Causation or Selection? New Evidence Regarding the Relationship between Multiple-
Partner Fertility and Depression

THESIS

Presented in Partial Fulfillment of the Requirements for the Degree Master of Arts in the
Graduate School of The Ohio State University

By

Jake Hays

Graduate Program in Sociology

The Ohio State University

2017

Master's Examination Committee:

Dr. Kristi Williams, Advisor

Dr. Kammi Schmeer

Dr. Sarah Hayford
Copyrighted by

Jake Hays

2017
Abstract

Multiple-partner fertility (MPF), or having children with more than one partner, is an increasingly prevalent social and demographic phenomenon. This increasing prevalence is important because MPF is associated with a multitude of negative outcomes. While some evidence suggests that MPF is linked to poor mental health, it is unclear whether this association reflects differential selection into MPF. I use four waves of data from the NLSY97 to estimate the relationship between MPF and depression. I do not find evidence for causation—that parents who transition into MPF experience changes in depressive symptoms. However, I find that relative to single-partner fertility (SPF) parents, those with multiple fertility partners have higher levels of depressive symptoms. This study provides evidence of selection into MPF by differential levels of depression. Future research should continue to identify the characteristics of those who form complex families and consider the role of such factors in producing spurious associations between family structure and a range of outcomes.
Acknowledgments

I would like to thank Dr. Kristi Williams for her consistent guidance on this project and support of me as a scholar. I am excited to continue to work together.

I am also grateful to Dr. Kammi Schmeer for her mentorship throughout my graduate career. Finally, I would like to thank Dr. Sarah Hayford for her feedback on this project.
Vita

2011 ........................................................Aurora High School

2011........................................................International Baccalaureate Diploma

2015...........................................................Bachelor of Arts, Sociology, University of
Cincinnati

2016 to 2017 ...........................................Graduate Teaching Associate, Department
of Sociology, The Ohio State University

2017 to present .........................................Graduate Administrative Associate,
Department of Sociology, The Ohio State
University

Publications

Schmeer, Kammi and Jake Hays. Forthcoming. "Complex Family Formation in
Developing Countries: The Case of Multi-Partner Fertility in Nicaragua."
International Perspectives on Sexual and Reproductive Health.

Fields of Study

Major Field: Sociology
Table of Contents

Abstract ........................................................................................................................................... ii

Acknowledgments ......................................................................................................................... iii

Vita ................................................................................................................................................ iv

Table of Contents ........................................................................................................................... v

List of Tables ................................................................................................................................ vi

Chapter 1: Introduction .................................................................................................................. 1

Chapter 2: Background ................................................................................................................... 3

Chapter 3: Data and Methods ......................................................................................................... 9

Chapter 4: Results ........................................................................................................................ 17

Chapter 5: Discussion and Conclusion ......................................................................................... 21

References ..................................................................................................................................... 26

Appendix: Tables ........................................................................................................................... 30
List of Tables

Table 1. Unweighted Descriptive Statistics of the Analytic Sample and by MPF Status  31
Table 2. Hybrid (Between-Within) Model Results Predicting Depressive Symptoms. (N=7,961) 32
Table 3. Logistic Regression Results Predicting a Transition into MPF, Odds Ratios. (N=3,847) 33
Chapter 1: Introduction

Multiple-partner fertility (MPF), or having children with more than one partner, is an increasingly prevalent social and demographic phenomenon. For example, the prevalence of MPF among fathers aged 30-34 rose from 12.9 % in 1996 to 15% in 2006 (Guzzo 2014). This increasing prevalence is important because MPF is associated with a host of negative outcomes including economic instability (Cancian and Meyer 2011), decreased father-child interaction (Scott et al. 2013), child disadvantage (Bronte-Tinkew, Horowitz, and Scott 2009), and depressive symptoms (Bronte-Tinkew et al. 2009; Fomby 2016; Guzzo 2014; Turney and Carlson 2011). Because racial minorities and the socioeconomically disadvantaged disproportionately have children with multiple partners (Guzzo and Furstenberg Jr. 2007a, 2007b), the increasing prevalence of MPF may reinforce or exacerbate class differences in multiple dimensions of well-being, but only if MPF exerts a causal effect on these outcomes. Differential selection into MPF is an alternative explanation for observed patterns that has yet to be adequately tested.

