i.e., gender, mother’s educational attainment, depression at wave three, externalizing behaviors at wave two, and substance abuse at wave three), full-time employment (i.e., gender and depression at wave three), annual income (i.e., gender, mother’s educational attainment, and depression at
wave three), marital status (i.e., current age at wave four, externalizing behavior problems at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three), and marital quality (i.e., depression at wave three, externalizing behaviors at wave two, parent-child relationship at wave one, and romantic relationship satisfaction at wave three). Similar to Aim 1, when small samples were encountered, romantic relationship satisfaction in young adulthood (controlling for depression at wave three, externalizing behaviors for waves one and three, parent-child relationship quality, and romantic relationship satisfaction at wave three) was used instead of marital relationship quality. A summary of all regression and propensity score analyses for Aim 2, including beta weights, t-values, and chi-square values, is provided in Table 14. Table 15 provides a summary for analyses conducted (Aims 1 and 2), specifying only statistical significance.

**Age at adoption.**

**Educational attainment.** A hierarchical multiple regression was used to examine whether those adopted prior to one year of age showed higher levels of educational attainment in young adulthood than those adopted at one year of age or older, after controlling for gender, mother’s educational attainment, depression from wave three, externalizing behaviors from wave two, and substance abuse from wave three (n = 84). The final regression model predicted 17% of the variability in educational attainment, but none of the confounds were significantly associated with educational attainment of adoptees. Adding age of adoption to the model did not significantly improve model fit, $F (1, 77) = 1.36, p = .25$, as age at adoption ($\beta = -.14, p = .25$) was not significantly associated with educational attainment.

Propensity score methods were also used to determine whether those adopted prior to one year of age showed higher levels of educational attainment in young adulthood than those
adopted after one year of age, after matching on all confounds. The sample of 84 participants from the regression analyses were matched on all confounds using nearest-neighbor matching procedures with a 1:1 ratio of adoptees and biologically-reared individuals, which resulted in 27 individuals in each group (total $n = 54$; see Figures 33 and 34 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test showed the educational attainment of those adopted at less than one year of age ($M = 2.89, SD = .89$) did not differ significantly from those adopted at one year of age or older ($M = 2.78, SD = .70$), $t(52) = 0.51, p = .61$.

Full-time employment. Logistic regression analyses were conducted to investigate whether those adopted prior to one year of age were more likely than those adopted at one year of age or older to be employed full time, after accounting for relevant confounds (i.e., gender, and depression at wave three; $n = 308$). Results showed the proposed model represented the data well, $\chi^2 (3) = 8.26, p = .04$. However, gender was the only variable significantly associated with full-time employment status ($B = .54, p = .03$). Age at adoption was not associated with full-time employment ($B = .22, p = .37$).

Propensity score methods were also used to examine whether those adopted prior to one year of age were more likely to be employed full-time than those adopted at one year of age or older, after matching participants on gender and depression at wave three. The sample of 308 participants from the regression analyses were matched on all confounds using nearest-neighbor matching procedures with a 1:1 ratio of adoptees adopted before and after one year of age, which resulted in 110 individuals in each group (total $n = 220$; see Figures 35 and 36 for jitter and histogram plots of matching procedures). After these matching procedures, a chi-square test showed age at adoption was not significantly associated with full-time employment status, $\chi^2 (1)$
= 0.17, \( p = .69 \), as proportion of those employed full-time did not differ significantly for those adopted prior to one year of age (55.5%) and those adopted after one year of age (52.7%) were employed full-time.

**Annual income.** A hierarchical multiple regression was used to examine whether those adopted prior to one year of age showed higher levels of annual income than those adopted after one year of age, after controlling for gender, mothers’ education, and depression at wave three (\( n = 285 \)). Results showed that the final regression model predicted 5.5% of the variability in annual income. Specifically, gender (\( \beta = -.17, p = .006 \)) and depression at wave three (\( \beta = -.14, p = .02 \)) were significantly associated with annual income. However, age at adoption (\( \beta = -.04, p = .49 \)) was not significantly associated with annual income.

Propensity score methods were also used to determine whether those adopted prior to one year of age showed higher levels of annual income in young adulthood than those adopted after one year of age, after controlling for gender, mothers’ education, and depression at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of adoptees adopted before and after one year of age, which resulted in 98 individuals in each group (total \( n = 196 \) see Figures 37 and 38 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test demonstrated the annual income of those adopted at less than one year of age (\( M = 29,798, SD = 30,274 \)) did not differ significantly from those adopted at one year of age or older (\( M = 31,667, SD = 28,176 \)), \( t(194) = -0.45, p = .66 \).

**Marital status.** Logistic regression analyses were conducted to investigate whether those adopted prior to one year of age were more likely than those adopted at one year of age or older to be married, after accounting for relevant confounds (i.e., age, externalizing behaviors at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three; \( n = \)}
The proposed model represented the data well, $\chi^2 (5) = 16.04, p = .01$. However, romantic relationship satisfaction at wave three was the only variable significantly associated with marital status ($B = .36, p = .003$). Age at adoption was not significantly associated with marital status ($B = .28, p = .63$).

Propensity score methods were also used to examine whether those adopted prior to one year of age were more likely to be married than those adopted at one year of age or older, after matching participants on age, externalizing behaviors at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of adoptees adopted before and after one year of age, which resulted in 23 individuals in each group (total $n = 46$ see Figures 39 and 40 for jitter and histogram plots of matching procedures). After these matching procedures, a chi-square test showed age at adoption was not significantly associated with full-time employment status, $\chi^2 (1) = 1.39, p = .24$, such that the married proportion of those adopted prior to one year of age (60.9%) did not differ significantly from the married proportion of those adopted after one year of age (43.5%).

**Marital quality.** A hierarchical multiple regression was planned to examine whether those adopted prior to one year of age showed higher levels of marital quality than those adopted one year or later in age, after controlling for depression at waves three, externalizing behaviors at wave two, parent-child relationship quality, and romantic relationship satisfaction at wave three. However, due to the small sample of individuals with data on all confounds ($n = 9$) this analysis was not run. Instead, follow up analyses were conducted to examining romantic relationship quality at wave four ($n = 84$), controlling for depression at wave three, externalizing behaviors at wave three, parent-child relationship quality, and romantic relationship satisfaction at wave
three. However, none of the confounds were associated with romantic relationship quality at wave four. Age at adoption was not significantly associated with romantic relationship quality at wave four ($\beta = -.16, p = .15$).

Propensity score methods were also used to determine whether those adopted prior to one year of age showed higher levels of romantic relationship quality (regardless of marital status) than those adopted after one year of age, after controlling for depression at wave three, externalizing behaviors at wave two, parent-child relationship quality, and romantic relationship satisfaction at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of adoptees adopted before and after one year of age, which resulted in 23 individuals in each group (total $n = 46$ see Figures 41 and 42 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test revealed the romantic relationship quality of those adopted at less than one year of age ($M = 14.26, SD = 3.08$) did not differ significantly from those adopted at one year of age or older ($M = 12.91, SD = 4.08$), $t(44) = 1.27, p = .21$.

**Foster care experience.**

**Educational attainment.** A hierarchical multiple regression was used to examine whether those without foster care experience showed higher levels of educational attainment in young adulthood than with foster care experience, after controlling for gender, mother’s educational attainment, depression from wave three, externalizing behaviors from wave two, and substance

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4 Additional analyses were conducted to examine romantic relationship quality with a measure using the IOS scale (Joyner & Campa, 2006) based on age at adoption. Results were consistent with the previously discussed analyses. Results showed the final regression model ($n = 84$) predicted 11.2% of the variability in romantic relationship quality. However, none of the confounds nor age at adoption ($\beta = -.14, p = .21$) were significantly associated with romantic relationship quality at wave four.
abuse from wave three, \((n = 90)\). Results showed that the final regression model predicted 16.8% of the variability in educational attainment. Specifically, mother’s educational attainment \((\beta = .31, p = .004)\) was the only confound significantly associated with educational attainment. Adding foster care status to the model did not a significantly improve model fit, \(F (1, 83) = 0.33, p = .57\), as foster care experience \((\beta = .06, p = .57)\) was not significantly associated with educational attainment, after accounting for these confounds.

Propensity score methods were also used to determine whether those without foster care experience showed higher levels of educational attainment in young adulthood than with foster care experience, after controlling for gender, mother’s educational attainment, depression at wave three, externalizing behaviors at wave two, and substance abuse at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of adoptees with and without foster care experience, which resulted in 30 individuals in each group (total \(n = 60\) see Figures 43 and 44 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test demonstrated the educational attainment of adoptees with foster care experience \((M = 3.10, SD = .80)\) did not differ significantly from the educational attainment of adoptees without foster care experience \((M = 2.97, SD = 1.00)\), \(t(58) = -0.57, p = .57\).

**Full-time employment.** Logistic regression analyses were conducted to investigate whether those without foster care experience were more likely than those with foster care experience to be employed full time, after accounting for relevant confounds (i.e., gender, and depression at wave three; \(n = 335\)). Results showed that the proposed regression model represented the data well, \(\chi^2 (3) = 11.11, p = .01\). However, gender was the only variable significantly associated with full-time employment status \((B = .58, p = .01)\). Foster care experience was not significantly associated with full-time employment status \((B = .37, p = .11)\).
Propensity score methods were also used to examine whether those without foster care experience were more likely than those with foster care experience to be employed full time, after accounting for gender, and depression at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of adoptees with and without foster care experience, which resulted in 58 individuals in each group (total $n = 113$ see Figures 45 and 46 for jitter and histogram plots of matching procedures). Following these matching procedures, a chi-square test showed foster care status was not significantly associated with full-time employment status, $\chi^2 (1) = 0.64, p = .43$, such that the proportion of adoptees with foster care experience employed full-time (46.0%) did not differ from the proportion of adoptees without foster care experience employed full-time (51.3%).

**Annual income.** A hierarchical multiple regression was used to examine whether those without foster care experience reported higher levels of annual income than those with foster care experience, after controlling for gender, mothers’ education, and depression at wave three ($n = 300$). Results showed that the final regression model predicted 5.2% of the variability in annual income. Gender ($\beta = -.17, p = .004$) and depression at wave three ($\beta = -.12, p = .045$) were significantly associated with annual income. However, foster care experience ($\beta = -.04, p = .53$) was not significantly associated with annual income and adding it to the model did not significantly improve model fit, $F (1, 295) = 0.40, p = .53$.

Propensity score methods were also used to investigate whether those without foster care experience reported higher levels of annual income than those with foster care experience, after controlling for gender, mothers’ education, and depression at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of adoptees with and without foster care experience, which resulted in 95 individuals in each group (total $n = 190$ see Figures 47 and
48 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test showed the annual income of those with foster care experience (\(M = 29,318, SD = 25,873\)) did not differ significantly from those without foster care experience (\(M = 30,534, SD = 33,926\)), \(t(188) = 0.28, p = .78\).

**Marital status.** Logistic regression analyses were conducted to investigate whether those without foster care experience were more likely than those with foster care experience to be married, after accounting for relevant confounds (i.e., age, externalizing behaviors at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three; \(n = 83\)). Results showed that the proposed regression model represented the data well, \(\chi^2 (5) = 18.13, p = .003\). However, romantic relationship satisfaction at wave three was the only variable significantly associated with marital status (\(B = .42, p = .001\)). Foster care experience was not significantly associated with marital status (\(B = .42, p = .43\)).

Propensity score methods were also used to examine whether those without foster care experience were more likely than those without foster care experience to be married, after matching for age, externalizing behaviors at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of adoptees with and without foster care experience, which resulted in 27 individuals in each group (total \(n = 54\); see Figures 49 and 50 for jitter and histogram plots of matching procedures). Following these matching procedures, a chi-square test showed foster care experience demonstrated a trending significant association with marital status, \(\chi^2 (1) = 3.82, p = .051\), such that the married proportion of adoptees with foster care experience (48.1%) was smaller than the married proportion of adoptees without foster care experience (74.1%).
Marital quality. A hierarchical multiple regression was planned to examine whether those without foster care experience reported higher levels of marital quality than those with foster care experience, after controlling for depression at wave three, externalizing behaviors at wave two, parent-child relationship quality at wave one, and romantic relationship satisfaction at wave three. However, due to the small sample of individuals with data on all confounds \((n = 9)\) this analysis could not be run. Instead, follow up analyses were conducted to examine romantic relationship quality at wave four \((n = 88)\), controlling for depression at wave three, externalizing behaviors for wave three, parent-child relationship quality, and romantic relationship quality at wave three. Results showed that the final regression model predicted 10.8% of the variability in romantic relationship quality. However, none of the confounds nor foster care experience \((\beta = .02, p = .85)\) were significantly associated with romantic relationship quality at wave four\(^5\).

