ABSTRACT

Title of Thesis: THE IMPACT OF NONRESIDENT FATHER INVOLVEMENT ON ADOLESCENT TO ADULT SUBSTANCE USE: A LIFECOURSE PERSPECTIVE

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The structure of the "traditional" American family has changed dramatically in recent decades. This change is concerning because existing knowledge suggests that increased involvement with the biological father serves as a protective factor against problem behavior. This study analyzed the impact of nonresident father involvement (NRFI) on substance use throughout the life course. Data from the National Longitudinal Study of Adolescent to Adult Health were analyzed to identify whether NRFI at baseline (1994-1996) was associated with substance use in adolescence (1996), young adulthood (2002-2001), and adulthood (2008). The results indicate that NRFI was not associated with marijuana or heavy alcohol use at any time point. However, the results did show that sex modified the relationship between NRFI and heavy alcohol use in adulthood. These results suggest the need for additional research to explore the impact of NRFI on marijuana and heavy alcohol use and determine how sex impacts this relationship.

THE IMPACT OF NONRESIDENT FATHER INVOLVEMENT ON ADOLESCENT TO ADULT SUBSTANCE USE: A LIFECOURSE PERSPECTIVE

By

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Chapter 1: Introduction

The framework of the "traditional" American family has changed dramatically in recent decades due to the increase in divorce rates, nonmarital birth, and incarceration (Coley & Medeiros, 2007: Miller, 2006). In 2014, nearly 21 million children in the United States lived with only one parent, and of those children, more than 17 million lived with their mother only (U.S. Census Bureau, 2015). Researchers are concerned with the disintegration of the "traditional" family because existing knowledge suggests that increased involvement with the biological father serves as a protective role against problem behavior (Coley & Medeiros, 2007).

Extant research has established an association between increased nonresident father involvement (NRFI) and reduced negative adolescent behaviors. Children who do not live with their biological father have an increased risk of poor educational outcomes and school failure (Mitchell, Booth, & King, 2009; Menning, 2006). Additionally, children who do not live with their biological father have a heightened risk of a multitude of negative behavioral problems such as drinking, engaging in sexual activity, smoking, and marijuana use (Antecol & Bedard, 2007). Ali and David (2015) found that increased NRFI was associated with reduced cigarette smoking among adolescent children and the involvement had a greater impact on the intensity and duration of cigarette smoking among female adolescent children than among male adolescent children.

In past research, the frequency of NRFI has been studied but the quality or type of NRFI is less well understood (Habib, et al., 2010). The link between nonresident fathers paying child support and adolescent substance abuse is also well established. However, it is unknown if there are other types of NRFI have greater impact and whether that impact

continues throughout one's life course (Amato, Meyers, & Emery, 2009). For example, little is known about whether there is an association between NRFI and adolescent substance use and if the impact of NRFI on substance use persists into adulthood. Also, it is unclear whether the involvement results in differential substance use in male and female adolescents.

This research fills this knowledge gap by determining if there is an association between NRFI and substance use in adolescence and into adulthood and if the relationship is modified by sex. As opposed to past research that only examines one NRFI indicator (e.g., if the nonresident father paid child support) this research expands on this literature because it uses a comprehensive NRFI index that incorporates many different types of father involvement, and applies that index to substance use throughout the life course.

Chapter 2: Specific Aims

The objectives of this research are to establish the impact of NRFI on substance abuse during adolescence and into adulthood, and to determine if NRFI results in differential substance use in males and females. This research is important because the number of Americans ages 12 years and older reporting current substance use reached a high in 2014, with over 27 million Americans reporting current illicit drug use (NSDUH, 2014). In general, substance use results in lower quality of life and increased negative outcomes (CDC, 2010; CDC 2015). Substance use also contributes to the leading cause of death among people ages 15 to 44 years old, unintentional injury, through drug overdose (CDC, 2015). Further analysis of the impact of nonresident father involvement on the development of substance use would be highly beneficial to reduce the prevalence of substance abuse among adolescents and adults. The study aims are as follows:

Study Aim 1: To measure the association between NRFI and children's substance use from adolescence into adulthood. Hypothesis: We hypothesize that increased NRFI will be associated with decreased substance use in adolescence and into adulthood.

Study Aim 2: To test whether the association between NRFI and children's substance use from adolescence to adulthood is modified by sex. Hypothesis: The association between NRFI and substance use in adolescence into adulthood will be greater for females compared to males.

Data from the National Longitudinal Study of Adolescent to Adult Health were analyzed to identify NRFI at baseline (Wave I and Wave II) and determine what impact NRFI has on adolescents (Wave II) and adults (Waves III and IV). Data will also be

analyzed to determine if sex modifies the relationship between NRFI and adolescent to adulthood substance use.