In this paper, I draw on four years of data from the NLSY97, a nationally representative sample of young adults, to estimate the between- and within-associations of having children with multiple partners (MPF) and depressive symptoms in a sample of young parents (n=7,961). I find no evidence that moving from one fertility partner to multiple fertility partners is associated with a change in depressive symptoms for parents.
(the within-effect). However, I find that MPF parents have higher levels of depressive symptoms than do single-partner fertility (SPF) parents (the between-effect), and a number of background controls explain only part of the between-association of MPF and depressive symptoms. As a further test of selection, logistic regression results showed that those with higher levels of depressive symptoms were more likely to transition into MPF. These findings point toward the role of selection on unobserved factors in the relationship between MPF and depression, calling attention to who is entering this complex family form rather than its consequences.
Chapter 2: Background

A number of studies have addressed the relationship between family structure and mental health (see Umberson, Thomeer, and Williams 2013). On average, stable family structures, such as marriage, are positively related to mental health and well-being, whereas unstable family structures or transitions (e.g., divorce, dissolving a cohabiting union, and death of a spouse) are associated with worse mental health. Findings regarding the relationship between mental health and childbearing, on the other hand, are mixed. Some research finds that parents do not have better mental health than non-parents (Evenson and Simon 2005), while others note that children can have both positive and negative effects on parental mental health (Umberson, Pudrovska, and Reczek 2010). Moreover, childbearing intersects with marital status to shape positive or negative associations with mental health (Nomaguchi and Milkie 2003; Williams and Dunne-Bryant 2006). For example, Nomaguchi and Milkie (2003) find that unmarried parents have higher rates of depression than do their childless, unmarried counterparts.

Research has also investigated the direction of the relationship between family structure and mental health. Specifically, researchers are interested in understanding whether the relationship is due to causation (i.e., disadvantageous family types cause changes in mental health) or due to selection (i.e., the way that individuals sort themselves into families account for differences in mental health). For instance,
researchers tend to agree that marriage confers a number of health benefits; however, researchers also acknowledge that the healthiest individuals in a society are the most likely to marry (Goldman 2001). The distinction between causation and selection is important because it informs knowledge on how disparities in health are distributed by family type. Is family structure generating the disadvantage, or are the disadvantaged selecting into certain family types?

One form of familial instability that combines family structure and childbearing is multiple-partner fertility. By definition, MPF necessitates bearing children with at least two partners, and usually involves shifts across unions with these partners. For example, one path to MPF might encompass forming a union, bearing a child with that partner, dissolving said union, forming a union with a new partner, and bearing a child with that new partner. Several studies find associations between MPF and depression (Bronte-Tinkew et al. 2009; Guzzo 2014); however, in these studies, the authors were either establishing prevalence estimates of MPF, or the relationship between MPF and depression was not the focal point of the study. Thus, we know little about the direction of this association: is the relationship between MPF and depression causal or selective? Given the established associations between family structure and depression, and little understanding on whether this is due to causation or selection, further study on the direction of the relationship between MPF and depression is needed.

_Causation Hypothesis_

Theoretically, the life course perspective provides a framework for understanding why multiple-partner fertility may contribute to depressive symptoms. The life course
perspective recognizes (1) the timing of critical life events and (2) social networks as important factors for well-being (Elder Jr, Johnson, and Crosnoe 2003), and MPF encompasses both of these components. First, union dissolution (Kamp Dush 2013) and having children in a non-marital setting (Umberson et al. 2010) are key life events that are associated with increased depressive symptoms, and MPF parents often experience both of these events. Second, the life course perspective acknowledges the importance of personal relationships, or “linked lives” (Elder Jr et al. 2003:13), for individuals. In the case of MPF, parents’ lives are permanently linked to past partners because they share a child—these relationships may be particularly stressful due to their previous union dissolution. Taken together, the timing of critical life events and linked lives may coalesce to heighten depressive symptoms for MPF parents. I draw on a life course perspective to argue that the effects of union formations, union dissolutions, and childbearing with multiple partners culminate to produce worse mental health for MPF parents (Dorius 2012; Guzzo 2014).

Focusing explicitly on the relationship between MPF and depression, Fomby (2016) finds support for the causation hypothesis. Using a sample of mothers from the Fragile Families and Child Well-being Study (hereafter Fragile Families), Fomby (2016) finds that mothers who have children with multiple partners were more likely to have depression than mothers who had children with only one partner, controlling for previous levels of depression. While the lagged dependent variable models in Fomby’s analysis are not causal per se, they do impose temporal ordering on MPF and multiple waves of depression. This analysis, however, is limited in that it focused only on mothers and
Fragile Families data are only representative to non-married parents in large, urban areas. I extend this research by considering the between-and within-associations of MPF and depressive symptoms in a nationally representative sample of young adults.

*Selection Hypothesis*

Researchers have long considered the role of selection—wherein background factors produce a spurious relationship—in the nexus of family and health. This stream of research has addressed mortality differences in the married and unmarried, with the selection hypothesis purporting that the healthy are more likely to marry than are the unhealthy (Goldman 1993, 2001). Health behavior is one explanation for the selection of healthy individuals into marriage. Engaging in healthy behaviors is predictive of better health, and these behaviors are also traits that are desirable in a romantic partner (Fu and Goldman 1996).