Propensity score methods were also used to investigate whether those without foster care experience reported higher levels of romantic relationship quality than those with foster care experience, after controlling for depression at wave three, externalizing behaviors at wave three, parent-child relationship quality, and romantic relationship quality at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of adoptees with and without foster care experience, which resulted in 30 individuals in each group \((\text{total } n = 60)\); see Figures 51 and 52 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test showed the romantic relationship quality of those with foster care experience

\(^5\) Additional analyses were conducted to examine romantic relationship quality with a measure using the IOS scale (Joyner & Campa, 2006) based on foster care experience. Results were consistent with the previously discussed analyses. Results showed the final regression model \((n = 88)\) predicted 12.3% of the variability in romantic relationship quality. However, foster care experience was not significantly associated with romantic relationship quality at wave four \((\beta = .03, p = .76)\).
(M = 13.73, SD = 3.81) did not differ significantly from those without foster care experience (M = 13.80, SD = 3.31), t(58) = 0.07, p = .94.

**International versus domestic adoption.**

**Educational attainment.** A hierarchical multiple regression was planned to examine whether those adopted internationally showed higher levels of educational attainment in young adulthood than those adopted domestically, after controlling for gender, mother’s educational attainment, depression from wave three, externalizing behaviors from wave two, and substance abuse from wave three. However, this regression would have included eight international adoptees. Therefore, regression analyses were not conducted for educational attainment, but means and standard deviations for both groups are reported in Table 11. Similarly, propensity score analyses were planned to investigate whether those adopted internationally showed higher levels of educational attainment in young adulthood than those adopted domestically, after controlling for gender, mother’s educational attainment, depression from wave three, externalizing behaviors from wave two, and substance abuse from wave three. However, after nearest neighbor matching procedures were implemented, there were only eight matched individuals in each group. As such, inferential statistics were not performed.

**Full-time employment.** A logistic regression was conducted to investigate whether those adopted internationally were more likely than those adopted domestically to be employed full-time, after accounting for relevant confounds (i.e., gender and depression at wave three; n = 264). Results showed that the proposed regression model represented the data well, $\chi^2 (3) = 10.08, p = .02$. However, gender was the only significant predictor of employment status ($B = .60, p = .02$). International adoption status ($B = -.50, p = .21$) was not significantly associated with full-time employment status.
Propensity score methods were also used to examine whether those adopted internationally were more likely than those adopted domestically to be employed full time, after accounting for gender and depression at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of ratio of international and domestic adoptees, which resulted in 32 individuals in each group (total $n = 64$; see Figures 53 and 54 for jitter and histogram plots of matching procedures). Following these matching procedures, a chi-square test showed international adoption status was not significantly associated with full-time employment status, $\chi^2 (1) = 1.02, p = .31$, such that the proportion of internationally-adopted individuals employed full-time (62.5%) did not differ significantly from the proportion of domestically-adopted individuals employed full-time (50.0%).

**Annual income.** A hierarchical multiple regression was used to examine whether those adopted internationally reported higher levels of annual income than those adopted domestically, after controlling for gender, mothers’ education, and depression at wave three ($n = 244$). Results showed that the final regression model predicted 7.9% of the variability in annual income. Gender ($\beta = -.16, p = .01$) and depression at wave three ($\beta = -.20, p = .002$) were significantly associated with annual income. However, international adoption status ($\beta = .07, p = .26$) was not significantly associated with annual income and adding it to the model did not significantly improve model fit, $F (1, 239) = 1.30, p = .26$.

Propensity score methods were also used to investigate whether those adopted internationally reported higher levels of annual income than those adopted domestically, after controlling for gender, mothers’ education, and depression at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of international and domestic adoptees, which resulted in 31 individuals in each group (total $n = 60$; see Figures 55 and 56 for
jitter and histogram plots of matching procedures). Following these matching procedures, a t-test demonstrated the annual income of those adopted internationally ($M = 39,732, SD = 28,572$) did not differ significantly from the annual income of those adopted domestically ($M = 32,926, SD = 33,438$), $t(60) = -0.86, p = .39$.

**Marital status.** A logistic regression was planned to investigate whether those adopted internationally were more likely than those adopted domestically to be married, after accounting for relevant confounds (i.e., age, externalizing behaviors at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three). However, this regression analysis would have only included seven international adoptees. Therefore, regression analyses were not conducted to compare the marital status rates of international and domestic adoptees, but the proportions for both groups are reported in Table 11. Similarly, propensity score methods were planned to investigate whether those adopted internationally were more likely than those adopted domestically to be married. However, after nearest neighbor matching procedures were implemented, there were only seven matched individuals in each group. As such, inferential statistics were not performed.

**Marital quality.** A hierarchical multiple regression was planned to examine whether those adopted internationally reported higher levels of marital quality than those adopted domestically, after controlling for depression at wave three, externalizing behaviors at wave two, parent-child relationship quality, and romantic relationship satisfaction at wave three. However, due to the small sample of individuals with data on all confounds ($n = 8$) this analysis could not be run. Follow up analyses were then planned to examine romantic relationship quality at wave four, controlling for depression at wave three, externalizing behaviors at wave three, parent-child relationship quality, and romantic relationship quality at wave three. However, this regression
analysis would have included only nine international adoptees. Therefore, regression analyses for romantic relationship quality at wave four were not conducted, but means and standard deviations for both groups are reported in Table 11. Propensity score analyses were also planned to investigate whether those adopted internationally show higher levels of romantic relationship quality than those adopted domestically. However, after nearest neighbor matching procedures were implemented, there were only nine matched individuals in each group. Therefore, inferential statistics were not performed.

**Transracial versus same-race adoption.**

**Educational attainment.** A hierarchical multiple regression was planned to examine whether same-race adoptees showed higher levels of educational attainment in young adulthood than transracial adoptees, after controlling for gender, mother’s educational attainment, depression at wave three, externalizing behaviors at wave two, and substance abuse at waves three. However, this regression analysis would have included only ten transracial adoptees. Therefore, regression analyses for educational attainment were not conducted, but means and standard deviations for both groups are reported in Table 12. Similarly, propensity score analyses were planned to investigate whether same-race adoptees show higher levels of educational attainment in young adulthood than transracial adoptees. However, after nearest neighbor matching procedures were implemented, there were only ten matched individuals in each group. Therefore, inferential statistics were not performed.

**Full-time employment.** A logistic regression was conducted to investigate whether same-race adoptees were more likely than transracial adoptees to be employed full time, after accounting for relevant confounds (i.e., gender and depression at wave three; \( n = 262 \)). Results showed that the proposed model represented the data well, \( \chi^2 (3) = 1.85, p = .05 \). Gender \( (B = \)
.55, \( p = .03 \)) was significantly associated with employment status. However, transracial adoption status \((B = .25, p = .54)\) was not significantly associated with employment status.

Propensity score methods were also used to examine whether same-race adoptees were more likely than transracial adoptees to be employed full time, after accounting for gender and depression at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of ratio of transracial and same-race adoptees, which resulted in 37 individuals in each group \((\text{total}\ n = 74);\ \text{see\ Figures\ 57\ and\ 58\ for\ jitter\ and\ histogram\ plots\ of\ matching\ procedures}\). Following these matching procedures, a chi-square test showed international adoption status was not significantly associated with full-time employment status, \(\chi^2 (1) = 0.06, p = .84\), such that the proportion of transracial adoptees employed full-time \((56.8\%)\) did not differ from the proportion of same-race adoptees employed full-time \((59.5\%)\).

**Annual income.** A hierarchical multiple regression was used to examine whether same-race adoptees reported higher levels of annual income than transracial adoptees, after controlling for gender, mothers’ education, and depression at wave three \((n = 242)\). Results showed that the final regression model predicted 8.0\% of the variability in annual income. Gender \((\beta = -.16, p = .01)\) and depression \((\beta = -.20, p = .002)\) at wave three were significantly associated with annual income. However, transracial adoption status \((\beta = -.07, p = .29)\) was not significantly associated with annual income.

Propensity score methods were also used to investigate whether same-race adoptees reported higher levels of annual income than transracial adoptees, after controlling for gender, mothers’ education, and depression at waves one, two, and three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of transracial and same-race adoptees, which resulted in 41 individuals in each group \((\text{total}\ n = 82);\ \text{see\ Figures\ 59\ and\ 60\ for\ jitter\ and\ histogram\ plots\ of\ matching\ procedures}\).
histogram plots of matching procedures). Following these matching procedures, a t-test showed the annual income of transracial adoptees ($M = 38,753, SD = 32,480$) did not differ significantly from the annual income of those same-race adoptees ($M = 32,025, SD = 23,697$), $t(80) = -1.07, p = .29$.

**Marital status.** A logistic regression was planned to investigate whether same-race adoptees were more likely than transracial adoptees to be married, after accounting for relevant confounds (i.e., age, externalizing behaviors at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three). However, this regression analysis would have included only eight transracial adoptees. Therefore, regression analyses for marital status were not conducted, but the proportion married for both groups are reported in Table 12. Propensity score analyses were also planned to investigate whether same-race adoptees were more likely than transracial adoptees to be married. However, after nearest neighbor matching procedures were implemented, there were only eight matched individuals in each group. Therefore, inferential statistics were not performed.

**Marital quality.** A hierarchical multiple regression was planned to examine whether same-race adoptees reported higher levels of marital quality than transracial adoptees, after controlling for depression at wave three, externalizing behaviors at wave two, parent-child relationship quality, and romantic relationship satisfaction at wave three. However, due to the small sample of individuals with data on all confounds ($n = 8$) this analysis could not be run. Next, follow up analyses were planned to examine romantic relationship quality at wave four, controlling for depression at wave three, externalizing behaviors at wave three, parent-child relationship quality, and romantic relationship quality at wave three. However, this regression analysis would have included only seven transracial adoptees. Therefore, regression analyses for
romantic relationship quality at wave four were not conducted, but means and standard deviations for both groups are reported in Table 12. Propensity score analyses were also planned to investigate whether transracial adoptees show higher levels of romantic relationship quality than same-race adoptees. However, after nearest neighbor matching procedures were implemented, there were only seven matched individuals in each group. Therefore, inferential statistics were not performed.

**Kinship versus non-relative adoption.**

**Educational attainment.** A hierarchical multiple regression was planned to examine whether those adopted by kin and those adopted by non-relatives differ in their levels of educational attainment in young adulthood, after controlling for gender, mother’s educational attainment, depression at wave three, externalizing behaviors at wave two, and substance abuse at wave three. However, this regression analysis would have included only eight individuals adopted by kin. Therefore, regression analyses for educational attainment were not conducted, but means and standard deviations for both groups are reported in Table 13. In addition, propensity score analyses were planned to investigate whether those adopted by kin differ from those adopted by non-relatives in their educational attainment in young adulthood. However, after nearest neighbor matching procedures were implemented, there were only eight matched individuals in each group. Therefore, inferential statistics were not performed.

**Full-time employment.** A logistic regression was conducted to investigate whether those adopted by kin and those adopted by non-relatives differ in their likelihood of being employed full time, after accounting for relevant confounds (i.e., gender and depression at wave three; \( n = 321 \)). The proposed regression model represented the data well, \( \chi^2 (3) = 11.13, p = .01 \). Specifically, gender (\( B = .50, p = .03 \)) was significantly associated with employment status.
Kinship adoption status \((B = -.70, p = .04)\) was also significantly associated with employment status, such the proportion employed full-time was larger for those adopted by kin (69.6%) than those adopted by non-relatives (52.7%).

Propensity score methods were also used to examine whether those adopted by kin and those adopted by non-relatives differ in their likelihood of being employed full time, after accounting for gender and depression at wave three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of ratio of kin and non-kin adoptees, which resulted in 46 individuals in each group (total \(n = 92\); see Figures 61 and 62 for jitter and histogram plots of matching procedures). Following these matching procedures, a chi-square test showed kinship adoption status was not significantly associated with full-time employment status, \(\chi^2 (1) = 0.20, p = .66\), such that the proportion of those adopted by kin employed full-time (69.6%) did not differ from the proportion of those adopted by non-relatives employed full-time (65.2%).