Through this analysis, our goal is to better understand how childhood experiences impact later behavioral choices using the life course model. We aim to further understand the role that NRFI has on adolescent and adult substance abuse and how male and female adolescents are differentially impacted. With this information, appropriate intervention methods can be developed and implemented to strengthen the protective factors that reduce adolescent and adult substance use.

Chapter 3: Literature Review

In 2014, the number of Americans ages 12 years and older reporting past month substance use peaked, with over 27 million Americans reporting current illicit drug use (NSDUH, 2015). The majority of the Americans reporting illicit drug use reported marijuana or hashish use (22.2 million) (NSDUH, 2015). In 2014, approximately 21.5 million Americans over the age of 12 met the criteria for past year substance use disorder (SUD) (NSDUH, 2015). Of the 21.5 million Americans with SUD, the majority reported alcohol use disorder (17 million), followed by illicit drug use disorder (7.1 million), and marijuana use disorder (4.2 million) (NSDUH, 2015). Young adults continue to be the most commonly affected age group, with approximately 5.0 percent of adolescents, 16.3 percent of young adults (ages 18-25), and 7.1 percent of adults (ages 26 and older) reporting past year SUD in 2014 (NSDUH, 2015).

Substance use is a major contributor to low quality of life and increased negative health outcomes (CDC, 2010; CDC 2015). Substance use can lead to a number of negative health and behavior consequences such as a "heightened risk of accident, substance dependence, poor psychosocial outcomes, and weakened mental health in adulthood" (Hall, 2014). Heavy drinking, or binge drinking, defined as 5 or more drinks for males or 4 or more drinks for females in two hours, is a contributing cause of alcohol use disorder (CDC, 2015).

Adolescents who used alcohol and marijuana were found to have abnormal brain development compared with adolescent peers that did not use substances (Squeglia, Jacobus, & Tapert, 2009). The adverse effects of short-term marijuana use are impaired short-term memory and motor coordination, altered judgement and in large doses

paranoia and psychosis (Volkow, et al., 2014). The adverse effects of long term marijuana use are addiction, altered brain development, poor educational outcome, cognitive impairment, diminished life satisfaction and achievement, chronic bronchitis, and increased risk of chronic psychosis (Volkow, et al., 2014).

Current research suggests that substance use is increasing among adolescent and adult Americans (NSDUH, 2014). The leading cause of death among American ages 15 to 44 years old is unintentional injury and substance abuse is a major contributor through drug overdoses (CDC, 2010; CDC 2015). Since substance use has become a great concern among adolescents and young adults alike, there is a great need to identify what factors may be protective against substance use during adolescence.

The structure of the "traditional" American family has changed dramatically in recent decades. Since the 1960s and 1970s the increase in divorce rates and nonmarital births has resulted in more children living with only one parent (Amato, Meyers, & Emery, 2009; Coley & Medeiros, 2007). In the past 40 years, the U.S. has seen a nearly 500% increase in the number of American sentenced to prisons (The Sentencing Project, 2017). In 2014, nearly 21 million children in the United States lived with only one parent, and of those children, the vast majority (greater than 17 million) lived with their mother only (U.S. Census Bureau, 2015). Thus, it is important to consider the implications of the evolution of the "traditional" family structure from a household of two parents to a household of one biological parent.

Children raised with two parents are "more likely to have a broader spectrum of competencies than those children who grow up with only one parent" and are more likely to complete school (Habib, et al., 2010; Menning, 2006). Failure to complete school is

associated with living in a household with one parent (Menning, 2006). Due to this known relationship between parental relationships serving as a protector against negative behavioral outcomes, researchers have begun to look at the types of involvement fathers that no longer live with their children have and how that type of involvement impacts the children. This is particularly important since the majority of children residing with only one parent reside with their mother (U.S. Census Bureau, 2015).

Fathers that no longer live with their children, (i.e. nonresident fathers) take on different roles than do fathers that live with their children. Jones and Mosher (2013) determined that fathers living with their children participated in their child's life more than fathers who live away from their children. Additionally, the type of NRFI differs greatly between families, with some fathers maintaining contact, responsibility and a relationship, while others provide little or no contact (Coley & Medeiros, 2007). The relationship between father involvement and child outcome must be further investigated because existing knowledge suggests that increased involvement with the biological father serves as a protective role against a multitude of negative behaviors including delinquency (Coley & Medeiros, 2007).