If the observed relationship between MPF and depressive symptoms is selective, then there are two possible explanations. First, depressive symptoms alone might be a predictor of MPF. The one study that examined this directly found no empirical support that depressive symptoms predict MPF (Turney and Carlson 2011), but research suggests that depression predicts divorce (Wade and Pevalin 2004) and non-marital childbearing (Kessler et al. 1997). Because parents with non-marital first births are more likely to enter MPF than parents with marital first births are (Guzzo 2014), depression may predict MPF by setting individuals on a pathway toward having children with multiple partners.

Second, background factors that are individually associated with higher levels of depressive symptoms and MPF may drive the observed relationship. Depression-selective
effects in divorce and early childbearing (Amato 2000; Mollborn and Morningstar 2009), two components of the cumulative process of MPF, suggest a potentially spurious relationship between MPF and depressive symptoms. Mollborn and Morningstar (2009) find that mothers who bore children in their teen years already had higher levels of depression, and socioeconomic status, educational performance, and family structure explained this relationship. One possible background factor that may produce a spurious relationship between MPF and depression is socioeconomic status. Lower levels of socioeconomic status are independently associated with higher levels of depressive symptoms (Gupta and Huston 2009; Miech and Shanahan 2000) and MPF (Guzzo and Furstenberg Jr. 2007a, 2007b; Monte 2011), and might be producing the observed association between MPF and depressive symptoms.

Turney and Carlson (2011) find evidence for a selection effect, with background factors driving the association between MPF and depression, using data from Fragile Families. The authors’ fixed effects models (which estimate within-individual change) indicate no evidence of an association between having children with a second fertility partner and change in depression. The authors do find evidence, however, that depressed parents were more likely to later have children with a second partner than their non-depressed counterparts were. A number of background factors explained this association for mothers, and current relationship status explained this association for men. Despite this evidence of selection, the relationship between MPF and depression requires more study due to Fragile Families’ focus on disadvantaged families.

The Present Study

7
Inconclusive results on the direction (causation or selection) of the relationship between MPF and depression indicate a need for further research. In order to assess whether MPF exerts a causal effect on depressive symptoms, I estimate whether a transition into MPF is associated with changes in depressive symptoms in a sample of young parents, ranging from 19-25 years old (in 2004—the first wave) to 25-31 years old (in 2010—the last wave). Although MPF parents who have completed childbearing, on average, had their first birth by 24 (Dorius 2011; Guzzo 2014), the average age at first birth among younger (i.e., 25-32 years old) MPF parents is 19 for mothers and 21 for fathers. Research has shown that parents who have children with multiple partners at younger ages are disproportionately non-white or from disadvantaged backgrounds (Guzzo and Furstenberg Jr. 2007a, 2007b). Therefore, the sample used here will capture transitions into MPF at an age where, on average, disadvantaged MPF parents have had their first birth and plausibly will transition into MPF during this study’s duration. Drawing on this sample of young parents, I address two research questions: (1) Are transitions into MPF within individuals associated with changes in depressive symptoms? (2) Do MPF parents have higher levels of depressive symptoms than parents with one fertility partner do? For each of these questions, I control for observed background factors that may confound the relationship between MPF and depressive symptoms. As I explain below, the analysis addressing the first question also controls for unobserved time-invariant background factors.
Chapter 3: Data and Methods

Data

Data are from the National Longitudinal Study of Youth, Cohort of 1997 (NLSY97). The NLSY97 is a nationally representative panel study of approximately 9,000 adolescents at wave 1 (in 1997) when respondents were 12-18 years old. Data were collected annually from 1997 to 2011 and biennially thereafter. This dataset oversamples Black and Latino respondents (Bureau of Labor Statistics 2016). The sample and the oversample were collected through two, stratified, multistage area probability samples at the household level.

The NLSY97 data are well suited to examine the present study’s research questions, as they contain rich birth and partnership histories for both mothers and fathers. It also enables me to understand how each partner-specific birth is associated with changes in mental health. I use waves 8, 10, 12, and 14 (i.e., years 2004, 2006, 2008, and 2010)\(^1\) because mental health information was collected in these years, and all respondents were within childbearing range. Respondents ages ranged from 19 (the youngest in 2004) to 31 (the oldest in 2010).

Sample

---

\(^1\) Although analyses come from the listed years, I use two time-invariant variables (mother’s age at first birth, mother’s education) that were collected only in 1997.
Restricting the dataset to waves 8, 10, 12, and 14 left a sample of 35,936 person-years. Respondents were dropped if they were not parents (n=17,618) or if they did not have a valid dependent variable (i.e., MHI-5) score (n=6,538). Respondents who adopted out a child or had a deceased child were also dropped from the sample (n=265). Finally, respondents whose race was mixed were dropped from the sample due to small cell sizes (n=115). These deletions reduced the sample to 11,400 person-years, the sample of interest for the current study. The analytic sample for the current study is smaller because multiple imputation is not used—only respondents with a valid score for every independent variable are included in the analyses.