**Annual income.** A hierarchical multiple regression was used to examine whether those adopted by kin and those adopted by non-relatives differ in their levels of annual income, after controlling for gender, mothers’ education, and depression at wave three \((n = 293)\). The final regression model predicted 5.5% of the variability in annual income. Gender \((\beta = -.15, p = .009)\) and depression at wave three \((\beta = -.15, p = .01)\) were significantly associated with annual income. However, kinship adoption status \((\beta = -.05, p = .40)\) was not significantly associated with annual income.

Propensity score methods were also used to investigate whether those adopted by kin and those adopted by non-relatives differ in their levels of annual income, after controlling for gender, mothers’ education, and depression at waves one, two, and three. Nearest neighbor propensity score matching procedures included a 1:1 ratio of kinship and non-relative adoptees,
which resulted in 42 individuals in each group (total \( n = 84 \); see Figures 63 and 64 for jitter and histogram plots of matching procedures). Following these matching procedures, a t-test showed the annual income of kinship adoptees (\( M = 29,292, SD = 30,331 \)) did not differ significantly from the annual income of those non-relative adoptees (\( M = 33,925, SD = 27,288 \)), \( t(82) = 0.74, p = .46 \).

**Marital status.** A logistic regression was planned to investigate whether those adopted by kin and those adopted by non-relatives differ in their likelihood of being married, after accounting for relevant confounds (i.e., age, externalizing behaviors at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three). However, this regression analysis would have included only seven individuals adopted by kin. Therefore, regression analyses for marital status were not conducted, but the proportion married for both groups are reported in Table 13. Propensity score analyses were also planned to investigate whether those adopted by kin and those adopted by non-relatives differ in their likelihood of being married. However, after nearest neighbor matching procedures were implemented, there were only seven matched individuals in each group. Therefore, inferential statistics were not performed.

**Marital quality.** A hierarchical multiple regression was planned to examine whether those adopted by kin and those adopted by non-relatives differ in levels of marital quality, after controlling for depression at wave three, externalizing behaviors at wave two, parent-child relationship quality, and romantic relationship satisfaction at wave three. However, due to the small sample of individuals with data on all confounds (\( n = 9 \)) this analysis was not run. Instead, follow up analyses were planned to examine romantic relationship quality at wave four, controlling for depression at wave three, externalizing behaviors at wave three, parent-child
relationship quality, and romantic relationship quality at wave three. However, this regression analysis would have included only eight individuals adopted by kin. Therefore, regression analyses for romantic relationship quality at wave four were not conducted, but means and standard deviations for both groups are reported in Table 13. Propensity score analyses were also planned to investigate whether those adopted by kin and those adopted by non-relatives differ in levels of marital quality. However, after nearest neighbor matching procedures were implemented, there were only eight matched individuals in each group. Therefore, inferential statistics were not performed.
CHAPTER VI

DISCUSSION

The current study extends the existing literature on adoptee outcomes during childhood and adolescence by investigating the long-term outcomes of adoptees during young adulthood. In addition, this study examined how adoptees fare in key developmental tasks of young adulthood by considering educational attainment, full-time employment status, annual income, marital status, and romantic relationship quality in a single study. Furthermore, this study provides a more nuanced understanding of the young adult outcomes of adoptees by not only examining differences based on adoption status, but also exploring differences based on adoption-related experiences (i.e., age at adoption, foster care experience, international versus domestic adoption, transracial versus same-race adoption, and kinship versus non-relative adoption). Two analytical techniques were used to estimate differences across groups (i.e., regression analyses and propensity score analyses), which identified and accounted for relevant confounds. Thus, these techniques provide a more precise estimate of the long-term impact of adoption and adoption-related experiences than what has been observed in the existing literature. In general, findings suggest few statistically significant differences across groups (i.e., only six of 74 analyses demonstrated statistically significant differences across groups). Specifically, significant differences were observed for: the educational attainment of adoptees and their biologically-reared counterparts (for regression and propensity score analyses), the educational attainment, full-time employment status, and romantic relationship quality of male adoptees and their
biologically-reared counterparts (for regression analyses only), and the full-time employment status of adoptees adopted by kin and adoptees adopted by non-relatives (regression analyses only). Most results were consistent across analytic technique (i.e., only four of 31 analytic comparisons demonstrated disparate findings). The findings for each aim of the study are discussed in detail below.

**Aim 1: Differences between Adoptees and Biologically-reared Individuals**

The first aim investigated differences in educational attainment, full-time employment status, annual income, marital status, and romantic relationship quality based on adoption status. Considering previous research, I hypothesized that biologically-reared individuals, as compared to adoptees, would show higher levels of educational attainment (e.g., Feigelman, 1997; Loehlin et al., 2007; Scarr & Weinberg, 1994), full-time employment and income (e.g., Collishaw et al., 1998; Feigelman, 1997), and higher rates of marriage and levels of marital quality in young adulthood (e.g., Collishaw et al., 1998; Lindblad, Hjern, & Vinnerljung, 2003; Tieman et al., 2006). This hypothesis was partially supported, as both regression analyses and propensity score analyses showed adoptees demonstrated lower levels of educational attainment in young adulthood, as compared to biologically-reared individuals. In line with previous research (e.g., NCES, 2015), educational attainment was assessed using the degree(s) obtained by each participant. The findings of the current study are consistent with the limited evidence that demonstrates adoptees show lower educational attainment than their biologically-reared counterparts during young adulthood (e.g., Björklund, Lindahl, & Plug, 2006; Loehlin, Horn, & Ernst, 2007; Scarr & Weinberg, 1994). Moreover, the current study provides strong evidence that the impact of adoption status on educational attainment is quite robust, because the association is present even after controlling for – or matching on – gender, mother’s educational attainment,
depression, externalizing behaviors, and substance abuse. Therefore, accounting for and matching on these confounds did not fully explain the differences in educational attainment observed between adoptees and biologically-reared individuals. It should be noted, however, that the size of the effect of adoption status on educational attainment ranged from small to medium based on analytic technique (i.e., \( d = .25 \) based on the standardized regression coefficient and \( d = .38 \) based on propensity score analyses). The effect sizes observed in the current study are also consistent with previous work (e.g., Loehlin, Horn, & Ernst, 2007). The small to medium effect adoption status has on educational attainment suggests adoption status is only one of many contributing factors to educational attainment. Though the current study included several covariates that were associated with educational attainment (i.e., gender, mother’s educational attainment, depression, externalizing behaviors, and substance abuse), other predictors of educational attainment should be considered in future research. For example, characteristics of both biological and adoptive parents have been shown to be important predictors of educational attainment (e.g., Björklund, Lindahl, & Plug, 2006; McGue, Rustichini, & Iacono, 2017). Specifically, previous research demonstrates the educational attainment of birth parents and the educational attainment of adoptive parents demonstrate significant associations with adoptees’ educational attainment. These associations suggest that, for adoptees, it is important to account for birth and adoptive family characteristics, in order to account for the intergenerational transmission of educational attainment. Assessments of birth and adoptive parent educational attainment were not available in the dataset used in the current study, but may be beneficial for future researchers who aim to understand the factors that contribute to the differences observed across adoptees’ and biologically-reared individuals’ educational attainment. In summary, these findings contribute to growing evidence that adoptees and biologically-reared individuals differ
in regard to educational attainment. Though the group differences in educational attainment are not large in magnitude, they still point to the need for additional supports to bolster adoptees’ educational attainment (which is discussed further in Theoretical and Practical Implications).

Hypotheses regarding full-time employment status, annual income, marital status, and marital/romantic relationship quality were not supported, as neither analytic technique revealed statistically significant differences based on adoption status. In other words, adoptees and individuals reared by biological parents do not differ significantly regarding full-time employment status, annual income, marital status, or romantic relationship quality in young adulthood. Though there are mixed findings regarding how adoptees fare in some of these outcomes, the findings of the current study are not consistent with the literature showing differences across these groups (e.g., Collishaw et al., 1998; Feigelman, 1997; Lindblad, Hjern, & Vinnerljung, 2003). The current study may not have replicated these findings due to sampling differences. For example, some of the previous research (e.g., Collishaw et al., 1998; Lindblad et al., 2003) did not assess young adult outcomes in a U.S. sample. Therefore, it may be that significant differences are observed between adoptees’ and biologically-reared individuals’ employment status, annual income, marital status, or romantic relationship quality in some cultures/counties but not others. Though there has been little research investigating how the adoption experience may differ across countries, it is certainly a plausible hypothesis (Palacios & Brodzinsky, 2010) because the meaning of adoption is socially constructed (Leon, 2002). For instance, how a given society emphasizes the loss associated with adoption (i.e., the child’s loss of their birth parents and the birth parents’ loss of a child), weighs the importance of biological or blood ties, and stigma surrounding adoption results in a social construction of adoption, which likely impacts adoptee development (Leon, 2002). In addition, the current study may not have
replicated other previous work because of cohort effects/the timing of data collection. Specifically, Feigelman (1997) used a U.S. sample, but data collection began in 1979 and young adult outcomes were assessed in 1992. In contrast, the current sample assessed young adults over a decade later, in 2008. Those adopted more recently may have experienced less stigma than those adopted earlier, as adoption is more common in the U.S. and many individuals in the U.S. report favorable attitudes toward adoption (Harris Interactive, 2002). These changes in societal opinions may impact adoptee employment, income, and marital/romantic outcomes, as social stigma in general likely contributes to adoptees feeling ‘different’ from their peers (Palacios & Brodzinsky, 2010). Therefore, the current study’s failure to replicate these findings may reflect differences across culture and/or generational differences. Even though the non-significant associations between adoption status and full-time employment status, annual income, marital status, and marital/romantic relationship quality were not consistent with my hypotheses, the null findings are consistent with other previous work. Specifically, some studies fail to find statistically significant differences in the employment (Scarr & Weinberg, 1994), marital status (Feigelman, 1997), and romantic relationship quality (Borders, Penney, & Portnoy, 2000) of adoptees and biologically-reared individuals during young adulthood or adulthood.

Taken together, these findings suggest that adoptees’ poorer outcomes in childhood and adolescence (e.g., Juffer & van IJzendoorn. 2005; van den Berg et al., 2008; Wierzbicki, 1993; Yoon, Westermeyer, Warwick, & Kuskowski, 2012) do not persist into young adulthood. Therefore, these findings indicate the impact of adoption changes over the course of the lifespan. This finding directly informs the development of theoretical models of adoptee adjustment, as it suggests theory needs to allow for the impact of adoption to change over time. Future research is needed to determine when (developmentally) adoption status *is* and is *not* associated with poorer
outcomes in developmentally salient tasks. For instance, longitudinal datasets could utilize time series analysis to identify at which time point(s) adoption status is significantly associated with a given outcome across the lifespan. This work would help determine whether this association changes direction across the lifespan (e.g., it may be that adoption status is significantly positively associated with an outcome during childhood, but this association moves closer zero or becomes positive over the course of adolescence and young adulthood). Moreover, this work would distinguish the pattern by which adoption status is associated with various outcomes of interest (e.g., how adoption status is associated with externalizing behavior problems across the lifespan may be different from how adoption status is associated with social competence across the lifespan). Identifying the relative impact of adoption status across the lifespan and across developmental outcomes will help inform future prevention/intervention efforts by identifying (a) the age at which adoptees should be targeted for intervention and (b) the outcomes that are particularly important for targeting at a given age period.

In general, findings from Aim 1 did not support my hypothesis that propensity score analyses would show an attenuated effect of adoption on young adult outcomes. Contrary to my hypothesis, results from propensity score and regression analyses were consistent for all analyses comparing adoptees and biologically-reared individuals. In other words, utilizing regression techniques or propensity score analyses resulted in equivalent findings regarding statistical significance for all Aim 1 analyses. In addition, I hypothesized propensity score analyses would show an attenuated effect of adoption status on young adult outcomes. However, effect sizes do not appear to differ significantly across analytic technique. Specifically, when significant group differences were observed (i.e., educational attainment of adoptees and biologically-reared individuals), propensity score analyses appeared to show a larger effect size ($d = -.38, 95\% CI: -$
.67 – .09) for the impact of adoption status on educational attainment, as compared to the effect sizes from regression analyses ($d = -0.25$, 95% CI: -0.45 – -0.04). Yet, these effect sizes did not differ significantly from one another, as their confidence intervals overlap. This consistency across analytic techniques speaks to the robust effect adoption status has on educational attainment in young adulthood. Similarly, the consistency in the null-effects across technique provides strong evidence that adoption status does not significantly impact full-time employment status, annual income, marital status, or romantic relationship quality in young adulthood. Alternatively, the consistency of null-effects could mean that the impact of adoption status on full-time employment, annual income, marital status, and romantic relationship quality in young adulthood is quite small and cannot be reliably estimated to be different from zero within samples of this size.