Previous research has found an association between increased NRFI and reduced negative adolescent behaviors (Menning, 2006; Mitchell, Booth, & King, 2009; Antecol & Bedard, 2007; Ali & David, 2015). Children who do not live with their father have an increased chance of poor educational outcomes (Antecol & Bedard, 2007). Little NRFI is related to school failure/dropout and a change in involvement from early adolescence to late adolescence is related to a higher odds of dropout (Menning, 2006). NRFI is also associated with healthier eating habits in adolescent children (Stewart & Menning, 2008).

Mitchell and colleagues found that children who do not live with their biological father have a heightened risk of a multitude of negative behavioral problems such as drinking, engaging in sexual activity, smoking, and marijuana use (Mitchell, Booth, & King, 2009). Adolescents with increased involvement with their fathers are less likely to begin smoking regularly and a change in the involvement with fathers is associated with a change in the probability of adolescent children smoking, however, father smoking status must be considered (Menning, 2006). Ali and David (2015) found that increased NRFI was associated with reduced cigarette smoking among adolescent children. Habib and colleagues (2010) found that close father adolescent relationships are associated with abstaining from alcohol use, but father alcohol use has to be considered.

Many of the studies conducted in this area of research have concluded that the impact of NRFI on substance use differs between the sex of the child (Mandara & Rogers, 2011; Jones and Mosher, 2013; Mitchell, Booth, & King, 2009; Ali & David, 2016). Nonresident fathers tend to have differential involvement with male and female adolescent children and the influence of the involvement also differs between genders (Jones and Mosher, 2013; Mitchell, Booth, & King, 2009). Mandara and Rogers (2011) found that adolescent female marijuana use was not associated with family structure but being raised with both biological parents was associated with reduced marijuana use for adolescent males. NRFI has had a greater impact on the intensity and duration of cigarette smoking among female adolescent children than male adolescent children in previous research, and this modification continued into adulthood (Ali & David, 2015).

The findings from these studies suggest the need for additional research identifying what role nonresident father's play in the development of adolescent

substance use and if this impact continues into young adulthood. This relationship needs to be considered with sex as a mediator because previous knowledge has suggested this relationship differs between sexes.

Chapter 4: Methods

I. Data Source & Study Population

This study is a secondary analysis using data collected from the National Longitudinal Study of Adolescent to Adult Health (Add Health). The Add Health study is conducted by the University of North Carolina, Carolina Population Center with funding from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, and cooperative funding from 23 additional federal agencies and foundations.

The Add Health sampling frame includes approximately 80 high schools and 52 feeder middle schools selected in the United States. The study design includes systematic sampling and stratification to ensure the sample is representative of US schools with consideration of region of the country, school size and type, ethnicity, and urbanization. In 1994 and 1995, over 90,000 students in grades 7 through 12 (approximately ages 12 through 18) were recruited for the study from these 132 schools. The 90,000 students gave written informed consent and completed an in-school questionnaire if they were interested in participating in the study. Approximately 20,745 students were selected from this sample of 90,000 to complete in-home questionnaires and interviews. This final sample includes approximately 17 students from each high school/middle school feeder system and additional participants in order to oversample specific populations.

Since the initial data collection, three additional waves of data collection occurred in 1996, 2001-2002, and 2008. In each of these additional waves of data collection, researchers attempted to follow-up with the 20,745 students from Wave I. In 1996, researchers followed-up with 14,738 students ages 13 through 18 (grades 8 through 12).

The third wave of data collection was conducted in 2001 and 2002. The Wave III sample consisted of 15,197 participants ages 18 through 26. The most recent data collection, Wave IV, took place in 2008 when researchers followed-up with approximately 15,701 participants ages 24 to 32.

II. Study Design

This study is a longitudinal cohort study using secondary data analysis of the National Longitudinal Study of Adolescent to Adult Health (Add Health) dataset. The exposure variable (NRFI) was created by a Wave I and Wave II average and the dependent variables (marijuana use and heavy alcohol use) uses data from Waves II through IV of data collection.

III. Inclusion Criteria

The inclusion criteria for this study were having a nonresident biological father, living with their biological mother, and having nonmissing information for all variables. Further, separate samples were created for each outcome variable at each wave. The marijuana use samples included people who reported not using marijuana at wave I and the heavy alcohol use samples included people who reported not engaging in heavy alcohol use at wave I. Three samples were created for the outcome variable marijuana use: wave II (n=1,416), wave III (n=1,123), and wave IV (n=1,199). Three samples were created for the outcome variable heavy alcohol use: wave II (n=1,199), wave III (n=1,119), and wave IV (n=938).