To arrive at the analytic sample of 7,961 person-years, the following person-years were excluded in the analysis because they were missing on one or more variables: 45 missing on MPF, 1,889 missing on income, 986 missing on mother’s education, 1,103 missing on mother’s age at first birth, 335 missing on urbanicity, and 45 missing on number of children. Note that the total number excluded (4,403) is greater than the difference between the sample of interest (n=11,400) and the analytic sample (n=7,961) because some person-years were missing on more than one variable.

Measures

**Dependent Variable:** The dependent variable for this study is depressive symptoms, which I operationalize as one’s score on the Mental Health Inventory (MHI-5). This scale measures psychological distress and well-being (Veit and Ware 1983) and is a valid predictor of depression and anxiety (Berwick et al. 1991). The MHI-5 consists

\[ \text{Results did not substantively change when these parents were included in the final models.} \]
of five questions, asking respondents how often they have felt the following ways in the past month: nervous, calm and peaceful, down and blue, happy, and depressed. Responses range from 1 (none of the time) to 4 (all of the time). I recoded responses to be unidirectional, ranging from least depressed (0) to most depressed (3), summed the scores, and gave each respondent a total score ranging from 0 to 15, with 15 indicating the highest level of depressive symptoms.

Key Independent Variable: The key independent variable for this study is multiple partner fertility (MPF). I measure MPF (dummy variable) by adding up the total number of fertility partners for each respondent; for each wave, any respondent with two or more fertility partners is considered to have MPF. One advantage of the NLSY97 in ascertaining MPF is its identification of the other parent for each child of a given respondent. This allows the number of fertility partners for a respondent (where having two or more fertility partners indicates MPF) at any time to be determined. Obtaining MPF in this way is simpler, and therefore less prone to error, than using union and childbirth histories to pinpoint the occurrence of MPF (Guzzo and Dorius 2016), which is how MPF has usually been deduced. Once a respondent entered MPF, they were unable to enter out of it.

Controls: A number of time-varying and time-invariant covariates that may confound the relationship between multiple partner fertility and depressive symptoms were included. The time-varying variables, which have between- and within- individual variation include income, age, urbanicity, and number of children. I include income as a proxy for socioeconomic status, as there are economic constraints for those who have
children with multiple partners (Cancian and Meyer 2011), and the relationship between SES and mental health is well established. I include age because older respondents have spent more time in childbearing years and depressive symptoms decline from ages 19 to 31 (the range of ages in this study) (Mirowsky and Ross 1992). Urbanicity is a dummy variable (reference is rural) denoting one’s place of residence at each wave. Number of children is included to control for differences between MPF parents (who necessarily have at least two children) and parents with one child, as well as overall differences across parents.

The time-invariant variables, for which within-individual associations cannot be estimated, include mother’s age at first birth, and mother’s education, gender, and race. Mother’s age at first birth controls for potential differences in childbearing in the family of origin; the relationship between parental age at first birth and child age at first birth is well-established (Hardy et al. 1998). Mother’s education serves as a proxy for social class of the family in which the respondent was raised. Finally, there are strong racial and gender differences in MPF and depression (Dunlop et al. 2003; Guzzo 2014; Rosenfield and Mouzon 2013). While there is reason to believe that the relationship between some of the independent variables, including MPF, and the dependent variable may differ for mothers and fathers, models stratified by gender (not shown) produced substantively similar results. Therefore, I present estimates from one, pooled sample.

Analytic Approaches

First, the present study uses a linear hybrid model (i.e., between-within models) to answer both research questions. Hybrid models capitalize on the strengths of random-
and fixed-effects models by separately estimating the between- and within-associations of the predictor variables (Allison 2009; Rabe-Hesketh and Skrondal 2012; Schunck and Perales 2017). Random effects use between and within-individual variation to estimate how a change in the independent variable is associated with a change in the dependent variable. However, random effects assume between- and within-individual variation carry the same weight, and these estimates are biased if omitted variables are correlated with observed covariates. Fixed effects improve on random effects because they avoid said potential bias by estimating only within-individual variation. They are considered rigorous estimates of change because they inherently control for all time-invariant variables. Consequentially, however, fixed effect models are unable to estimate the effects of time-invariant variables (e.g., race, gender) on the dependent variable as these are consistent within individuals overtime.