**Gender differences.** Because previous research shows mean differences across gender in many of the young adult outcomes examined (e.g., educational attainment and annual income, NCRS, 2015), follow-up analyses were conducted to examine females and males separately. In other words, female adoptees were compared to females reared by biological parents, and male adoptees were compared to males reared by biological parents. Regression and propensity score techniques failed to find any statistically significant differences between the young adult outcomes of female adoptees and females reared by biological parents. Thus, statistical significance did not differ based on analytical technique for females. However, findings were less consistent for males. Though regression and propensity score analyses failed to find statistically significant differences between male adoptees and males reared by biological parents regarding annual income and marital status, regression analyses did show male adoptees reported lower levels of educational attainment, were less likely to be employed full-time, and reported
lower levels of romantic relationship quality. These regression findings support previous research suggesting that male adoptees may demonstrate worse outcomes, as compared to their biologically-reared counterparts, than do female adoptees (e.g., Feigelman, 1997; Collishaw, 1998) and suggest the need to tailor intervention and prevention efforts for adoptees (which is discussed further in Theoretical and Practical Implications below). In contrast, propensity score analyses suggested male adoptees did not differ from their biologically-reared counterparts in educational attainment, full-time employment, or romantic relationship quality.

The inconsistency across analytical techniques examining males supports the hypothesis that propensity score analyses, as compared to regression analyses, would show an attenuated effect of adoption on young adult outcomes. Indeed, these inconsistencies suggest that the non-zero estimate for adoption status observed in the regression analyses is likely an artifact of the assumptions of OLS regression. Specifically, when including covariates in a regression framework, the analysis assumes that there are individuals “matched” at all values of the covariates at similar rates across groups. Indeed, researchers are cautioned against using covariates in naturally occurring groups, as they can result in statistically significant results that are spurious (Miller & Chapman, 2001). In contrast, propensity score methods ensure that the samples are matched on covariates using a 1:1 ratio. Thus, the regression analyses are impacted by the fact that one group may have more extreme scores than another. Indeed, the potential for more extreme scores within an adopted sample (as compared to a biologically-reared sample) has also been documented in previous research (i.e., Miller et al., 2000a). As such, the propensity score analyses provide a more accurate and conservative estimate of the impact of adoption on young adult outcomes. This project directly informs future research, as it demonstrates more conservative tests of the long-term impact of adoption status show non-significant associations.
with young adult outcomes for males and females. Future research comparing adoptees and biologically-reared individuals would benefit from utilizing these more conservative methods (i.e., propensity score methods) to obtain a more accurate estimate of the impact of adoption. Moreover, this study provides a starting point for identifying relevant covariates when constructing models to analyze adoptee outcomes. Specifically, the same covariates (i.e., mother’s educational attainment, depression, externalizing behaviors, and substance abuse) were significantly associated with educational attainment in young adulthood for females and males in the regression analyses. Based on these findings, future research would benefit from including these covariates as the basis for matching adoptee and biologically-reared samples.

**Aim 2: Differences based on Adoption-related Experiences**

The second aim of the current study investigated differences in educational attainment, full-time employment status, annual income, marital status, and romantic relationship quality based on adoption-related experiences, including age at adoption, foster care experience, international versus domestic adoption, transracial versus same-race adoption, and kinship versus non-relative adoption. Based on previous research (Juffer & van IJzendoorn, 2009; Verhulst et al., 1990), I hypothesized those adopted prior to one year of age would outperform those adopted at one year of age or older for all young adult outcomes. However, this hypothesis was not supported, as both regression and propensity score analyses demonstrated those adopted prior to one year of age and those adopted at one year of age or older did not differ significantly on any outcome. It is possible that the current study failed to find an association between age at adoption and young adult outcomes because the variable for age at adoption was dichotomized. Dichotomizing any continuous variable can be problematic, as it reduces the information about individual differences (MacCallum, Zhang, Preacher, & Rucker, 2002). The decision to
dichotomize this variable was based on meta-analytic findings demonstrating those adopted before 12 months of age fare better than those adopted after 12 months of age during childhood and early adolescence (e.g., Juffer & van IJzendoorn, 2009). Therefore, findings from the current study failed to replicate this association with outcomes in young adulthood. It is possible that this established “cut-off” of one-year of age is no longer relevant for young adult adoptees. This could mean that age at adoption is not a long-term predictor of developmental outcomes, perhaps because adoptees have had even more time to “catch-up” to their biologically-reared counterparts. Alternatively, it could mean that only those adopted at a much later age are at risk for worse outcomes in young adulthood. Those adopted at a much later age would have less time to adjust to their new adoptive family and less time to “catch-up” to their biologically-reared counterparts, if they are behind developmentally. For instance, some research also utilizing the Add Health data demonstrates that four-years-of-age may be a more suitable “cut-off” point. Specifically, findings suggest that those adopted at four years of age or older demonstrated worse mental health outcomes (as indicated by depression and suicidal thoughts) than those adopted prior to four years of age (Festinger & Jaccard, 2012). However, because this cut-off point was only used in one study and this finding has not been replicated in other datasets, the well-established “cut-off” point of one year was used in the current study (e.g., Juffer & van IJzendoorn, 2009). Based on these conclusions, future research is needed to (a) replicate the null association between age at adoption (dichotomized based on one year of age) and young adult outcomes and (b) determine whether a later “cut-off” point (e.g., those adopted after four years of age) better predicts long-term outcomes of adoptees.

Based on previous research (Minnis, et al., 2006; Oswald et al., 2010), I hypothesized adoptees without foster care experience would demonstrate better outcomes in young adulthood
than adoptees with foster care experience. However, this hypothesis was not supported, as both regression analyses and propensity score analyses indicated those with and without foster care experience did not differ significantly on any outcome. This finding suggests that even though foster care experience is associated with increased likelihood of experiencing developmental delays, mental health problems, and internalizing and externalizing behavior problems during childhood and adolescence (Heflinger et al., 2000; McIntyre & Keesler, 1986), it is not associated with poorer outcomes in young adulthood. This finding could mean that foster care experience is a risk factor for childhood and adolescence, but not for young adulthood. Alternatively, this single indicator of foster care experience may not accurately capture experiences within the foster care system. Other indicators of experiences in the foster care system, such as time in care and number of foster placements, may be better predictors of young adult outcomes. Indeed, research suggests that more time in care and higher number of foster placements are associated with less healthy development (e.g., Fowler, Toro, & Miles, 2009; Leathers, 2006). Similarly, utilizing other indicators of childhood and adolescent adversity (beyond the instability assessed with foster care experiences) may better differentiate adoptee outcomes, as evidence suggests experiencing multiple early adversities increases the likelihood of poorer adjustment outcomes into young adulthood (see Palacios & Brodzinsky, 2010 for review). In summary, the current study suggests foster care experience, in general, does not predict young adult outcomes. However, additional research is needed to (a) replicate this finding and (b) determine if other indicators of foster care experience have long-term consequences for adoptee outcomes.

I also hypothesized that those adopted internationally would show better outcomes in young adulthood than those adopted domestically. Though regression and propensity score
analyses could not be conducted for educational attainment, marital status, or romantic relationship quality because the sample sizes were too small for inferential statistics ($n$’s less than ten), regression and propensity score analyses failed to find any statistically significant differences in young adult full-time employment rates and annual income based on international adoption status. This finding is not consistent with the literature demonstrating internationally-adopted children demonstrate better adjustment in childhood and adolescence than domestically adopted children (e.g., Askeland et al., 2016; Juffer & van IJzendoorn, 2005), thereby suggesting that the differences observed in childhood do not persist to young adulthood. However, it is important to note that “better adjustment” in studies conducted during childhood and adolescence is generally indicated by lower levels of negative outcomes, such as internalizing and externalizing behavior problems, as opposed to higher levels of strengths or assets, such as educational attainment and romantic relationship quality. Indeed, most of the research on adoptee outcomes during childhood and adolescences focuses on the prevalence of negative outcomes, and there is a dearth of research on positive outcomes or strengths of adopted individuals (Grotevant & McDermott, 2014). Thus, is possible that differences are observed between internationally- and domestically-adopted individuals when the dependent variable is a negative outcome, but not when the dependent variable is a positive outcome. In summary, the current study suggests international adoption status is not associated with young adult outcomes. However, additional research is needed to (a) replicate this finding in other young adult samples and (b) investigate whether there is an association between international adoption status and other positive outcomes or assets across the lifespan.

I hypothesized that those adopted by parents of the same race (i.e., same-race adoption) would show better outcomes in young adulthood than those adopted by parents of a different
race (i.e., transracial adoption). However, this hypothesis was not supported, as regression and propensity score analyses showed same-race adoptees and transracial adoptees did not differ significantly regarding full-time employment status and annual income. Though regression and propensity score analyses could not be conducted to examine differences in educational attainment, marital status, and romantic relationship quality based on international adoption status due to small sample sizes ($n < 10$), the findings in the current study are consistent with some work in childhood and adolescence that demonstrates transracial and same-race adoptees do not differ significantly in developmentally salient outcomes (Versluis-den Bieman & Verhulst, 1995). Again, the outcomes observed in childhood and adolescence for these populations are generally negative (i.e., emotional and behavioral problems). Thus, to my knowledge, this is the first study to examine the role of transracial/same-race adoption in developmentally salient outcomes of young adulthood, and one of the few studies to examine assets or positive outcomes, as opposed to negative outcomes (see Basow, Lilley, Bookwala, & McGillicuddy-DeLisi, 2008 and Lee, Yun, Yoo, & Nelson, 2010 for exceptions). In addition, the current study provides further support for the argument that differences observed between transracial and same-race adoptees are further qualified by gender (Lee, 2003), as gender was significantly associated with both employment and annual income. The findings of the current study also extend to this argument by identifying an additional factor for consideration: depression. Given that depression, in addition to gender, was significantly associated with reports of annual income, future research should continue investigating the role of depression in the outcomes of transracial and same-race adoptees. The association between depression and young adult outcomes may be linked to the racial/ethnic discrimination faced by many transracially adopted individuals (Lee, 2003). Indeed, there is work demonstrating the link
between racial/ethnic discrimination and depression (e.g., Becker & Grilo, 2007; Cassidy, O’Connor, Howe, & Warden, 2004), as well as large scale studies demonstrating transracially adopted adolescents and young adults show similar rates of suicidal attempts and psychiatric care as Asian and Latin American immigrants (Hjern, Lindblad, & Vinnerlijung, 2002). Thus, future research should consider the interplay of depression and racial/ethnic discrimination when examining the outcomes of transracially adopted individuals.

Finally, I explored whether those adopted by kin differed from those adopted by non-relatives. However, only one statistically significant difference emerged. Specifically, regression analyses suggested those adopted by kin were more likely than those adopted by non-relatives to be employed full-time. In contrast, propensity score analyses did not reveal differences in full-time employment status between kinship and non-relative adoptees. Given that propensity score analyses offer a more conservative test for the impact of kin/non-relative adoption, they can be interpreted as more reliable. In addition, given the exploratory nature of the analyses examining differences for kin and non-relative adoptees, it is important to interpret the significant regression finding with caution, as no specific hypothesis was tested. Furthermore, in light of the large number of analyses conducted in the current study (i.e., 71), it is possible that this finding is due to type I error. Therefore, additional research is needed to replicate that kin adoptees are more likely than those adopted by non-relatives to be employed full-time. In general, more research is needed to better understand the role of kin versus non-kin adoption in young adult outcomes. The current study can directly inform future studies examining the young adult outcomes of kin and non-kin adoptees, as this work suggests it is important to include gender and depression in analytical models, as both were associated with outcomes of interest.