IV. Outcome Variables

The two outcome variables for the study were: any past 30 day marijuana use and any past year heavy alcohol use. Marijuana use was measured by the question: "[d]uring the past 30 days, how many times did you use marijuana?" Responses ranged from from 0 to 950 times. This variable was coded binary as 1 (reporting any marijuana use in the past 30 days) or 0 (reporting no marijuana use in past 30 days). The second outcome variable was measured by the question: "[o]ver the past 12 months, on how many days have you gotten drunk or 'very, very high' on alcohol?" Responses ranged from 1 (every day or almost every day) to 7 (never). This variable was coded binary as 1 (reporting any past year heavy alcohol use) or 0 (reporting no past year heavy alcohol use). People who had skipped either question because they had reported not using the substance in a previous question were also coded as 0.

V. Exposure Variable

NRFI was created using the scale developed by Menning and Stewart in 2008. The variable was constructed by summing and standardizing the responses to 11 indicators that assess NRFI. The indicators included:

- "How close do you feel to your [nonresident] father?" Responses ranged from 1 (not close at all) to 5 (extremely close).
- "How often have you stayed with your [nonresident] father during the past year?" Responses ranged from 0 (not at all) to 5 (more than once per week).

- Nine additional questions about if the adolescent had done specific activities with their nonresident father including: shopping, going to the movies, and working on schoolwork together. Responses limited to either 1 (yes) or 0 (no).

The level of NRFI was identified for each participant at wave I and wave II of data collection. The two measures were averaged to find a total NRFI level. A higher value for the NRFI variable indicated a higher level of NRFI.

VI. Confounders

The variables age (numerical in years), race (Caucasian, African American, Hispanic, other), easy access to drugs (yes or no), and classmate drug use (yes or no) were analyzed for potential inclusion in the final models. The resident mother variables: education (attended college or not), alcohol use (yes or no), receives welfare (yes or no), closeness to child (yes or no), and current marital status (married yes or no) were considered for inclusion into the models. The nonresident father variables: education (attended college or not) and paying child support (yes or no) were considered for inclusion in the models. In addition, the household income variable (numerical) was included from Wave I. I used a manual stepwise procedure to identify which variables should be included in the final model. The final model included the confounding variables: sex, age, income, race, if the nonresident father paid child support, if the resident mother was college educated, and if the resident mother received welfare.

VII. Data Analysis

All analytic procedures were performed using SAS 9.2 (SAS Institute, Inc.). We applied Add Health sampling weights to each model to account for the complex sample design. Domain statements were used since the models were applied to only a subset of the entire Add Health sample (see Methods – III. Inclusion Criteria). All analyses were modeled using logistical regression for survey data. The following models were analyzed:

- *Model 1*: NRFI (Wave I/II average) + Confounders = Marijuana Use (Wave II)
- *Model 2*: NRFI (Wave I/II average) + Confounders = Marijuana Use (Wave III)
- *Model 3*: NRFI (Wave I/II average) + Confounders = Marijuana Use (Wave IV)
- *Model 4*: NRFI (Wave I/II average) + Confounders = Heavy Alcohol Use (Wave II)
- *Model 5*: NRFI (Wave I/II average) + Confounders = Heavy Alcohol Use (Wave III)
- *Model 6*: NRFI (Wave I/II average) + Confounders = Heavy Alcohol Use (Wave IV)

Each model was first analyzed unadjusted and subsequently analyzed adjusted for the confounders that were selected (see Methods – VI. Confounders). Further, each model included a sex and NRFI interaction term to identify any effect modification of the association between NRFI and each outcome by sex.

VIII. Human Subjects

The study was submitted to and approved by the University of Maryland Institutional Review Board. The study utilized secondary de-identified data and no attempt was made to link the data to individual participants.

Chapter 5: Results

I. Outcome Variable: Marijuana Use

The results for the outcome variable any past 30 day marijuana use are outlined in this section. Table 1 displays the descriptive statistics of the Wave II (adolescent) marijuana sample. The prevalence of any past 30 day marijuana use was 12% at Wave II. The wave I and wave II average NRFI was 12.5 on the NRFI index (see Methods for a description of the NRFI index).

Table 2 presents the results of the first model, which analyzes the impact of average NRFI on wave II marijuana use. The model is presented first unadjusted and then adjusted for confounders. The parameter estimate, odds ratio, 95% confidence interval, and p-value are presented for each explanatory variable included in the model. The unadjusted model shows that NRFI is not associated with wave II marijuana use at the α level of .05 (OR: .99, CI: 0.953 – 1.027). After adjusting for the confounding variables, the model shows similar results (OR: .98, CI: 0.948 – 1.022). This model was also analyzed with the NRFI and sex interaction term to assess if effect modification was present, and findings were not significant (p-value: .3382; data not shown).