A hybrid model provides a methodological advantage over random- and fixed-effects models (the approach used by Turney and Carlson (2011)) because it separates the between- and within-associations, and estimates them both in the same model. The hybrid model also relaxes the assumption made by random effects models and still estimates the within-individual variation of time-variant variables. Of course, the hybrid model is still unable to estimate the within-associations of time-invariant variables. Finally, the hybrid models are a strong fit for this analysis because they take advantage of the longitudinal data: the coefficients can be interpreted as change over time (Allison 2009; Rabe-Hesketh and Skrondal 2012; Schunck and Perales 2017).
\[ y_{it} = \beta_1 + \beta_2 x_{2i} + \beta_3 x_{it} + \beta_4 \bar{x}_i + \epsilon_{it} \] (1)

Equation 1 was used to estimate the hybrid model. \( y_{it} \) represents the dependent variable, depressive symptoms, for individual \( i \) at time \( t \). \( \beta_1 \) represents the intercept. \( \beta_2 x_{2i} \) represents the effects of time-invariant variables (i.e., race, gender, mother’s education, mother’s age at first birth) which only have between-variation. The hybrid model’s strength comes from separating the within- and between-effects of time-varying variables (i.e., MPF, age, urbanicity, income, number of children), represented by \( \beta_3 x_{it} \) and \( \beta_4 \bar{x}_it \). The within-effect (\( \beta_3 x_{it} \)) is estimated from individual deviation, which is calculated by taking the individual’s score at each wave (person-year) and subtracting it from the individual mean. The between-effect (\( \beta_4 \bar{x}_i \)) is estimated by comparing the individual mean to the group mean for each time-varying variable. \( \epsilon_{it} \) represents the error term (Bell and Jones 2015).

The hybrid model allows me to address both research questions by examining the between- and within-associations of MPF and depressive symptoms. If a change in MPF status is associated with a change in depressive symptoms within-individuals, then evidence for causation (not proof of causality) is present. Alternately, if MPF is associated with depressive symptoms between individuals, but not within individuals (i.e., individual parents do not experience changes in depressive symptoms when they go from one fertility partner to multiple fertility partners), then evidence for selection is present. A selection effect would indicate that unobserved factors that influence both
MPF and depressive symptoms—not the MPF itself—are driving the observed differences in levels of depressive symptoms between MPF and SPF parents.

Second, as a further test of selection, I estimate a logistic regression model that predicts a transition to MPF with prior depressive symptoms as the key independent variable. I coded individuals as “transition into MPF” (dummy variable) if they were not MPF in one wave, but were MPF in the subsequent wave. The analysis controls for clustering at the individual level, and I lag other time-varying control variables so they predate the transition into MPF (the dependent variable).

Both analyses include biennial data from 2004 through 2010. Because data were collected every two years, it is unlikely that a change in MPF status—estimated by the within-effect—is particularly far away from any given data point. Therefore, the analysis is likely to estimate accurately the impact of MPF on depressive symptoms (if any).

Alternately, the hybrid model is limited in its ability to estimate the effects of duration, wherein the impact of MPF on depressive symptoms unfolds overtime. This is not a fatal concern, however, as some research suggests that the effects of family transitions on mental health are generally immediate rather than long-term (Booth and Amato 1991).

The analysis is structured as follows: Table 1 shows the unweighted descriptive statistics of the analytic sample, as well as comparisons between MPF and SPF parents. In Table 2 (the hybrid), model 1 estimates the bivariate relationship between MPF and depression score. Model 2 adds between- and within-estimations (where plausible) of sociodemographic covariates of the respondent. These covariates include age, gender, race, and urbanicity. Model 3 adds between- and within-estimations (where plausible) of
socioeconomic covariates of the respondent’s family of origin and current family. These covariates include mother’s education, mother’s age at first birth, income (natural log transformation), and number of children. In general, the confounders capture background variables that are independently related to both MPF and depression. However, potential mechanisms through which MPF may affect depression (e.g., union dissolution, relationship conflict) are not included, as these mediators would dilute the true strength of the relationship. In table 3 (logistic regression), model 1 estimates the bivariate relationship between MPF and depression score. Model 2 adds in the listed covariates from Table 2 to rule out potential confounders that may be producing a spurious relationship between MPF and depressive symptoms.
Chapter 4: Results

Descriptive Statistics

Table 1 shows the unweighted descriptive statistics of the total analytic sample (n=7,961 person-years; 3,369 clusters), as well as comparisons by MPF status. The sample, on average, scored over 4 on the MHI-5 (range: 0-15; 15 indicates highest level of depressive symptoms). A little over a fifth of the sample are MPF, and the sample is relatively racially diverse due to the oversample in the NLSY.

[Insert Table 1 about here.]

MPF and SPF parents significantly differed on a number of the covariates in the sample. Consistent with past research, MPF parents have higher levels of depressive symptoms (about half of a point) than SPF parents do. Additionally, MPF parents were older, less likely to be male and white, and were more likely to be Black than were SPF parents. Additionally, MPF parents were more likely to be from urban areas, their mothers had lower levels of education and lower ages at first birth, they had lower levels of income, and they had more children than did SPF parents.

Statistical Results

Table 2 shows the results from the hybrid models, estimating within- and between-associations with depressive symptoms. Model 1 focuses on the bivariate relationship between MPF and depressive symptoms. Even at a bivariate level, the
within-association suggests that entering into multiple-partner fertility is not associated with a change in depressive symptoms for individual. However, the between-association shows that, on average, MPF parents have .61 more depressive symptoms than SPF parents do. Taken together, these results provide evidence that selection is driving the relationship between MPF and depressive symptoms.