**Theoretical Considerations and Practical Implications**
Understanding the long-term impact of adoption status is a necessary step for creating a comprehensive theoretical model for the development of adoptees. The current study identifies several relevant confounds that are important for researchers to consider when investigating adoptees’ young adult outcomes. Based on the findings of the current study, future models examining adoptee outcomes (as compared to biologically-reared counterparts) should account for depression during adolescence. Depression during adolescence was significantly associated with several outcomes in young adulthood, including educational attainment, full-time employment status, annual income, and quality of romantic relationships. In other words, theoretical models aiming to explain adoptee outcomes will likely need to consider individual differences in depression. These findings are consistent with work demonstrating differences in depression for adoptees and their biologically-reared counterparts during childhood and adolescence (e.g., Fan et al., 2002; Juffer & van IJzendoorn, 2005; Miller et al., 2000b; Wierzbicki, 1993). Depression was also significantly associated with annual income when examining differences based on all adoption-related experiences (i.e., age at adoption, foster care experience, international adoption status, transracial adoption status, and kinship adoption status). Given these findings, future research is needed to investigate predictors of depression for adoptees. Additional work is also needed to determine whether depression serves as a potential mechanism for explaining differences in adoptee outcomes, as compared to their biologically-reared counterparts. In addition, the associations observed between depression and young adult outcomes of adoptees are also relevant for clinicians working with this population. Research indicates that adoptees are more likely than their biologically-reared counterparts to seek counseling (Borders, Penny, & Portnoy, 2000). When they do seek counseling, they often discuss feelings of loss and grief associated with their adoption (see Corder, 2012 for review), which
may contribute to their levels of depression. As such, adoptees report that therapists’ competence in discussing adoption-related issues is the most important factor when selecting a therapist (Baden et al., 2017). Similarly, they report more satisfaction with their therapy experience when the therapist places an emphasis on adoption (Baden et al., 2017). Therefore, clinicians should frequently assess adopted clients for depression levels, how their depression may be related to their adoptive identity, and discuss how depression may be impacting their educational, employment, and romantic lives.

Future theoretical models should also account for gender differences. Gender consistently demonstrated significant associations with educational attainment, full-time employment, and annual income when comparing outcomes of adoptees and biologically-reared individuals. Moreover, gender remained significantly associated with full-time employment and annual income when examining differences based on all adoption-related experiences (i.e., age at adoption, foster care experience, international adoption status, transracial adoption status, and kinship adoption status). These findings are in line with previous research demonstrating gender differences in educational attainment, employment, and income in the general population (NCES, 2015). Given the importance of gender, future research should strive to include both males and females in samples in order to better understand and compare the outcomes of male and female adoptees. This work could directly inform intervention and prevention efforts for adoptees by identifying who should be targeted for programming.

The current study suggests the need to tailor intervention and prevention efforts for adoptees. Specifically, the current study highlights the need for supporting adoptees’ educational attainment. Results showed (across two analytical techniques) that adoptees demonstrated lower levels of educational attainment than their biologically-reared counterparts. Efforts designed to
support adoptees’ educational attainment should also incorporate elements to address the relevant covariates of educational attainment identified in this study. For instance, programs designed to improve adoptees’ educational attainment should target adoptees with mother’s who have low levels of educational attainment, as these children demonstrate worse educational outcomes. Moreover, the prevention/intervention program would likely bolster adoptee educational outcomes if it includes elements to reduce depression, externalizing behaviors, and substance use, as these indicators were significantly inversely associated with educational attainment. For instance, existing family-focused interventions designed to reduce behavior problems, depression, and substance abuse in adolescents, such as The Adolescent Transitions Program (ATP; Connell & Dishion, 2008), could be tailored to address the needs of adoptive families. Programs like ATP already include family checkups and motivational interviewing techniques designed to trigger behavior changes, which could be tailored to discuss topics relevant to adoptive families (e.g., questions the adoptee has about their birth parents, how the adoptee and adoptive parents feel about the levels of contact with the birth family). In addition, because differences in educational attainment were not observed based on age at adoption, foster care experience, or type of adoption, prevention/intervention programs can recruit widely, as the current study indicates no specific adoption-related experience is more at risk for lower levels of educational attainment. In summary, this project points to the need for educational interventions that are tailored to the specific needs of adoptees, and offers ideas for who to target for these interventions.

Limitations and Future Directions

The current study provides a novel contribution to the literature, as it suggests that, in general, adoption status is not associated with poorer long-term outcomes into young adulthood.
More specifically, adoption status was not associated with worse outcomes for the developmentally salient tasks of young adulthood, including full-time employment, annual income, marital status, and romantic relationship quality. The only exception is that adoptees report lower levels of educational attainment than their biologically-reared counterparts. Though additional research is needed to provide support for the current findings, the findings from this study suggest the field should move beyond comparisons between adoptees and biologically-reared individuals. Indeed, the use of one comparison group can artificially inflate the estimate of the impact of adoption status due to the pre-existing group differences present between adoptees and biologically-reared individuals (Cook et al., 1979). In other words, by continuously comparing adoptees to biologically-reared individuals, the literature may be exaggerating the differences between groups. Though previous researchers have questioned with whom adoptees should be compared (e.g., Finley, 1999), one way to improve upon this methodological issue is to compare adoptees to multiple comparison groups. Including more than one comparison group would improve upon this methodological limitation of the previous literature, as it would provide a more nuanced understanding of adoptees’ adjustment. Future research should strive to include multiple comparison groups for adoptees, especially comparison groups that have fewer pre-existing group differences, such as groups with similar life experiences. For example, adoptees could be compared to individuals who have also experienced a family transition or dissolution, such as individuals in the foster care system or those who experienced a parental divorce. Those in the foster care system have also been removed from their biological parents, and most adoptees in the U.S. are adopted from the foster care system (Child Welfare Information Gateway, 2014b). Thus, adoptees and foster youth share similar family dissolution and transition experiences. Similarly, individuals who have experienced a parental divorce have also undergone
a family transition, as these individuals experienced their parents separating from one another, and likely one parent has moved out of the home and/or the child has had to move. Much like adoptees, foster youth and those who have experienced a parental divorce often show worse outcomes than individuals reared by biological parents. Specifically, some evidence suggests foster youth and those who have experienced parental divorce demonstrate lower levels of educational attainment (e.g., Courtney, Piliavin, Grogan-Kaylor, & Nesmith, 2001; Fischer, 2007), lower likelihood of employment (e.g., Aro & Palosaari, 1992; Courtney et al., 2007), and worse romantic relationship outcomes (e.g., Amato, 1996; Courtney et al., 2014) than biologically-reared individuals in young adulthood. Given that foster youth and those who have experienced parental divorce share similar but unique family transitions and display poorer outcomes in young adulthood when compared to biologically-reared counterparts, they can provide an alternative test for whether adoption is a successful intervention. Comparing adoptees to foster youth and those who have experienced parental divorce will also reveal how adoptees fare in comparison to other individuals who have experienced significant family transitions. These comparisons could help identify the unique risk and protective factors associated with adoption (as compared to other family transition and dissolution experiences).

Though the current study provides a conservative test for the impact of adoption and adoption-related experiences on young adult outcomes, it is not without limitations. The current study utilized data from a large-scale, nationally representative sample of adolescents. This dataset allowed for larger sample sizes across groups and granted access to a large number of potential covariates for analyses. However, the sample in this dataset may not represent current young adult adoptees. The first wave of data collection for Add Health began in 1994-1995, when participants were on average around 16 years of age. Based on the timing of data
collection, most adoptees were adopted in the late 1970’s and early 1980’s. Given that the process of adoption and attitudes toward adoption have substantially changed since the 1970’s/1980’s, it is possible the findings from this dataset will not generalize to adoptees adopted more recently. Though adoption is continuing to become more common within families in the United States (U.S. Census Bureau, 2010), there are now fewer international adoptions and more adoptions from the foster care system (U.S. Department of Health and Human Services, 2017). Adoptions by LGBTQ parents are also more common today (Pertman & Howard, 2012). In addition to changes in trends for the type of adoption, there are changes in the family context of adoption. For example, openness in adoption (i.e., contact and communication between a child’s adoptive and birth families) is more widely accepted than it used to be, especially for domestic adoptions, and is associated with higher levels of family satisfaction (e.g., Grotevant, Reuter, van Korff, & Gonzalez, 2011). Societal attitudes toward adoption have also changed over time (Wegar, 2000), but adoptees still report stigma surrounding their adopted identity (Brodzinsky, 2011), as well as experiencing micro-aggressions by others due to their adoption status (Garber & Grotevant, 2015). Given these changes, novel and current data collection is needed to determine if the associations observed in the current study replicate for adoptees currently in young adulthood, as well as future generations of adoptees. This work will allow adoption researchers to determine if there are differences across generations of adoptees due to changes in adoption trends, acceptance of openness in adoption, and zeitgeist of the generation.

The current study sought to be liberal in its inclusion of covariates, but it is still limited by the age-range from which the covariates are drawn. Specifically, all covariates were assessed during adolescence. Given that previous research indicates adoptees demonstrate worse behavioral outcomes during childhood and early adolescence (e.g., Levy-Shiff, 2001), it is
possible the assessments during childhood and early adolescence may better predict/distinguish later outcomes in young adulthood. The current study is an important step toward identifying relevant factors for understanding adoptee outcomes, but additional research is needed to build on this work. Specifically, long-term longitudinal studies from childhood to adulthood are needed to determine whether childhood behavior problems predict outcomes in young adulthood. This work would help identify what factors are important to target for intervention. For example, if externalizing behaviors problems, but not internalizing behavior problems, in childhood predict developmental outcomes in young adulthood, this would suggest interventions for adoptees should focus on reducing externalizing behavior problems during childhood. Future longitudinal models should also test whether the strength of these associations differ across the lifespan. Specifically, future research should test whether adoption status and adoption-related experiences have stronger associations with developmentally-salient outcomes in childhood and adolescence, as compared to young adulthood and adulthood. Based on the findings of the current study, it is likely that adoption status is associated with developmental outcomes in childhood, but not young adulthood. Therefore, future research can determine when this transition occurs and what other factors from childhood may better predict adoptee outcomes in young adulthood.

The current study utilized an alternative, more conservative approach (propensity score methods) to estimate the impact of adoption status on young adult outcomes. Propensity score methods simulate the randomization present in controlled trials by matching participants on empirically-validated confounds, resulting in a less biased estimate for the impact of adoption status or adoption-related experiences. As such, propensity score methods offer a promising tool for researchers using non-experimental data. Indeed, the current study provides evidence that
regression analyses are more likely to demonstrate significant differences across groups than the propensity score methods (e.g., educational attainment, employment status, and romantic relationship quality of males, and employment state of kin/non-kin adoptees). Researchers with large datasets should utilize propensity score methods whenever possible, as it provides a more accurate estimate for the impact of adoption. However, propensity scoring methods are still subject to bias, as they cannot control for unmeasured confounds (Shadish, Cook, & Campbell, 2002). The current study was quite liberal in the inclusion of covariates (i.e., $r > .10$) and examined a large number of potential covariates across several waves of data (i.e., 11 candidate constructs were considered for inclusion). However, being liberal in the inclusion of covariates inherently reduces the sample size in propensity score analyses, as it requires complete data prior to matching procedures. For instance, due to the liberal inclusion of covariates, 12 planned analyses could not be conducted due to small sample sizes ($n < ten$). Therefore, future studies should first consider including the covariates identified in this study for each outcome of interest. In addition, future studies should explore alternative covariates to create a better understanding of adoptee outcomes. For example, when using large archival datasets to examine adoptee outcomes, researchers could test multiple subsets of covariates when matching participants. By testing competing subsets of covariates within the dataset, researchers would identify the subset of covariates that lead to optimal prediction of the dependent variable and the covariates that are most important for matching. In summary, the current study provides a more conservative test for the long-term impact of adoption and identifies several important covariates for future researchers to consider when investigating long-term outcomes of adoptees. This work directly informs future research that will help determine which covariates are most important for each
outcome of interest, as well as identifying the covariates that are consistently relevant across outcomes of interest.