Table 3 presents the results of the second model, which analyzes the impact of average NRFI on wave III marijuana use. The unadjusted model shows that NRFI is associated with wave III marijuana use at the α level of .05 (OR: 1.04, CI: 1.011 – 1.077). However, after adjusting for the confounding variables, the model shows that NRFI is not significantly associated with wave III marijuana use (OR: 1.03, CI: 0.995 – 1.064). This model was also analyzed with the NRFI and sex interaction term to assess if

effect modification was present, and the results were not significant (p-value: 0.2204; data not shown).

Table 4 presents the results of the third model, which analyzes the impact of average NRFI on wave IV marijuana use. The unadjusted model shows that NRFI is not associated with wave IV marijuana use at the α level of .05 (OR: 1.001, CI: 0.972 – 1.041). After adjusting for the confounding variables, the model shows similar results (OR: 1.03, CI: 0.995 – 1.064). This model was also analyzed with the NRFI and sex interaction term to assess if effect modification was present, and findings were not significant (p-value: 0.6454; data not shown).

Table 1: Descriptive Statistics of Adolescent (Wave II) Marijuana Sample
(N= 1,416)

Continuous Variables	Wave	Mean	Standard Deviation	Min	Max
Independent Variable					
NRFI - Average	I/II	12.4	5.4	2.5	26.5
Demographic Characteristics					
Household income (in thousands)	I	36.3	38.0	0.0	750.0
Age	I	15.4	1.7	12.0	18.0

Categorical Variables	Wave	Percentage
Dependent Variables		
Any Past 30 Day Marijuana Use	II	12%
Demographic Characteristics		
Female	I	56%
Race – Caucasian	I	67%
Race – African American	I	21%
Race – Hispanic	I	8%
Race – Other	I	4%
Nonresident Father Characteristics		
Pays child support	I	65%
Mother Characteristics		
College educated	I	39%
Received welfare	I	17%

Table 2: Wave I/II Average NRFI on Any Past 30 Day Marijuana Use
Wave 2 – Adolescents (N= 1,416)

Variables	Parameter Estimate	Odds Ratio	95% Confidence Interval	P-value
Unadjusted				
NRFI Average	-0.01	0.99	(0.953 – 1.027)	0.5779
Adjusted for Confounders				
NRFI Average	-0.02	0.98	(0.948 – 1.022)	0.4026
Sex	-0.18	0.84	(0.546 – 1.285)	0.4168
Age	-0.02	0.99	(0.857 – 1.115)	0.7367
Income	0.00	1.00	(0.996 – 1.006)	0.7324
Race – Hispanic	0.52	1.68	(0.980 – 3.153)	0.1098
Race – African American	-0.10	0.90	(0.540 – 1.506)	0.6930
Race – Other	-0.69	0.50	(0.116 – 1.512)	0.2200
Resident mother receives welfare	0.25	1.28	(0.707 – 2.320)	0.4147
Nonresident father pays child support	0.11	1.12	(0.705 – 1.775)	0.6346
Resident mother college educated	-0.01	0.99	(0.630 – 1.549)	0.9576

Table 3: Wave I/II Average NRFI on Any Past 30 Day Marijuana Use
Wave 3 – Young Adults (N= 1,123)

Variables	Parameter Estimate	Odds Ratio	95% Confidence Interval	P-value
Unadjusted				
NRFI Average	0.04	1.04	(1.011 – 1.077)	0.0090
Adjusted for Confounders				
NRFI Average	0.03	1.03	(0.995 – 1.064)	0.0952
Sex	-0.29	0.75	(0.516 – 1.081)	0.1221
Age	-0.04	0.96	(0.864 – 1.075)	0.5111
Income	0.00	1.00	(0.998 – 1.009)	0.2043
Race – Hispanic	-0.10	0.91	(0.461 – 1.786)	0.7783
Race – African American	-0.54	0.58	(0.357 – 0.946)	0.0289
Race – Other	0.18	1.20	(0.450 – 3.185)	0.7188
Resident mother receives welfare	0.16	1.17	(0.669 – 2.044)	0.5835
Nonresident father pays child support	0.25	1.29	(0.837 – 1.984)	0.2497
Resident mother college educated	-0.01	0.99	(0.675 – 1.459)	0.9702

Table 4: Wave I/II Average NRFI on Any Past 30 Day Marijuana Use
Wave IV – Adults (N= 1,199)