[Insert Table 2 about here.]

Model 2 adds the within- and between-estimates of several sociodemographic covariates. Unsurprisingly, the within-effect of the predictor of interest, MPF, remains statistically insignificant. The between-association of MPF, however, slightly decreases from .61 in Model 1 to .51 in Model 2, meaning that the included covariates explain some of the (presumably) spurious relationship between MPF and depressive symptoms.

Looking to the within-effects of the control variables, an increase in age and a change in urban to rural (or vice-versa) is not associated with changes in depressive symptoms within individuals. Among the between-effects, those who are older, from rural areas, male, and Black or Hispanic (relative to being white) are associated with lower levels of depressive symptoms.

Model 3 adds within- and between-estimates of several socioeconomic and family-level variables. The results continue to provide no evidence that a change in MPF status is associated with a change in depressive symptoms for individuals. However, the between-association of MPF shows that, controlling for all other covariates, MPF parents still have higher levels of depressive symptoms than those SPF parents do. That is, the observed controls did not fully explain the differential selection into MPF.
In terms of the controls, surprisingly, an increase in income is associated with a small increase in depressive symptoms within individuals. Similar to the between-effects in model 2, an increase in age, being rural, men, and Blacks and Hispanics (relative to Whites) had lower levels of depressive symptoms. The between-effects also indicate that those with higher levels of income and those whose mothers had more education had lower levels of depressive symptoms.

**Testing the Selection Effect**

In short, the hybrid models demonstrate that differences between individuals, rather than within individuals, drive the association between MPF and depression. As a further test of selection, Table 3 uses logistic regression to predict the likelihood of transitioning into MPF, with prior depressive symptoms as the key independent variable. If estimates indicate that those with higher levels of depressive symptoms are more likely to enter into MPF, then this would provide further evidence of selection driving the relationship between MPF and depression.

[Insert Table 3 about here.]

Model 1 of Table 3 shows the bivariate relationship between depressive symptoms and a subsequent transition to MPF. For every 1-point increase on depressive symptoms, parents in the sample are about 5% more likely to transition into MPF. Similar to the hybrid models, Model 2 adds background factors that may explain the relationship between depressive symptoms and a transition into MPF. Despite these observed controls, higher levels of depressive symptoms were still predictive of a transition to MPF. In addition, younger ages, lower income, and fewer children were each associated
with an increased likelihood of transitioning into MPF, all else equal. Blacks and Hispanics were also more likely to transition into MPF than were their white counterparts. The logistic regression results corroborate the findings from the hybrid models: differential selection into MPF accounts for the observed association between MPF and depressive symptoms.
Chapter 5: Discussion and Conclusion

The increasing prevalence of multiple-partner fertility—having children with more than one fertility partner—raises concerns about the potential consequences of this complex family structure. Previous research shows an association between MPF and depression for parents. However, whether MPF exerts a causal effect on depression, or if background factors are causing those with higher levels of depression to select into MPF, has yet to be adequately tested. Drawing on longitudinal data from the NLSY97, this study uses a sample of young parents to estimate associations of changes in depressive symptoms.

The results provide no evidence that a transition to MPF is linked to changes in depressive symptoms for individuals (the within-association). However, the descriptive statistics (table 1) indicated that there were significant differences in depressive symptoms between MPF and SPF parents. The significant between-association of MPF and depressive symptoms indicates that these group differences are a result of selection: some background factor(s) are leading those with higher levels of depressive symptoms to select into MPF. I also found that the sociodemographic and socioeconomic covariates explained only part of the between-association of MPF and depressive symptoms, meaning that other, unobserved background factors likely matter for this relationship.
The logistic regression results predicting a transition into MPF (Table 3) further substantiate this finding.

There are a few possible explanations for a selection effect between MPF and depressive symptoms. First, those with MPF have already experienced a significant life course transition: they (probably) dissolved a union with a previous partner with whom they had a child. This alone may inflate depression, and those affected by this experience (which must predate MPF) may go on to form new families. In this study, MPF is indicated by the birth of a child with a second fertility partner. Although the results suggest that a birth with a second fertility partner does not drive the observed difference in depression between MPF and SPF parents, it is possible that prior relationship processes (e.g., union dissolution) do. Alternately, an unmeasured control variable might be a particularly strong confounder for MPF and depression. For example, childhood family structure and relationship quality with parents are associated with later unmarried childbearing, union instability, and poorer well-being (Musick and Meier 2010).

Although the within-associations did not show that individuals who transition into MPF experience significant changes in depressive symptoms, this does not mean that the life course perspective is an unfit theory to study multiple-partner fertility. MPF does not appear to be a process that culminates in worsened mental health, but the path toward MPF involves a number of life course events. The results suggest that those with higher levels of depression are entering MPF disproportionately, and other research shows that depression is present before other disadvantaged family behaviors, like teenage motherhood (Mollborn and Morningstar 2009). As early childbearing is associated with
MPF (Guzzo 2014), those with higher levels of depressive symptoms may be on a path to have children with multiple partners from a young age.