Given the prevalence of null findings in the current study, additional research is needed to determine the consistency of the non-significant differences across groups. To examine these null or very small effects, future researchers should consider utilizing alternative analytical techniques. For example, future research may benefit from utilizing techniques other than null-hypothesis significance testing, such as Bayesian approaches, to determine the strength of the association present. This method can be used to examine the role of adoption status, as well as the role of adoption-related experiences, with various outcomes. Using Bayesian methods, researchers can test whether the strength of the associations is consistent with previous findings, as opposed to whether the association is different from zero. In addition, Bayesian methods can produce more reliable estimates with small samples than null hypothesis significance testing, particularly when researchers can include informative priors in the model, based on existing research or meta-analytic reviews (McNeish, 2016). Given that adoption research is prone to small sample sizes, and small effect sizes (see Palacios & Brodzinsky, 2010 for review), Bayesian techniques may be a more fruitful and accurate way to test the impact of adoption status and adoption-related experiences on developmental outcomes.

Conclusions

The current study extends the previous literature by investigating the long-term impact of adoption on developmentally salient outcomes of young adulthood (i.e., education, employment, and romantic outcomes). In addition, the current study examined whether adoption-related experiences (i.e., age of adoption, foster care experience, and type of adoption) explained within-group variability in the young adult outcomes of adoptees. These questions were answered by
comparing two analytic techniques (OLS regression and propensity score matching) to determine if matching techniques resulted in attenuated differences across groups. With the exception of educational attainment, the findings suggest adoptees do not underperform their biologically-reared counterparts in developmentally salient tasks of young adulthood. In addition, the differences observed for the educational attainment of adoptees and biologically-reared individuals was not large. Similarly, only one difference was found based adoption-related experiences, but this was not consistent across analytic techniques. In general, these findings suggest that regression and propensity score analyses are largely consistent regarding statistical significance testing. However, when inconsistencies did arise across technique, propensity score analyses were more likely to show an attenuated effect. In summary, though adoptees appear to lower levels of adjustment than their biologically-reared counterparts in childhood and adolescence, in general, this does not persist into young adulthood.

Future research is needed to determine if these findings replicate in other samples. In general, these findings suggest the impact of adoption status does not persist into young adulthood. As such, additional research is need to examine the relative impact of adoption status and adoption-related experiences over the lifespan. In addition, these findings suggest future research and theoretical models would benefit from accounting for gender and depression when modeling adoptee outcomes. Furthermore, given the few differences observed between adoptees and biologically-reared individuals, future research should utilize more than alternative comparison groups (e.g., foster alumni, children of divorce), as this will lead to a more comprehensive understanding of the role of adoption in developmentally salient outcomes.
REFERENCES


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### Table 1

*Variables of Interest and Corresponding Wave of Data Collection.*

<table>
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<th>Variables of Interest</th>
<th>Wave 1</th>
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### Table 2

**Bivariate correlations for all considered confounds and outcomes variables (N = 9850).**

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*Note: *p < .05, **p < .01.
ADOPTION AND YOUNG ADULT OUTCOMES

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Note: * p < .05. ** p < .01.
ADOPTION AND YOUNG ADULT OUTCOMES

Table 2

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Note: * p < .05. ** p < .01. ~ signifies that the correlation could not be computed because one variable is dependent on the score of the other (i.e., marital quality is computed only for those who are married).
ADOPTION AND YOUNG ADULT OUTCOMES

Table 3

*Descriptives for all Outcome Variables for Adoptees and Biologically-reared Individuals.*

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<td></td>
<td>N</td>
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<td>Educational Attainment</td>
<td>92</td>
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<td>Full-time Employment</td>
<td>341</td>
<td>182 (53.4%)</td>
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<td>Annual Income</td>
<td>307</td>
<td>32,263 (31,229)</td>
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<td>Marital Status</td>
<td>86</td>
<td>41 (47.7%)</td>
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<td>Marital Quality</td>
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<td>14.30 (3.83)</td>
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<tr>
<td>Romantic Relationship Quality</td>
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<td>13.65 (3.53)</td>
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*NOTE: N (%) reflect those who respond in the affirmative. This descriptive information reflects all individuals with complete data on the relevant variables. As such, this table reflects sample data prior to propensity score matching.*
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<th>Propensity Score Analyses</th>
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<td>$t(182) = 2.64, p = .009$</td>
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<td>$B = .17, p = .14$</td>
<td>$\chi^2 (1) = 1.93, p = .17$</td>
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<td>$\beta = -.02, p = .059$</td>
<td>$t(612) = 1.81, p = .07$</td>
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<td>$B = .35, p = .14$</td>
<td>$\chi^2 (1) = 1.14, p = .29$</td>
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<td>$\beta = -.03, p = .12$</td>
<td>$t(180) = 0.19, p = .85$</td>
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*Note.* This table reflects the results of regression and propensity score analyses comparing adoptees to biologically-reared individuals. All analyses include relevant confounds for each dependent variable (see Preliminary Analyses on page 31-32). Regression analyses include $B$ or $\beta$ for adoption status within the model. $B$ is the unstandardized beta from the logistic regression analyses, whereas $\beta$ is the standardized beta from the OLS regression. All analyses examining educational attainment control for gender, mother’s educational attainment, depression at wave three, externalizing behaviors at wave two, and substance abuse at wave three. All analyses examining full-time employment control for gender and depression at wave three. All analyses examining annual income control for gender, mother’s educational attainment, and depression at wave three. All analyses examining marital status control for current age at wave four, externalizing behavior problems at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three. All analyses examining marital/romantic relationship quality control for depression at wave three, externalizing behaviors at wave two, parent-adolescent relationship at wave one, and romantic relationship satisfaction at wave three.
ADOPTION AND YOUNG ADULT OUTCOMES

Table 5

Descriptives for all Outcome Variables for Male and Female Adoptees and Biologically-reared Individuals.

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<td>M(SD) or n (%)</td>
<td>N</td>
<td>M(SD) or n (%)</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>43</td>
<td>3.12 (.91)</td>
<td>2350</td>
<td>3.17 (86)</td>
</tr>
<tr>
<td>Employment</td>
<td>189</td>
<td>88 (46.6%)</td>
<td>3805</td>
<td>1815 (47.7%)</td>
</tr>
<tr>
<td>Income</td>
<td>161</td>
<td>26664 (26720)</td>
<td>3447</td>
<td>27739 (23715)</td>
</tr>
<tr>
<td>Marital Status</td>
<td>46</td>
<td>22 (47.8%)</td>
<td>1025</td>
<td>582 (56.8%)</td>
</tr>
<tr>
<td>Marital Quality</td>
<td>6</td>
<td>13.33 (4.84)</td>
<td>581</td>
<td>14.69 (2.63)</td>
</tr>
<tr>
<td>Romantic</td>
<td>54</td>
<td>14.28 (3.12)</td>
<td>1171</td>
<td>14.23 (2.85)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| NOTE: N (%) reflect those who respond in the affirmative. This descriptive information reflects all individuals with complete data on the relevant variables, but this table reflects sample data prior to propensity score matching.
ADOPTION AND YOUNG ADULT OUTCOMES

Table 6

Summary of All Aim 1 Regression and Propensity Score Analyses Separated by Gender.

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regression</td>
<td>Propensity Score</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td>β = -0.03, p = 0.12</td>
<td>t(84) = 0.81, p = 0.42</td>
</tr>
<tr>
<td>Full-time Employment</td>
<td>B = 0.04, p = 0.81</td>
<td>χ²(1) = 1.06, p = 0.30</td>
</tr>
<tr>
<td>Annual Income</td>
<td>β = -0.02, p = 0.15</td>
<td>t(320) = 1.52, p = 0.13</td>
</tr>
<tr>
<td>Marital Status</td>
<td>B = 0.40, p = 0.20</td>
<td>χ²(1) = 0.39, p = 0.53</td>
</tr>
<tr>
<td>Marital Quality</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Romantic Relationship Quality</td>
<td>β = 0.01, p = 0.70</td>
<td>t(106) = 0.77, p = 0.44</td>
</tr>
</tbody>
</table>

Note. This table reflects the results of regression and propensity score analyses comparing female adoptees to biologically-reared individuals and male adoptees to biologically-reared individuals. All analyses include relevant confounds for each dependent variable (see Preliminary Analyses on page 31-32). Regression analyses include B or β for adoption status within the model. B is the unstandardized beta from the logistic regression analyses, whereas β is the standardized beta from the OLS regression. All analyses examining educational attainment control for gender, mother’s educational attainment, depression at wave three, externalizing behaviors at wave two, and substance abuse at wave three. All analyses examining full-time employment control for gender and depression at wave three. All analyses examining annual income control for gender, mother’s educational attainment, and depression at wave three. All analyses examining marital status control for current age at wave four, externalizing behavior problems at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three. All analyses examining marital/romantic relationship quality control for depression at wave three, externalizing behaviors at wave two, parent-adolescent relationship at wave one, and romantic relationship satisfaction at wave three.
Table 7

Correlations between Adoption-related Experiences and Outcomes

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age at Adoption</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Foster Care Experience</td>
<td>-</td>
<td>.27**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. International Adoption</td>
<td>.11*</td>
<td>-</td>
<td>.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Transracial Adoption</td>
<td>.15*</td>
<td>.05</td>
<td>.55*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Kinship Adoption</td>
<td>.31*</td>
<td>-.17**</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Educational Attainment</td>
<td>-.23**</td>
<td>.03</td>
<td>.19**</td>
<td>.11</td>
<td>-.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Full-time Employment</td>
<td>-.04</td>
<td>-.10</td>
<td>.07</td>
<td>.03</td>
<td>.12*</td>
<td>.17**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Annual Income</td>
<td>-.05</td>
<td>-.04</td>
<td>.06</td>
<td>.08</td>
<td>-.05</td>
<td>.18**</td>
<td>.31**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Marital Status</td>
<td>-.05</td>
<td>-.05</td>
<td>-.13*</td>
<td>-.15</td>
<td>.05</td>
<td>.07</td>
<td>.02</td>
<td>.07</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Romantic Relationship Quality</td>
<td>-.12*</td>
<td>-.01</td>
<td>.09</td>
<td>.03</td>
<td>-.13*</td>
<td>.09</td>
<td>.01</td>
<td>.07</td>
<td>.16**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Marital Relationship Quality</td>
<td>-.15</td>
<td>-.004</td>
<td>.11</td>
<td>.05</td>
<td>-.24**</td>
<td>.09</td>
<td>.09</td>
<td>.13</td>
<td>C</td>
<td>1.00**</td>
<td></td>
</tr>
</tbody>
</table>

Note: * p < .05. ** p < .01; C denotes a correlation that could not be computed because at least one variable is constant within the context of the other variable.
# ADOPTION AND YOUNG ADULT OUTCOMES

Table 8

*Descriptives for Adoption-Related Experiences*

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Age at Adoption</td>
<td>241</td>
<td>61.3%</td>
</tr>
<tr>
<td>Foster Care Experience</td>
<td>137</td>
<td>31.3%</td>
</tr>
<tr>
<td>International Adoption</td>
<td>47</td>
<td>14.4%</td>
</tr>
<tr>
<td>Transracial Adoption</td>
<td>53</td>
<td>16.3%</td>
</tr>
<tr>
<td>Kinship Adoption</td>
<td>68</td>
<td>16.5%</td>
</tr>
</tbody>
</table>

*Note.* Age at adoption compares those adopted prior to twelve months of age (i.e., yes) and those adopted after twelve months of age (i.e., no). For all other adoption-related experiences, “yes” refers to those who responded in the affirmative.
## ADOPTION AND YOUNG ADULT OUTCOMES

Table 9

*Descriptives for Outcome Variables for those Adopted Prior to One Year of Age and those Adopted at One Year or older.*

<table>
<thead>
<tr>
<th></th>
<th>Adopted before One Year</th>
<th>Adopted at One Year or Later</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M (SD) / n (%)</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td>57</td>
<td>3.16 (.84)</td>
</tr>
<tr>
<td>Full-time Employment</td>
<td>198</td>
<td>113 (57.1%)</td>
</tr>
<tr>
<td>Annual Income</td>
<td>187</td>
<td>33960 (33644)</td>
</tr>
<tr>
<td>Marital Status</td>
<td>58</td>
<td>30 (51.7%)</td>
</tr>
<tr>
<td>Marital Quality</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Romantic Relationship Quality</td>
<td>61</td>
<td>14.02 (3.19)</td>
</tr>
</tbody>
</table>

*NOTE: N (%) reflect those who respond in the affirmative. This descriptive information reflects all individuals with complete data on the relevant variables, but this table reflects sample data prior to propensity score matching.*
### Table 10

**Descriptives for Outcome Variables for those with and without Foster Care Experience.**

<table>
<thead>
<tr>
<th>Outcome Variable</th>
<th>Foster Care Experience</th>
<th>No Foster Care Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational Attainment</td>
<td>30 N 3.10 (.80)</td>
<td>60 N 2.92 (.91)</td>
</tr>
<tr>
<td>Full-time Employment</td>
<td>113 N 52 (46.0%)</td>
<td>222 N 126 (56.8%)</td>
</tr>
<tr>
<td>Annual Income</td>
<td>95 N 29318 (25873)</td>
<td>205 N 33540 (33754)</td>
</tr>
<tr>
<td>Marital Status</td>
<td>27 N 13 (48.1%)</td>
<td>56 N 26 (66.7%)</td>
</tr>
<tr>
<td>Marital Quality</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Romantic Relationship Quality</td>
<td>30 N 13.73 (3.81)</td>
<td>58 N 13.48 (3.46)</td>
</tr>
</tbody>
</table>

**NOTE:** N (%) reflect those who respond in the affirmative. This descriptive information reflects all individuals with complete data on the relevant variables, but this table reflects sample data prior to propensity score matching.
### Descriptives for Outcome Variables for those Adopted Internationally and Domestically.