Variables	Parameter Estimate	Odds Ratio	95% Confidence Interval	P-value
Unadjusted				
NRFI Average	0.01	1.01	(0.972 – 1.041)	0.7401
Adjusted for Confounders				
NRFI Average	-0.01	1.03	(0.995 – 1.064)	0.8437
Sex	-0.94	0.75	(0.516 – 1.081)	<.0001
Age	-0.16	0.96	(0.864 – 1.075)	0.0070
Income	0.00	1.00	(0.998 – 1.009)	0.8436
Race – Hispanic	0.23	0.91	(0.461 – 1.786)	0.5173
Race – African American	-0.08	0.58	(0.357 – 0.946)	0.7560
Race – Other	0.56	1.20	(0.450 – 3.185)	0.2135
Resident mother receives welfare	0.10	1.17	(0.669 – 2.044)	0.7253
Nonresident father pays child support	-0.07	1.29	(0.837 – 1.984)	0.7464
Resident mother college educated	-0.32	0.99	(0.675 – 1.459)	0.1372

II. Outcome Variable: Alcohol Use

The results for the outcome variable any past year heavy alcohol use are outlined in this section. Table 5 displays the descriptive statistics of the Wave II (adolescent) alcohol sample. The prevalence of any past year heavy alcohol use was 19% at Wave II. The wave I and wave II average NRFI was 12.4 on the NRFI index.

Table 6 presents the findings of the model four: the impact of average NRFI on wave II alcohol use. The unadjusted model shows that NRFI is not associated with wave II alcohol use at the α level of .05 (OR: 1.00, CI: 0.960 – 1.036). After adjusting for the confounding variables, the model shows similar results (OR: 1.00, CI: 0.966 – 1.044). This model was also analyzed with the NRFI and sex interaction term to assess if effect modification was present, and findings were not significant (p-value: 0.6231; data not shown).

Table 7 presents the findings of the fifth model: the impact of average NRFI on wave III alcohol use. The unadjusted model shows that NRFI is associated with wave III alcohol use at the α level of .05 (OR: 1.05, CI: 1.015 – 1.081). However, after adjusting for the confounding variables, the model shows that NRFI is not significantly associated with wave III alcohol use (OR: 1.03, CI: 0.991 – 1.061). This model was also analyzed with the NRFI and sex interaction term to assess if effect modification was present, and findings were not significant (p-value: 0.0598; data not shown).

Table 8 presents the findings of the sixth model: the impact of average NRFI on wave IV alcohol use. The unadjusted model shows that NRFI is not associated with wave IV alcohol use at the α level of .05 (OR: 1.15, CI: 0.984 – 1.047). After adjusting for the confounding variables, the model shows similar results (OR: 1.00, CI: 0.966 – 1.032).

This model was also analyzed with the NRFI and sex interaction term to assess if effect modification was present and findings were significant (β: -.0776, p-value: 0.0244; data not shown). These findings suggest that effect modification was present, and the association of NRFI on wave IV alcohol use was reduced among females as compared to males.

Table 5: Descriptive Statistics of Adolescent (Wave II) Alcohol Sample
(N= 1,199)

Continuous Variables	Wave	Mean	Standard Deviation	Min	Max
Independent Variable					
NRFI - Average	I/II	12.4	5.4	2.5	26.5
Demographic Characteristics					
Age	I	15.3	1.7	12.0	18.0
Household income (in thousands)	I	34.9	37.9	0.0	750.0

Categorical Variables	Wave	Percentage
Dependent Variables		
Any Past Year Heavy Alcohol Use	II	19%
Demographic Characteristics		
Race – Caucasian	I	61%
Race – African American	I	25%
Race – Hispanic	I	10%
Race – Other	I	4%
Female	I	56%
Nonresident Father Characteristics		
Pays child support	I	63%
Mother Characteristics		
College educated	I	38%
Received welfare	I	17%

Table 6: Wave I/II NRFI on Any Past Year Heavy Alcohol Use
Wave II – Adolescents (N= 1,119)

Variables	Parameter Estimate	Odds Ratio	95% Confidence Interval	P-value
Unadjusted				
NRFI Average	-0.01	1.00	(0.960 – 1.036)	0.8934
Adjusted for Confounders				
NRFI Average	0.01	1.00	(0.966 – 1.044)	0.8391
Sex	0.23	1.27	(0.827 – 1.934)	0.2791
Age	0.06	1.06	(0.943 – 1.185)	0.3423
Income	0.00	1.00	(0.995 – 1.005)	0.9602
Race – Hispanic	0.20	1.22	(0.668 – 2.234)	0.5165
Race – African American	-0.56	0.57	(0.341 – 0.960)	0.0346
Race – Other	-2.24	0.11	(0.106 – 0.442)	0.0020
Resident mother receives welfare	0.28	1.33	(1.328 – 2.350)	0.3298
Nonresident father pays child support	-0.19	0.83	(0.825 – 1.260)	0.3734
Resident mother college educated	0.09	1.09	(1.091 – 1.674)	0.6920