Perhaps a surprising result from this study is finding little gender difference in the relationship between MPF and depressive symptoms (results not shown). Because MPF is considered “a gendered phenomenon” (Guzzo and Dorius 2016:573), past studies on MPF usually stratify tables by gender or focus solely on mothers or fathers (e.g., Bronte-Tinkew et al. 2009; Dorius 2012; Guzzo and Furstenberg Jr. 2007a, 2007b; Turney and Carlson 2011). However, stratifying tables 2 and 3 by gender does not change substantively any of the results. I therefore decided to present estimates from one, pooled sample.

Overall, the results from this study build on evidence from Turney and Carlson (2011), who directly examined the relationship between MPF and depression. Turney and Carlson found that depressed parents were more likely to select into MPF than were their non-depressed counterparts. Taken together, the estimates provided here and by Turney and Carlson (2011) suggest that the association between multiple-partner fertility and depression is due to selection.

This study comes with several limitations. First, the sample of parents has not completed their childbearing years. While a young sample is well-suited to examine transitions into MPF, many of these parents will experience MPF later in their lives, and their mental health does not contribute to the presented within-individual estimates. Second, I am unable to rule out definitively a causal relationship between MPF and depression. While the within-association indicated that changes from SPF to MPF were
not associated with a change in depressive symptoms, this analysis primarily estimates short-term effects. It is possible that the impact of MPF on depressive symptoms unfolds over time, especially if a parent continues to have children with more partners.

Despite these limitations, this article makes two important contributions to the broader literature on families and health. First, I provided new estimates on the relationship between MPF and depression. I found support for selection, meaning that those with more depressive symptoms are more likely to enter MPF—a complex family form that is associated with a host of negative outcomes. I also found that observed background factors did not explain fully this selective relationship. Second, this study provided evidence that MPF itself does not produce worse rates of mental health for those who experience it in a sample of young parents. Young parents may be particularly vulnerable to the impacts of complex family forms, as they may not have completed schooling and are enduring a number of life course transitions (Furstenberg 2000). Despite this, the results here suggest that having children with multiple partners does not contribute to depression in this population.

Future research on the topic of MPF and mental health could address why those with worse rates of mental health are selecting into these complex family structures. Following a life course perspective, research could examine mental health trajectories for those who end up in MPF and other complex family forms. However, research interested in the consequences of MPF may want to focus on outcomes other than depression. Studies have presented little evidence that MPF exerts a causal effect on mental health. Certainly, there are theoretical and empirical reasons to believe that consequences exist
for parents and children in complex family structures. In the case of multiple-partner fertility, however, depression does not appear to be one of these consequences.


Appendix: Tables
Table 1. Unweighted Descriptive Statistics of the Analytic Sample and by MPF Status

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total</th>
<th>Multiple-Partner Fertility</th>
<th>Single-Partner Fertility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean or %</td>
<td>S.D.</td>
<td>Mean or %</td>
</tr>
<tr>
<td>Depressive Symptoms ***</td>
<td>4.43</td>
<td>2.49</td>
<td>4.78</td>
</tr>
<tr>
<td>Multiple-Partner Fertility</td>
<td>21.09%</td>
<td>--</td>
<td>100%</td>
</tr>
<tr>
<td>Age ***</td>
<td>25.74</td>
<td>2.51</td>
<td>26.13</td>
</tr>
<tr>
<td>Male ***</td>
<td>38.68%</td>
<td>--</td>
<td>28.11%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black ***</td>
<td>33.12%</td>
<td>--</td>
<td>47.83%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>23.99%</td>
<td>--</td>
<td>22.69%</td>
</tr>
<tr>
<td>White ***</td>
<td>34.14%</td>
<td>--</td>
<td>29.48%</td>
</tr>
<tr>
<td>Urban *</td>
<td>77.79%</td>
<td>--</td>
<td>79.69%</td>
</tr>
<tr>
<td>Mother's Education ***</td>
<td>11.75</td>
<td>2.72</td>
<td>11.42</td>
</tr>
<tr>
<td>Mother's Age at First Birth ***</td>
<td>21.47</td>
<td>4.53</td>
<td>20.68</td>
</tr>
<tr>
<td>Income (Natural Log) ***</td>
<td>10.18</td>
<td>1.95</td>
<td>9.66</td>
</tr>
<tr>
<td>Number of Children ***</td>
<td>1.73</td>
<td>0.93</td>
<td>2.75</td>
</tr>
<tr>
<td>N (Person-Years)</td>
<td>7,961</td>
<td></td>
<td>1,679</td>
</tr>
<tr>
<td>Individuals (Clusters)</td>
<td>3,369</td>
<td></td>
<td>809</td>
</tr>
</tbody>
</table>