<table>
<thead>
<tr>
<th>Outcome Variable</th>
<th>Adopted Internationally</th>
<th>Adopted Domestically</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M (SD) / n (%)</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td>8</td>
<td>3.50 (.53)</td>
</tr>
<tr>
<td>Full-time Employment</td>
<td>32</td>
<td>20 (62.5%)</td>
</tr>
<tr>
<td>Annual Income</td>
<td>31</td>
<td>39732 (81637)</td>
</tr>
<tr>
<td>Marital Status</td>
<td>7</td>
<td>3 (42.9%)</td>
</tr>
<tr>
<td>Marital Quality</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Romantic Relationship Quality</td>
<td>9</td>
<td>14.78 (2.94)</td>
</tr>
</tbody>
</table>

**NOTE:** N (%) reflect those who respond in the affirmative. This descriptive information reflects all individuals with complete data on the relevant variables, but this table reflects sample data prior to propensity score matching.
ADDITION AND YOUNG ADULT OUTCOMES

Table 12

Descriptives for Outcome Variables for those who have Experience Transracial and Same-race Adoption.

<table>
<thead>
<tr>
<th></th>
<th>Transracial Adoption</th>
<th>Same-race Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M (SD) / n (%)</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td>10</td>
<td>2.90 (.57)</td>
</tr>
<tr>
<td>Full-time Employment</td>
<td>37</td>
<td>21 (56.8%)</td>
</tr>
<tr>
<td>Annual Income</td>
<td>41</td>
<td>38753 (32480)</td>
</tr>
<tr>
<td>Marital Status</td>
<td>8</td>
<td>1 (12.5%)</td>
</tr>
<tr>
<td>Marital Quality</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Romantic Relationship Quality</td>
<td>7</td>
<td>14.71 (3.40)</td>
</tr>
</tbody>
</table>

*NOTE: N (%) reflect those who respond in the affirmative. This descriptive information reflects all individuals with complete data on the relevant variables, but this table reflects sample data prior to propensity score matching.*
# ADOPTION AND YOUNG ADULT OUTCOMES

## Table 13

*Descriptives for Outcome Variables for those Adopted by Kin and non-relatives.*

<table>
<thead>
<tr>
<th></th>
<th>Kinship Adoption</th>
<th>Non-relative Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M (SD) / n (%)</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td>8</td>
<td>3.13 (.64)</td>
</tr>
<tr>
<td>Full-time Employment</td>
<td>46</td>
<td>32 (69.6%)</td>
</tr>
<tr>
<td>Annual Income</td>
<td>42</td>
<td>29291 (30331)</td>
</tr>
<tr>
<td>Marital Status</td>
<td>7</td>
<td>4 (57.1%)</td>
</tr>
<tr>
<td>Marital Quality</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Romantic Relationship Quality</td>
<td>8</td>
<td>12.38 (3.93)</td>
</tr>
</tbody>
</table>

*NOTE: N (%) reflect those who respond in the affirmative. This descriptive information reflects all individuals with complete data on the relevant variables, but this table reflects sample data prior to propensity score matching.*
Table 14

Results of Regression and Propensity Score Analyses for Aim 2.

<table>
<thead>
<tr>
<th></th>
<th>Educational Attainment</th>
<th>Full-time Employment</th>
<th>Annual Income</th>
<th>Marital Status</th>
<th>Romantic Relationship Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age at Adoption</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>$\beta = -.14, p = .25$</td>
<td>$B = .22, p = .37$</td>
<td>$\beta = -.04, p = .49$</td>
<td>$B = .28, p = .63$</td>
<td>$\beta = -.16, p = .15$</td>
</tr>
<tr>
<td>Propensity Score</td>
<td>$t(52) = 0.51, p = .61$</td>
<td>$\chi^2(1) = 0.17, p = .69$</td>
<td>$t(194) = -0.45, p = .66$</td>
<td>$\chi^2(1) = 1.39, p = .24$</td>
<td>$t(44) = 1.27, p = .21$</td>
</tr>
<tr>
<td><strong>Foster Care Experience</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>$\beta = .06, p = .57$</td>
<td>$B = .37, p = .11$</td>
<td>$\beta = -.04, p = .53$</td>
<td>$B = .42, p = .43$</td>
<td>$\beta = .02, p = .85$</td>
</tr>
<tr>
<td>Propensity Score</td>
<td>$t(58) = -0.57, p = .57$</td>
<td>$\chi^2(1) = 0.64, p = .43$</td>
<td>$t(188) = 0.28, p = .78$</td>
<td>$\chi^2(1) = 3.82, p = .051$</td>
<td>$t(58) = 0.07, p = .94$</td>
</tr>
<tr>
<td><strong>International vs. Domestic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>n/a</td>
<td>$B = .25, p = .54$</td>
<td>$\beta = -.07, p = .29$</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Propensity Score</td>
<td>n/a</td>
<td>$\chi^2(1) = 0.06, p = .84$</td>
<td>$t(80) = 1.07, p = .29$</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Transracial vs. Same-race</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>n/a</td>
<td>$B = .69, p = .30$</td>
<td>$\beta = -.07, p = .50$</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
# ADOPTION AND YOUNG ADULT OUTCOMES

<table>
<thead>
<tr>
<th>Propensity Score</th>
<th>( \chi^2 ) (1) = 1.51, ( p = .22 )</th>
<th>( t ) (22) = 0.53, ( p = .60 )</th>
<th>n/a</th>
<th>n/a</th>
</tr>
</thead>
</table>

**Kinship vs. Non-relative**

<table>
<thead>
<tr>
<th>Regression</th>
<th>B = -.70, ( p = .04 )</th>
<th>( \beta = -.05, p = .40 )</th>
<th>n/a</th>
<th>n/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propensity Score</td>
<td>( \chi^2 ) (1) = 0.20, ( p = .66 )</td>
<td>( t ) (82) = 0.74, ( p = .46 )</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*Note.* This table reflects the results of regression and propensity score analyses for within-group comparisons of adoptee outcomes. All analyses include relevant confounds for each dependent variable (see Preliminary Analyses on page 31-32). B is the unstandardized beta from the logistic regression analyses, whereas \( \beta \) is the standardized beta from the OLS regression. All analyses examining educational attainment control for gender, mother’s educational attainment, depression at wave three, externalizing behaviors at wave two, and substance abuse at wave three. All analyses examining full-time employment control for gender and depression at wave three. All analyses examining annual income control for gender, mother’s educational attainment, and depression at wave three. All analyses examining marital status control for current age at wave four, externalizing behavior problems at wave three, substance abuse at wave three, and romantic relationship satisfaction at wave three. All analyses examining marital/romantic relationship quality control for depression at wave three, externalizing behaviors at wave two, parent-adolescent relationship at wave one, and romantic relationship satisfaction at wave three.
Table 15

Summary of Statistical Significance of Aim 1 and 2 Analyses.

<table>
<thead>
<tr>
<th></th>
<th>Aim 1</th>
<th>Aim 1: Females</th>
<th>Aim 1: Males</th>
<th>Aim 2: Age at Adoption</th>
<th>Aim 2: Foster Care</th>
<th>Aim 2: International Adoption</th>
<th>Aim 2: Transracial Adoption</th>
<th>Aim 2: Kinship Care</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Educational Attainment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
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<td>✗</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Propensity Score methods</td>
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<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
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<td><strong>Employment Status</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
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<td>✗</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Propensity Score methods</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Annual Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Propensity Score methods</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
ADOPTION AND YOUNG ADULT OUTCOMES

<table>
<thead>
<tr>
<th></th>
<th>Propensity Score methods</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>n/a</th>
<th>n/a</th>
<th>n/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td></td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Propensity Score methods</td>
<td></td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td></td>
<td>X</td>
<td>X</td>
<td>✓</td>
<td>X</td>
<td>X</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Propensity Score methods</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*Note:* Check marks indicate statistically significant differences across groups. X’s indicate non-significant differences across groups. N/A indicates when an analysis could not be conducted.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 1

*Propensity Score Analyses for Young Adult Outcomes of Adoptees and Biologically-reared Individuals.*

**Propensity Score Matching:**
- Age
- Gender
- Ethnicity
- Mother’s Education
- Maltreatment
- Depression
- Externalizing Behaviors
- Substance use
- Parent-child Relationships
- Peer Relationships
- Romantic Relationships

---

**Outcomes:**
- Educational Attainment
- Employment
- Income
- Marital Status
- Marital Quality
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 2

*Propensity Score Analyses for the Impact of Adoption-related Experiences on Young Adult Outcomes of Adoptees.*

Propensity Score Matching:
- Age
- Gender
- Ethnicity
- Mother’s Education
- Maltreatment
- Depression
- Externalizing Behaviors
- Substance use
- Parent-child Relationships
- Peer Relationships
- Romantic Relationships

Outcomes:
- Educational Attainment
- Employment
- Income
- Marital Status
- Marital Quality
Figure 3

_Jitter Plot for Aim 1 Educational Attainment._

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 4

*Histogram for Aim 1 Educational Attainment.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 5

*Jitter Plot for Females’ Educational Attainment.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 6

*Histogram for Females’ Educational Attainment.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 7

_Jitter Plot for Males’ Educational Attainment._

_Distribution of Propensity Scores_

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 8

*Histogram for Males’ Educational Attainment.*

Note. Controls refers to biologically-reared individuals and treated refers to adoptees.
**ADOPTION AND YOUNG ADULT OUTCOMES**

Figure 9

*Jitter Plot for Aim 1 Employment.*

![Diagram](image-url)

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPITION AND YOUNG ADULT OUTCOMES

Figure 10

*Histogram for Aim 1 Employment.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 11

*Jitter Plot for Females’ Employment.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 12

*Histogram for Females’ Employment.*

*Raw Treated*  
*Matched Treated*  
*Raw Control*  
*Matched Control*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 13

Jitter Plot for Males’ Employment.

Distribution of Propensity Scores

Unmatched Treatment Units

Matched Treatment Units

Matched Control Units

Unmatched Control Units

Propensity Score

Note. Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 14

_Histogram for Males’ Employment._

![Histograms showing employment distribution for males.](image)

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 15

*Jitter Plot for Aim 1 Income.*

*Distribution of Propensity Scores*

Unmatched Treatment Units

Matched Treatment Units

Matched Control Units

Unmatched Control Units

Note. Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 16

Histogram for Aim 1 Income.

Note. Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 17

Jitter Plot for Females’ Income.

Distribution of Propensity Scores

Unmatched Treatment Units

Matched Treatment Units

Matched Control Units

Unmatched Control Units

Propensity Score

Note. Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 18

*Histogram for Females’ Income.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 19

*Jitter Plot for Males’ Income.*

*Distribution of Propensity Scores*

*Propensity Score*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 20

*Histogram for Males’ Income.*

![Histograms for Males’ Income](image)

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 21

*Jitter Plot for Aim 1 Marital Status.*

Distribution of Propensity Scores

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 22

Histogram for Aim 1 Marital Status.

Note. Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 23

*Jitter Plot for Females’ Marital Status.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 24

*Histogram for Females’ Marital Status.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPITION AND YOUNG ADULT OUTCOMES

Figure 25

*Jitter Plot for Males’ Marital Status.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 26

*Histogram for Males’ Marital Status.*

Note. Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 27

Jitter Plot for Aim 1 Romantic Relationship Quality.