Table 7: Wave I/II Average NRFI on Any Past Year Heavy Alcohol Use
Wave III – Young Adults (N= 938)

Variables	Parameter Estimate	Odds Ratio	95% Confidence Interval	P-value
Unadjusted				
NRFI Average	0.05	1.05	(1.015 – 1.081)	0.0041
Adjusted for Confounders				
NRFI Average	0.03	1.03	(0.991 – 1.061)	0.1498
Sex	-0.36	0.70	(0.485 – 1.002)	0.0515
Age	-0.01	0.99	(0.891 – 1.109)	0.9110
Income	0.01	1.01	(0.998 – 1.016)	0.1405
Race – Hispanic	0.38	1.46	(0.803 – 2.639)	0.2163
Race – African American	-0.95	0.39	(0.253 – 0.590)	<0.0001
Race – Other	0.11	0.11	(0.500 – 2.498)	0.7871
Resident mother receives welfare	-0.34	0.71	(0.400 – 1.275)	0.2549
Nonresident father pays child support	0.28	1.33	(0.895 – 1.974)	0.1584
Resident mother college educated	0.28	1.33	(0.911 – 1.932)	0.1399

Table 8: Wave I/II Average NRFI on Any Past Year Heavy Alcohol Use
Wave IV – Adults (N= 998)

Variables	Parameter Estimate	Odds Ratio	95% Confidence Interval	P-value
Unadjusted				
NRFI Average	0.02	1.15	(0.984 – 1.047)	0.346
Adjusted for Confounders				
NRFI Average	-0.01	1.00	(0.966 – 1.032)	0.9293
Sex	-0.56	0.57	(0.400 – 0.816)	0.0021
Age	-0.09	0.91	(0.818 – 1.011)	0.0803
Income	0.01	1.01	(1.001 – 1.022)	0.0381
Race – Hispanic	-0.27	0.77	(0.425 – 1.383)	0.3765
Race – African American	-0.84	0.43	(0.282 – 0.660)	0.0001
Race – Other	0.34	1.40	(1.409 – 3.849)	0.5037
Resident mother receives welfare	0.19	1.21	(1.208 – 2.088)	0.4980
Nonresident father pays child support	-0.07	0.93	(0.932 – 1.359)	0.7159
Resident mother college educated	0.39	1.47	(1.471 – 2.118)	0.0381

Chapter 6: Discussion

I. Discussion of Results

This study found that NRFI was not associated with marijuana use or heavy alcohol use in adolescence, young adulthood or adulthood (p-value <.05). When looking at the impact of NRFI on heavy alcohol use in adulthood specifically, this study found that sex was an effect modifier of the relationship. In other words, the impact of NRFI on heavy alcohol use later in life was different for males and females. These findings suggest that interventions aiming to reduce heavy alcohol use in adulthood should be designed sex specific and that interventions will have the greatest impact if they target males and females individually.

II. Impact of Results

These results suggest a strong need for research to further look at the impact of NRFI on both marijuana use and heavy alcohol use in adolescents, young adults, and adults. Although these results are not significant at most time points, they do make evident the need to investigate this research question further.

III. Strengths & Limitations

While this study contributes to our understanding of the relationship between NRFI and substance use across the life course, it is not without limitation. The regression models are limited to the variables included in the Add Health questionnaires and interviews. The NRFI variable is constrained to specific questions from the adolescent child's perspective. Therefore the nonresident father indicators cannot be assessed for

validity or reliability because the nonresident father is not interviewed during the Add Health study. We are also unable to assess some important nonresident father variables, such as if he ever lived with the child, and if so how long he lived with the child. In addition, some important confounders of the NRFI and substance use relationship may not be included due to variable availability, such as when divorce occurred in the family and if/when either parent remarried. The limited response options available for the exposure and outcome variable indicators results in restricted analysis methods. In addition, some potential confounding variables could not be considered for inclusion into the final models due to the limited sample size once the inclusion criteria were applied.

Despite these limitations, there are multiple important contributions this proposed research will make to the current knowledge. Since the Add Health study is nationally representative, it will be possible to make generalizations to the entire US population. Additionally, the longitudinal nature of the data collection allows the independent variable to be assessed well in advance of the dependent variable ensuring the temporality of the relationship. Add health includes a biological mother questionnaire. The mother can be the informant for the multiple variables included in the model increasing the reliability and validity of those measures. Also, since a separate questionnaire is administered for the adolescent, he or she was able to give an accurate account of their involvement with nonresident father and substance use. Lastly, the Add Health study includes multiple indicators associated with family characteristics that contribute to the nonresident father substance use relationship.