*** p<0.001, ** p<0.01, * p<0.05 indicate significant differences between MPF and SPF.
Table 2. Hybrid (Between-Within) Model Results Predicting Depressive Symptoms.
(N=7,961)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MPF Associations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPF (Within-Assoc.)</td>
<td>-0.051</td>
<td>0.027</td>
<td>-0.057</td>
</tr>
<tr>
<td></td>
<td>(0.107)</td>
<td>(0.115)</td>
<td>(0.127)</td>
</tr>
<tr>
<td>MPF (Between-Assoc.)</td>
<td>0.61***</td>
<td>0.51***</td>
<td>0.39**</td>
</tr>
<tr>
<td></td>
<td>(0.103)</td>
<td>(0.104)</td>
<td>(0.128)</td>
</tr>
<tr>
<td><strong>Within Associations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.023</td>
<td>-0.036*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.014)</td>
<td></td>
</tr>
<tr>
<td>Urban(a)</td>
<td>-0.13</td>
<td>-0.13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.098)</td>
<td>(0.098)</td>
<td></td>
</tr>
<tr>
<td>Income (Nat. Log)</td>
<td></td>
<td>0.035*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.017)</td>
<td></td>
</tr>
<tr>
<td>Number of Children</td>
<td></td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.064)</td>
<td></td>
</tr>
<tr>
<td><strong>Between Associations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.081***</td>
<td>-0.066**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.020)</td>
<td></td>
</tr>
<tr>
<td>Urban(a)</td>
<td>0.21*</td>
<td>0.23*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.102)</td>
<td>(0.101)</td>
<td></td>
</tr>
<tr>
<td>Income (Nat. Log)</td>
<td></td>
<td>-0.12***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.023)</td>
<td></td>
</tr>
<tr>
<td>Number of Children</td>
<td></td>
<td>0.022</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.056)</td>
<td></td>
</tr>
<tr>
<td>Male(b)</td>
<td>-0.67***</td>
<td>-0.71***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.074)</td>
<td>(0.074)</td>
<td></td>
</tr>
<tr>
<td>Race(c)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>-0.27**</td>
<td>-0.38***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.087)</td>
<td>(0.090)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.26**</td>
<td>-0.37***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.096)</td>
<td>(0.104)</td>
<td></td>
</tr>
<tr>
<td>Mother's Education</td>
<td></td>
<td>-0.030*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.015)</td>
<td></td>
</tr>
<tr>
<td>Mother's age at 1(st) Birth</td>
<td></td>
<td>0.0024</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.008)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>4.28***</td>
<td>6.65***</td>
<td>7.80***</td>
</tr>
<tr>
<td></td>
<td>(0.042)</td>
<td>(0.527)</td>
<td>(0.589)</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-17784</td>
<td>-17723</td>
<td>-17704</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>35.3</td>
<td>161</td>
<td>202</td>
</tr>
</tbody>
</table>

Notes: \(a\) ref. is Rural, \(b\) ref. is Female, \(c\) ref. is White. Standard errors in parentheses. *** \(p<0.001\), ** \(p<0.01\), * \(p<0.05\)
Table 3. Logistic Regression Results Predicting a Transition into MPF, Odds Ratios.

(N=3,847)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged MHI-5 Score</td>
<td>1.05* (0.02)</td>
<td>1.05* (0.024)</td>
</tr>
<tr>
<td>Lagged Urban(a)</td>
<td>1.04 (0.161)</td>
<td>1.04 (0.161)</td>
</tr>
<tr>
<td>Lagged Income (Nat. Log)</td>
<td>0.95* (0.025)</td>
<td>0.95* (0.025)</td>
</tr>
<tr>
<td>Lagged Number of Children</td>
<td>0.71*** (0.072)</td>
<td>0.71*** (0.072)</td>
</tr>
<tr>
<td>Male(b)</td>
<td>0.92 (0.109)</td>
<td>0.92 (0.109)</td>
</tr>
<tr>
<td>Race(c)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>2.22*** (0.107)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.45* (0.062)</td>
<td></td>
</tr>
<tr>
<td>Mother's Education</td>
<td>1.00 (0.023)</td>
<td>1.00 (0.023)</td>
</tr>
<tr>
<td>Mother's Age at First Birth</td>
<td>0.98 (0.013)</td>
<td>0.98 (0.013)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.077*** (0.01)</td>
<td>12.7** (10.520)</td>
</tr>
<tr>
<td>Clusters</td>
<td>2,168</td>
<td>2,168</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-1152</td>
<td>-1105</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>4.703</td>
<td>103</td>
</tr>
</tbody>
</table>

Notes: \(a\) ref. is Rural, \(b\) ref. is Female, \(c\) ref. is White.
Robust Standard Errors in parentheses.

*** p<0.001, ** p<0.01, *p<0.05