Distribution of Propensity Scores

Note. Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 28

*Histogram for Aim 1 Romantic Relationship Quality.*

![Histograms showing the distribution of propensities scores for different groups.](image)

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 29

_Jitter Plot for Females’ Romantic Relationship Quality._

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
Figure 30

*Histogram for Females’ Romantic Relationship Quality.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 31

*Jitter Plot for Males’ Romantic Relationship Quality.*

*Distribution of Propensity Scores*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 32

*Histogram for Males’ Romantic Relationship Quality.*

*Note.* Controls refers to biologically-reared individuals and treated refers to adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 33

_Jitter Plot for Education Based on Age at Adoption._

*Note.* Controls refers to those adopted prior to one year of age and treated refers to those adopted after one year of age.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 34

Histogram for Education Based on Age at Adoption.

*Note.* Controls refers to those adopted prior to one year of age and treated refers to those adopted after one year of age.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 35

*Jitter Plot for Employment Based on Age at Adoption.*

**Distribution of Propensity Scores**

*Unmatched Treatment Units*

*Matched Treatment Units*

*Matched Control Units*

*Unmatched Control Units*

**Propensity Score**

*Note.* Controls refers to those adopted prior to one year of age and treated refers to those adopted after one year of age.
Figure 36

*Histogram for Employment Based on Age at Adoption.*

*Note.* Controls refers to those adopted prior to one year of age and treated refers to those adopted after one year of age.
ADOPITION AND YOUNG ADULT OUTCOMES

Figure 37

*Jitter Plot for Income Based on Age at Adoption.*

*Note.* Controls refers to those adopted prior to one year of age and treated refers to those adopted after one year of age.
Figure 38

Histogram for Income Based on Age at Adoption.

Note. Controls refers to those adopted prior to one year of age and treated refers to those adopted after one year of age.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 39

*Jitter Plot for Marital Status Based on Age at Adoption.*

*Note.* Controls refers to those adopted prior to one year of age and treated refers to those adopted after one year of age.
Figure 40

Histogram for Marital Status Based on Age at Adoption.

Note. Controls refers to those adopted prior to one year of age and treated refers to those adopted after one year of age.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 41

Jitter Plot for Romantic Relationship Quality Based on Age at Adoption.

Distribution of Propensity Scores

Unmatched Treatment Units

Matched Treatment Units

Matched Control Units

Unmatched Control Units

Propensity Score

Note. Controls refers to those adopted prior to one year of age and treated refers to those adopted after one year of age.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 42

*Histogram for Romantic Relationship Quality Based on Age at Adoption.*

Note. Controls refers to those adopted prior to one year of age and treated refers to those adopted after one year of age.
Jitter Plot for Educational Attainment Based on Foster Care Experience.

Note. Controls refers to those adopted without foster care experience and treated refers to those adopted with foster care experience.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 44

*Histogram for Educational Attainment Based on Foster Care Experience.*

*Note.* Controls refers to those adopted without foster care experience and treated refers to those adopted with foster care experience.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 45

*Jitter Plot for Employment Based on Foster Care Experience.*

*Note.* Controls refers to those adopted without foster care experience and treated refers to those adopted with foster care experience.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 46

*Histogram for Employment Based on Foster Care Experience.*

![Histograms showing employment distribution based on foster care experience.](image)

*Note.* Controls refers to those adopted without foster care experience and treated refers to those adopted with foster care experience.
Figure 47

*Jitter Plot for Income Based on Foster Care Experience.*

*Note.* Controls refers to those adopted without foster care experience and treated refers to those adopted with foster care experience.
Figure 48

*Histogram for Income Based on Foster Care Experience.*

*Note.* Controls refers to those adopted without foster care experience and treated refers to those adopted with foster care experience.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 49

*Jitter Plot for Marital Status Based on Foster Care Experience.*

*Note.* Controls refers to those adopted without foster care experience and treated refers to those adopted with foster care experience.
ADPTION AND YOUNG ADULT OUTCOMES

Figure 50

*Histogram for Marital Status Based on Foster Care Experience.*

![Histograms showing distribution of marital status](image)

*Note.* Controls refers to those adopted without foster care experience and treated refers to those adopted with foster care experience.
Figure 51

Jitter Plot for Romantic Relationship Quality Based on Foster Care Experience.

Note. Controls refers to those adopted without foster care experience and treated refers to those adopted with foster care experience.
Figure 52

*Histogram for Romantic Relationship Quality Based on Foster Care Experience.*

*Note.* Controls refers to those adopted without foster care experience and treated refers to those adopted with foster care experience.
Figure 53

*Jitter Plot for Employment Based on International and Domestic Adoption.*

*Note.* Controls refers to those adopted domestically and treated refers to those adopted internationally.
ADDITION AND YOUNG ADULT OUTCOMES

Figure 54

*Histogram for Employment Based on International and Domestic Adoption.*

*Note.* Controls refers to those adopted domestically and treated refers to those adopted internationally.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 55

*Jitter Plot for Income Based on International and Domestic Adoption.*

*Note.* Controls refers to those adopted domestically and treated refers to those adopted internationally.
Figure 56

Histogram for Income Based on International and Domestic Adoption.

Note. Controls refers to those adopted domestically and treated refers to those adopted internationally.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 57

*Jitter Plot for Employment Based on Transracial and Same-race Adoption.*

Note. Controls refers to same-race adoptees and treated refers to transracial adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 58

*Histogram for Employment Based on Transracial and Same-race Adoption.*

*Note.* Controls refers to same-race adoptees and treated refers to transracial adoptees.
Figure 59

Jitter Plot for Income Based on Transracial and Same-race Adoption.

Note. Controls refers to same-race adoptees and treated refers to transracial adoptees.
Figure 60

*Histogram for Income Based on Transracial and Same-race Adoption.*

*Note.* Controls refers to same-race adoptees and treated refers to transracial adoptees.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 61

*Jitter Plot for Employment Based on Kinship and Non-relative Adoption.*

*Note.* Controls refers to those adopted by non-relatives and treated refers to those adopted by kin.
ADOPTION AND YOUNG ADULT OUTCOMES

Figure 62

*Histogram for Employment Based on Kinship and Non-relative Adoption.*

*Note.* Controls refers to those adopted by non-relatives and treated refers to those adopted by kin.
Figure 63

*Jitter Plot for Income Based on Kinship and Non-relative Adoption.*

*Note.* Controls refers to those adopted by non-relatives and treated refers to those adopted by kin.
Figure 64

Histogram for Income Based on Kinship and Non-relative Adoption.

Note. Controls refers to those adopted by non-relatives and treated refers to those adopted by kin.
The following questions were asked of all participants:

<table>
<thead>
<tr>
<th></th>
<th>one time</th>
<th>two times</th>
<th>three to five times</th>
<th>six to ten times</th>
<th>more than ten times</th>
<th>this has never happened</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often had one of your parents or other adult care-</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>givers touched you in a sexual way, forced you to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>touch him or her in a sexual way, or forced you to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>have sexual relations?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often had your parents or other adult care-givers</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>slapped, hit, or kicked you?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following questions were asked of those who indicated adoptive or foster care experiences:

<table>
<thead>
<tr>
<th></th>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Were you ever in an adoptive or foster placement in</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>which you experienced neglect, or physical or sexual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>abuse?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did you experience neglect, or physical or sexual</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>abuse while you were in the custody of a biological</td>
<td></td>
<td></td>
</tr>
<tr>
<td>parent?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The following questions were asked of all participants:

<table>
<thead>
<tr>
<th></th>
<th>never or rarely</th>
<th>sometimes</th>
<th>a lot of the time</th>
<th>most of the time or all of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>You were bothered by things that usually don’t bother you</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You felt that you could not shake off the blues, even with help from your family and your friends</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You had trouble keeping your mind on what you were doing</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You felt depressed</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You felt sad</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You felt that you were just as good as other people</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You felt that you were too tired to do things</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You enjoyed life</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You felt that people disliked you</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
The following questions were asked of all participants:

In the past 12 months, how often did you…

<table>
<thead>
<tr>
<th>Question</th>
<th>never</th>
<th>1 or 2 times</th>
<th>3 or 4 times</th>
<th>5 or more times</th>
</tr>
</thead>
<tbody>
<tr>
<td>use or threaten to use a weapon</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>take part in a group fight</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>hurt someone badly enough they needed bandages or care from a doctor or nurse</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>carried a weapon at school</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>pulled a knife or gun on someone</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>shot or stabbed someone</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>get injured in a fight badly enough to need treated by a doctor or nurse</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>deliberately damage property</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>steal something worth less than $50</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>steal something worth more than $50</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
The following questions were asked of all participants:

<table>
<thead>
<tr>
<th>Question</th>
<th>not at all</th>
<th>very little</th>
<th>somewhat</th>
<th>quite a bit</th>
<th>very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much do you feel that your parents care about you?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>How much do you feel that people in your family understand you?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>How much do you feel that you want to leave home?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>How much do you feel that you and your family have fun?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>How much do you feel that your family pays attention to you?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>
Appendix E

Peer Relationships (wave 1 & 2)

The following questions were asked of all participants:

<table>
<thead>
<tr>
<th>Question</th>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you go to {NAME}’s house during the past seven days?</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Did you met {NAME} after school to hang out or go somewhere during the past seven days?</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Did you spend time with {NAME} during the past weekend?</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Did you talk to {NAME} about a problem during the past seven days?</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Did you talk to {NAME} on the phone during the past seven days?</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Romantic Relationship Quality (wave 2)

The following questions were asked of all participants:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Met your partner’s parents.</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You told other people that you were a couple.</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You told each other you loved each other.</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You thought of yourselves as a couple.</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
### Romantic Relationship Quality (wave 3)

The following questions were asked of all participants:

<table>
<thead>
<tr>
<th>In general, how satisfied are you with your relationship with &lt;PARTNER&gt;?</th>
<th>very satisfied</th>
<th>somewhat satisfied</th>
<th>neither dissatisfied or satisfied</th>
<th>somewhat dissatisfied</th>
<th>very dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How committed are you to your relationship with &lt;PARTNER&gt;?</th>
<th>completely committed</th>
<th>very committed</th>
<th>moderately committed</th>
<th>somewhat committed</th>
<th>not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How much do you love &lt;PARTNER&gt;?</th>
<th>a lot</th>
<th>somewhat</th>
<th>a little</th>
<th>not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How likely is it that your relationship with &lt;PARTNER&gt; will be permanent?</th>
<th>almost certain</th>
<th>a good chance</th>
<th>a 50-50 chance</th>
<th>some chance, but probably not</th>
<th>almost no chance</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>
The following questions were asked of all participants:

**What is the highest level of education that you have achieved to date?**

- 8th grade or less
- Some high school
- High school graduate
- Some vocational/technical training (after high school)
- Completed vocational/technical training (after high school)
- Some college
- Completed college (bachelor's degree)
- Some graduate school
- Completed a master's degree
- Some graduate training beyond a master's degree
- Completed a doctoral degree
- Some post baccalaureate professional education (e.g., law school, med school, nurse)
- Completed post baccalaureate professional education (e.g., law school, med school, nurse)
The following questions were asked of all participants:

<table>
<thead>
<tr>
<th>Type of relationship with partner</th>
<th>marriage</th>
<th>cohabitation</th>
<th>pregnancy</th>
<th>current dating</th>
<th>most recent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
The following data will only be used for those who indicate they are in a *marital relationship*:

### In general, how happy are you with your relationship with < PARTNER >?*

<table>
<thead>
<tr>
<th></th>
<th>very happy</th>
<th>somewhat happy</th>
<th>neither unhappy or happy</th>
<th>somewhat unhappy</th>
<th>very unhappy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

### How committed are you to your relationship with < PARTNER >?*

<table>
<thead>
<tr>
<th></th>
<th>completely committed</th>
<th>very committed</th>
<th>moderately committed</th>
<th>somewhat committed</th>
<th>not at all</th>
</tr>
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<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

### How much do you love < PARTNER >?*

<table>
<thead>
<tr>
<th></th>
<th>a lot</th>
<th>somewhat</th>
<th>a little</th>
<th>not at all</th>
</tr>
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<td>○</td>
<td>○</td>
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</table>

### How likely is it that your relationship with < PARTNER > will be permanent?*

<table>
<thead>
<tr>
<th></th>
<th>almost certain</th>
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<th>a 50-50 chance</th>
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