IV. Public Health Significance

This research contributes important information regarding factors that may contribute to increased substance use in the US population. This research is important because the number of Americans ages 12 years and older reporting current substance use reached a high in 2014, with over 27 million reporting current illicit drug use (NSDUH, 2014). In general, substance use results in lower life quality and increased negative outcomes (CDC, 2010). Substance use also contributes to the leading cause of death among people ages 15 to 44 years old, unintentional injury, through drug overdoses. Further analysis of the specific environmental factors and their effects on the development of substance use is highly beneficial to reduce the prevalence of substance use among adolescents and adults. This information allows public health officials to make educated and effective policies to reduce the burden of substance use on the US population. The results of this study prove that marijuana use land heavy alcohol use later in life may be related to adolescent NRFI and that sex must be considered as a potential effect modifier, particularly in adulthood.

Bibliography

Ali, M. M., & Dean, D. (2015). The influence of nonresident fathers on adolescent and young adult cigarette smoking. *Journal of Families, Systems, & Health*, 33, 3, 314-323.

Amato, P.R. Meyers, C. E. & Emery, R. E. (2009). Changes in nonresident father-child contact from 1976-2002. *Journal of Family Relations, 58*, 41-53.

Antecole, H. & Bedard, K. (2007). Does single parenthood increase the probability of teenage promiscuity, substance use, and crime? *Journal of Population Economics*, 20, 1, 55-71.

Centers for Disease Control and Prevention (CDC). (2010). 10 Leading Causes of Death by Age Group, United States.

Centers for Disease Control and Prevention (CDC). (2015). Alcohol and Public Health – Binge Drinking.

Coley, R. L., & Medeiros, B. L. (2007). Reciprocal longitudinal relations between nonresident father involvement and adolescent delinquency. *Child Development*, 78, 1, 132-147.

Habib, C., Santoro, J., Kremer, P., Toumbourou, J., Leslie, E., & Williams, J. (2010). The importance of family management, closeness with father and family structure in early adolescent alcohol use. *Addiction Journal*, 105, 1750-1758.

Hall, W. (2014). What has research over the past two decades revealed about the adverse health effects of recreational cannabis use? *Addiction Journal*, 110, 19-35.

Jeynes, W. H. (2015). A meta-analysis: The relationship between father involvement and student academic achievement. Urban Education, 50(4), 387-423.

Jones, J., & Mosher, W. D. (2013). Fathers' involvement with their children: United States 2006-2010. *National Health Statistics Report, 71*.

Hedden, S. L., Kennet, J., Lipari, R., Medley, G., Tice, P. Copello, E. A. P., & Kroutil, L. A. Survey on Drug Use and Health (NSDUH). (2015). Behavioral Health Trends in the United States.

Mandara, J., Rogers, S. Y., & Zinbarg, R. E. (2011). The effects of family structure on African American Adolescents' Marijuana Use. *Journal of Marriage and Family*, 73, 557-569.

Menning, C. L. (2006). Nonresident fathering and school failure. *Journal of Family Issues*, 27, 10, 1356-1382.

Menning, C. L. (2006). Nonresident fathers' involvement and adolescents' smoking. *Journal of Health and Social Behavior*, 47, 32-46.

Miller, K. A. (2006). The impact of parental incarceration on children: An emerging need for effective interventions. Child and Adolescent Social Work Journal, 23(4), 472-486.

Mitchell, K. S., Booth, A., & King, V. (2009). Adolescents with nonresident fathers: are daughters more disadvantaged than sons? *Journal of Marriage and Family*, 71, 650-662.

The Sentencing Project. (2017). Fact Sheet: Trends in U.S. Corrections. Washington, DC.

Stewart, S. D., & Menning, C. L. (2009). Family structure, nonresident father involvement, and adolescent eating patterns. *Journal of Adolescent Health*, 45, 193-201.

Squeglia, L. M., Jacobus, J., & Tapert, S. F. (2009). The influence of substance use on adolescent brain development. *Clinical EEG Neuroscience*, 40, 1, 31-38.

Volkow, N. D., Baler, R. D., Compton, W. M., & Weiss, S. R. B. Adverse effects of marijuana use. *The New England Journal of Medicine*, 370, 23, 2219-2227.

U.S. Census Bureau. (2015). Families and Living Arrangements: 2015: Children (C Table Series), Table 2.